

An aerial photograph of a winding asphalt road through a dense forest. The trees are in various stages of autumn, with some showing bright yellow and orange leaves, while others are still green. A white semi-truck is driving on the road, and a few smaller cars are visible further down. The road curves in a figure-eight pattern. A yellow rectangular box is overlaid on the top left of the image.

Navigating the shifts in supply chains

October 2023

The EY logo, consisting of the letters 'EY' in a bold, white, sans-serif font. Above the 'Y' is a yellow triangle pointing to the right.

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An aerial photograph of a blue semi-truck with a white cab and a long blue trailer, traveling on a multi-lane asphalt highway. The highway is flanked by vibrant green agricultural fields. The scene is captured from a high angle, showing the truck's position on the road and the surrounding landscape.

Shifting supply chains

In recent years, global trade and supply chains have experienced fundamental shifts in the way they function. Large-scale global events (namely, the COVID-19 pandemic and the war in Ukraine), geopolitical trade tensions (e.g., US-China), technological advancements and changing demographics have all changed how and where cargo is moved. Companies in the US trucking and broader logistics sector must recognize this confluence of external forces affecting global supply chain dynamics and take steps to anticipate industry shifts and maintain their competitiveness.

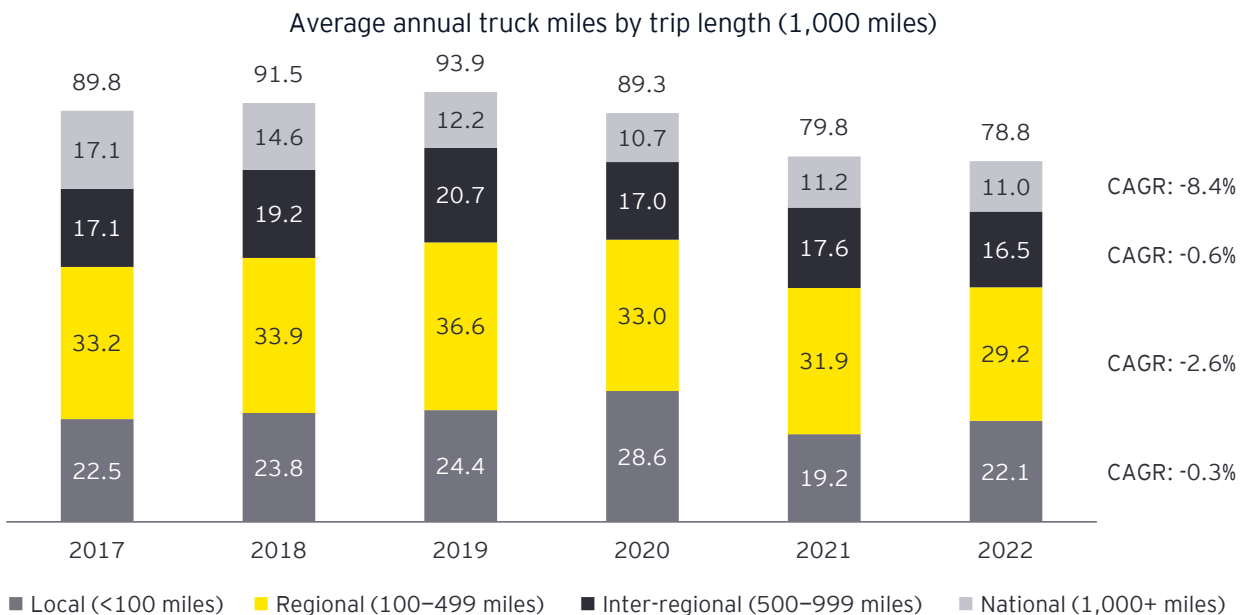


A study of the current landscape reveals four supply chain trends that are shaping the future of long-haul trucking in the United States:

- 1. Nearshoring, friendshoring and onshoring.** This trend is influencing trucking demand and routing, in large part through increased cross-border traffic with Mexico.
- 2. Shifts in inventory management.** This strategic change is leading to higher quantities of inventory being held close to population centers and greater reliance on short-haul routes.
- 3. US population shifting southward and more suburban.** These demographic trends are driving trucking demand toward the south and to the periphery of metropolitan areas.
- 4. Increased focus on sustainability.** Various pressures are pushing truckers and other carriers to reduce carbon emissions across the value chain, from product to delivery.

As a result of these emerging supply chain trends, long-haul trucking has declined in recent years. In this article, we take a closer look at these trends and explore how various trajectories could play out in three alternative scenarios for the US trucking industry in the next five years.

The overall annual truck miles have declined over the last few years with considerable drop in long-haul trucking



Note: ATRI – American Transportation Research Institute; The report encompasses survey results of 169,770 truck-tractors used by for-hire motor carriers.

Source: ATRI Operational cost of trucking – 2023 ([link](#)).

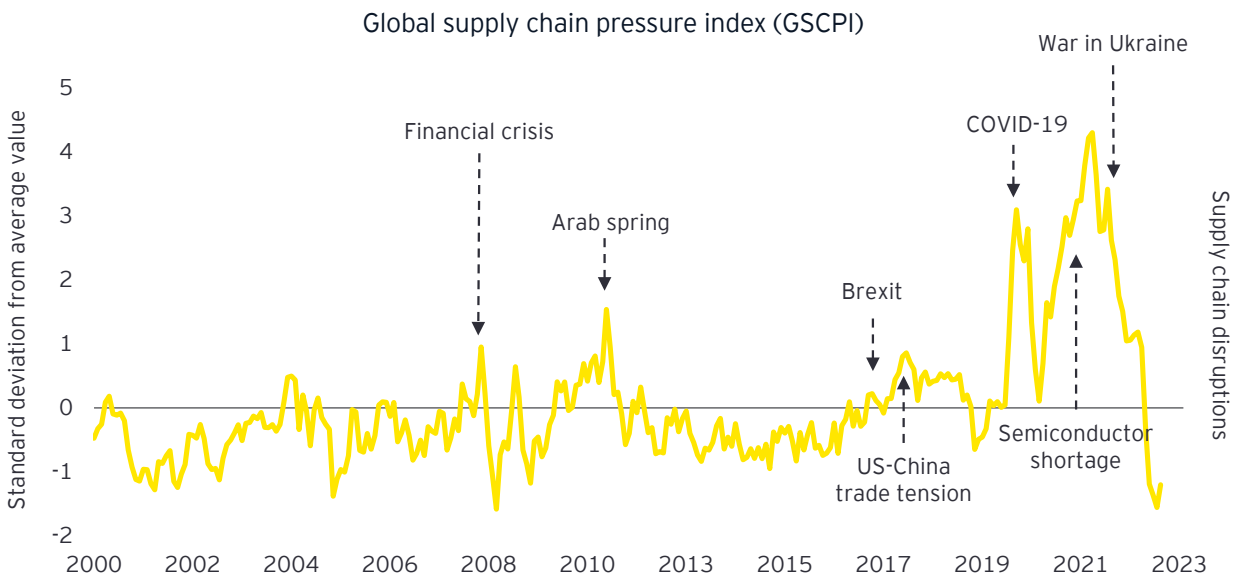
Period: 2017 – 2022

1 Nearshoring, friendshoring and onshoring

As discussed in the [EY 2023 Geostrategic Outlook](#), recent geopolitical developments have reinforced the goal of many governments to reduce their economic reliance on other countries – particularly on strategic rivals and in critical sectors. The COVID-19 pandemic; the environmental, social and governance (ESG) agenda; US-China competition; the war in Ukraine; and other geopolitical tensions have led

many governments to conclude that they need to incentivize companies to nearshore, friendshore and onshore their supply chains. The US government, for instance, has implemented an industrial strategy to foster more resilient supply chains and greater economic security, primarily through the Infrastructure Investment and Jobs Act (IIJA), the CHIPS and Science Act, and the Inflation Reduction Act (IRA).

Supply chain disruptions have become more intense and frequent since 2020



Source: Global Supply Chain Pressure Index and GlobalData.

Note: The Global Supply Chain Pressure Index (GSCPI) is a new measurement of supply chain conditions, created by the Federal Reserve Bank of New York. The GSCPI index includes 27 indicators – the Baltic Dry Index (BDI) and Harpex index, US Bureau of Labour Statistics price indices on airfreight costs for Asia-US, US-Asia, Europe-US and US-Europe (4), The other 21 components are Purchasing Managers Index (PMI) surveys for three subcomponents – delivery times, backlogs and purchased stocks – for seven economies (euro area, China Mainland, Japan, South Korea, Taiwan, U.K., U.S.). Interactive GSCPI Chart.

Period: 31 January 1998 – 30 June 2023

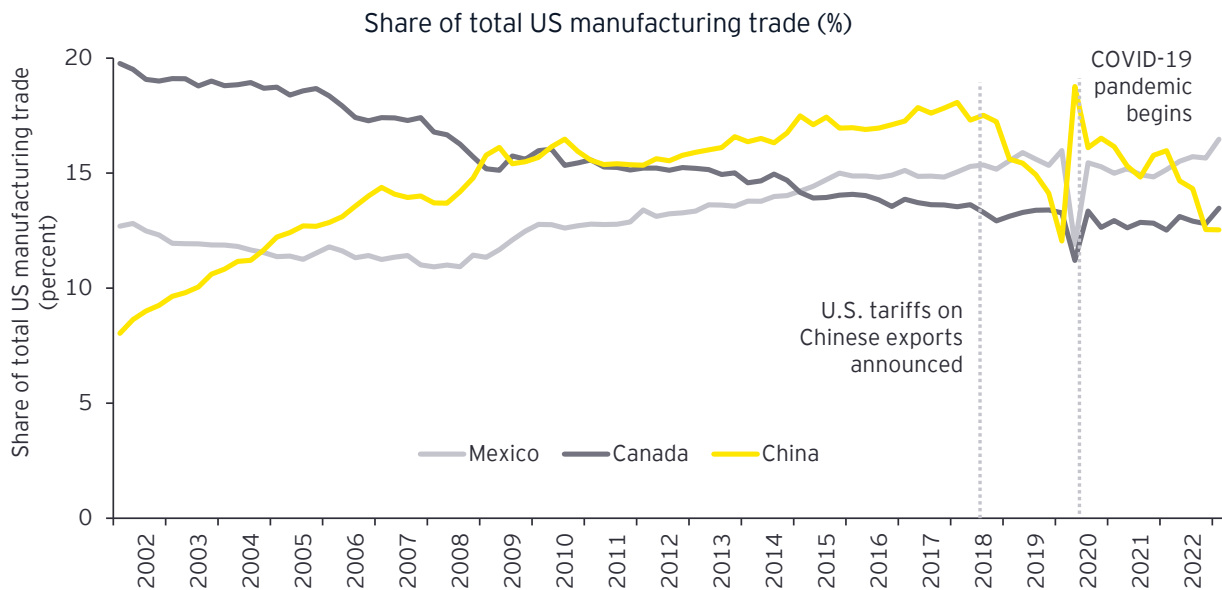
At the same time, the cost advantage availed by manufacturers in China is diminishing. China has enjoyed significant economic development in recent decades, and, as the country has prospered, its labor costs have risen. For example, Mexico's direct labor wage rates are now about 20% lower than that of China's.¹ With the increased cost of shipping, many manufacturers are making investments to move manufacturing and production centers closer to population centers in the US market. The cost of shipping a Forty-Foot-Equivalent-Unit (FEU) from Shanghai to Los Angeles has increased by ~61% (between August 2019 and August 2023).²

Consequently, companies are now re-evaluating their supply chain strategies, opting to expand their supplier base, establish multiple sourcing routes, and explore relocating operations and suppliers closer to their home markets. According to the Mexican government, more than 400 industrial, automotive and consumer goods firms are nearshoring production

facilities and suppliers, bringing them closer to the US market, with the goal of reducing complexity, easing delays and mitigating the risk of future disruptions.³

Mexico has emerged as the primary nearshoring and friendshoring location for companies serving the US market and, in the final quarter of 2021, replaced China as the primary US manufacturing trading partner.⁴ In 2022, freight value between the US and Mexico increased by 18% over the previous year, with trucks accounting for 69% of value by mode. This continues a trend of increased truck crossings into the US from Mexico since 2020, with 2022 crossings exceeding 2019 by 12.7%. Transportation and logistics companies are expanding their operations in Mexico, with the sector accounting for 15% of the total foreign direct investment (FDI) into Mexico and the US and Canada being the leading countries of origin.^{5,6}

Mexico and Canada surpassed China as the main US manufacturing trading partner



Note: Total manufacturing trade is the sum of manufacturing exports and imports.

Source: Federal Reserve of Dallas, US Census Bureau, EY Knowledge analysis.

Period: 1Q 2000 – 1Q 2023

¹ <https://www.ivemsa.com/manufacturing-in-mexico/mexico-vs-china-manufacturing>.

² <https://en.macromicro.me/charts/44756/drewry-world-container-index>.

³ <https://www.wsj.com/articles/mexicos-industrial-hubs-grow-as-part-of-trade-shift-toward-nearshoring-11675257070>.

⁴ <https://www.dallasfed.org/research/economics/2023/0711>.

⁵ <https://www.dallasfed.org/research/swe/2023/swe2303>.

⁶ <https://www.economia.gob.mx/datamexico/en/profile/industry/transportation-and-warehousing?fdiInvestmentSelector1=Total&investmentFdiTime=Year>.



The increased interest in establishing or expanding production and supplier relationships in Mexico is causing capacity challenges. For instance, some companies have faced hurdles accessing sufficient electricity and water resources for new manufacturing locations. Mexican policymakers want to alleviate such constraints – as well as potential labor shortages in certain areas – by encouraging more business investment in the southern regions of the country.

In addition, there are indications that the nearshoring and friendshoring trend is expanding to other Latin American countries. The US has free trade agreements with 10 other countries in the region – including Chile, Colombia, Costa Rica, Panama and Peru – all of which could provide new production and supplier locations to serve the US market. Some of these markets could ship freight via trucks through Mexico to the US, while others would likely use ocean carriers bound for ports throughout the US. In 2022, the Latin America and Caribbean region experienced significant growth in FDI according to the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), receiving US\$224.6 billion (~4% of the region’s GDP). This marked a 55.2% year-over-year (YoY) increase, with manufacturing (30%) being the second highest recipient sector and the US (38%) being the lead investor in the region.⁷

Within the US, the nearshoring and friendshoring of manufacturing have altered the domestic transportation map for intermodal drayage and cross-docking. The underutilized

Gulf Coast and Eastern ports are witnessing increased import traffic. In 2022, freight value of trade with Canada and Mexico rose by 42.5% for vessels. This has led to a shift in trade value from US West Coast ports toward Gulf Coast ports (+51% YoY) and East Coast ports (+27.5% YoY).⁸ The shift is driven by reduced trade with China, increasing trade with other countries in the Americas and a desire to import in closer proximity to growing manufacturing and demand centers in the Southeast (see trends 2 and 3).

Infrastructure and capacity enhancements at East Coast and Gulf Coast ports are also supporting this shift in supply chains. For instance, Savannah, Georgia, recently addressed its historic limitation by deepening its port to allow mega-ships to dock there.⁹ In addition, there are plans for dedicated trucking lanes from major ports (e.g., along I-75 in Georgia) that aim to address safety concerns and increase trucking freight traffic.

Metrics to watch as this trend evolves:

- ▶ US-China trade flows
- ▶ US-Mexico trade flows
- ▶ Volumes at West Coast vs. East Coast ports
- ▶ Truck border crossings
- ▶ US manufacturing import ratio

⁷ [https://www.cepal.org/en/pressreleases/foreign-direct-investment-latin-america-and-caribbean-rose-552-2022-reaching-historic#:~:text=In%202022%2C%20Latin%20America%20and,Caribbean%20\(ECLAC\)%20revealed%20today](https://www.cepal.org/en/pressreleases/foreign-direct-investment-latin-america-and-caribbean-rose-552-2022-reaching-historic#:~:text=In%202022%2C%20Latin%20America%20and,Caribbean%20(ECLAC)%20revealed%20today).

⁸ [Workbook: Dashboard Port by Commodity \(dot.gov\)](#).

⁹ <https://gaports.com/press-releases/port-of-savannah-marks-milestone-harbor-deepening-complete/>.

2

Shifts in inventory management

Largely triggered by supply chain disruptions through COVID-19, companies have increasingly moved from just-in-time to just-in-case supply chain strategies. Executives are prioritizing increased on-hand inventory located closer to population centers and emphasizing the importance of resilience in supply chains to mitigate the impact of future disruptions. One compelling statistic supporting this view is the manufacturing inventory-to-sales ratio (ISR) remaining

steady above pre-pandemic levels. It has been hovering near 1.5 in 2023, up from about 1.3 in 2013.

With greater inventory on hand, trucks are moving fewer containers from ports to warehouses and from warehouses to retail stores. According to Motive's Big Box Retail Index, truck visits to the top 50 retailers by volume in North America have reduced in 2023 compared to the past two years.

Supply shocks in the past two years have prompted US manufacturing firms to hold more inventory stock

Manufacturers: Inventories to Sales Ratio



Source: US Census Bureau, St. Louis Federal Reserve ([Link](#)).
Period: 1 July 2003 – 1 July 2023.

This decline in freight movement is likely to impact smaller fleets more severely compared to large fleet operators due to their higher sensitivity to operational costs and demand volatility; therefore, it remains unclear whether the trend toward higher inventories is a durable trend or a pandemic-era anomaly.

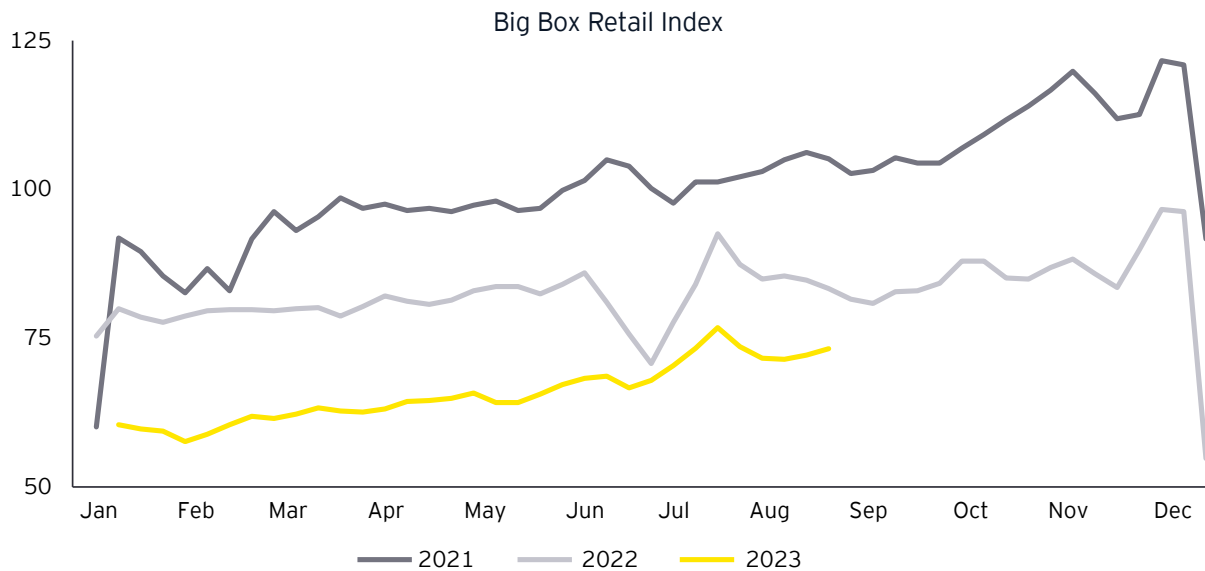
One inventory management trend that appears to have staying power is the diversification of the type and location of inventory holdings. Shippers are taking steps to expedite order delivery, trim shipping costs and reduce truck visits to the regional distribution center by placing goods closer to customers and increasing inventory in the system. Stores are being utilized as fulfillment centers in high-density areas. Ocean containers, rail containers and 53-foot trailers are also being used for storage in place of distribution centers that

are at capacity. Other trends include the development of smaller supply chain hubs near demand centers and the formation of interconnected regions to serve particular geographic locations. In addition, suppliers are being selected based on proximity to the end location, as well as inventory holding capacity.

Metrics to watch as this trend evolves:

- Inventory to sales ratio
- Truck to rail/intermodal import ratio
- Average miles traveled from production to consumption
- Share of deliveries by average trip length (%)
- Big Box Retail Index

Trucking visits from warehouses to distribution centers for the top five retailers in North America have reduced in 2023, compared to past two years



Note: Trucking visits for the five biggest retailers' distribution centers in North America.

Source: Motive ([Link](#)).

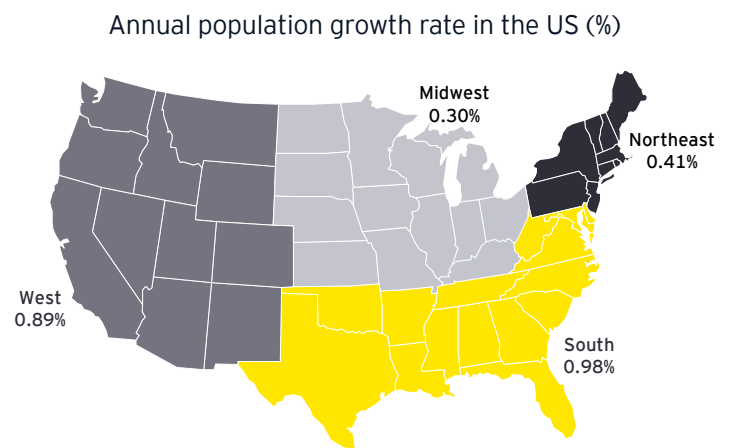
Period: January 2021 – August 2023

3 US population shifting southward and more suburban

The southern region of the US is emerging as a key demand center for long-haul truck freight, as it attracts more population growth than other US regions. The region registered 0.98% annual population growth from 2010 to 2020, the highest for any region.¹⁰ This trend has strengthened in recent years. In 2022, the South witnessed 1.08% annual population growth, while the Midwest and Northeast actually lost population. And in 2022, nine of the 15 fastest-growing large cities were in the South.¹¹ There are likely various factors driving this population shift southward. Many migrants are drawn to the warmer climate and lower tax rates prevalent in many southern states. Another factor may be that the Southeast and Southwest were two of the three US regions with the highest economic growth in 2022.¹³

The economic growth in the South is driven in part by manufacturers establishing domestic production and supply chains for semiconductors, electric vehicles (EVs) and batteries. The region is attractive for many firms due to affordable labor, cheap electricity, and generally favorable business regulations.¹⁴ Since 2021, the region has attracted 42% of private industrial investments in the US¹⁵, far greater than its 34% share of the country's GDP.

Southern region registered highest annual population growth rate in-between 2010-2020



Note: Annual population growth rate from Jul'10 to Jun'20.
Source: US Census Bureau, Pew Research ([Link](#)).
Period: July 2010 – June 2020

¹⁰ <https://www.pewtrusts.org/en/research-and-analysis/articles/2023/05/17/southern-states-gain-residents-the-fastest>.

¹¹ <https://www.census.gov/newsroom/press-releases/2023/subcounty-metro-micro-estimates.html#:~:text=Texas%20Continues%20to%20Top%20the,South%2C%20six%20were%20in%20Texas>.

¹² <https://taxfoundation.org/data/all/state/state-income-tax-rates-2023/>.

¹³ <https://www.bea.gov/data/gdp/gdp-state>.

¹⁴ <https://www.nationalreview.com/corner/manufacturing-moves-south/>.

¹⁵ <https://www.whitehouse.gov/invest/>, includes investments for Semiconductors, electric vehicles and batteries, clean energy, biomanufacturing and heavy engineering (Jan'21 - Aug'23), <https://www.brookings.edu/articles/spurred-by-federal-legislation-new-industrial-investments-are-reaching-a-wide-swath-of-the-country/>.

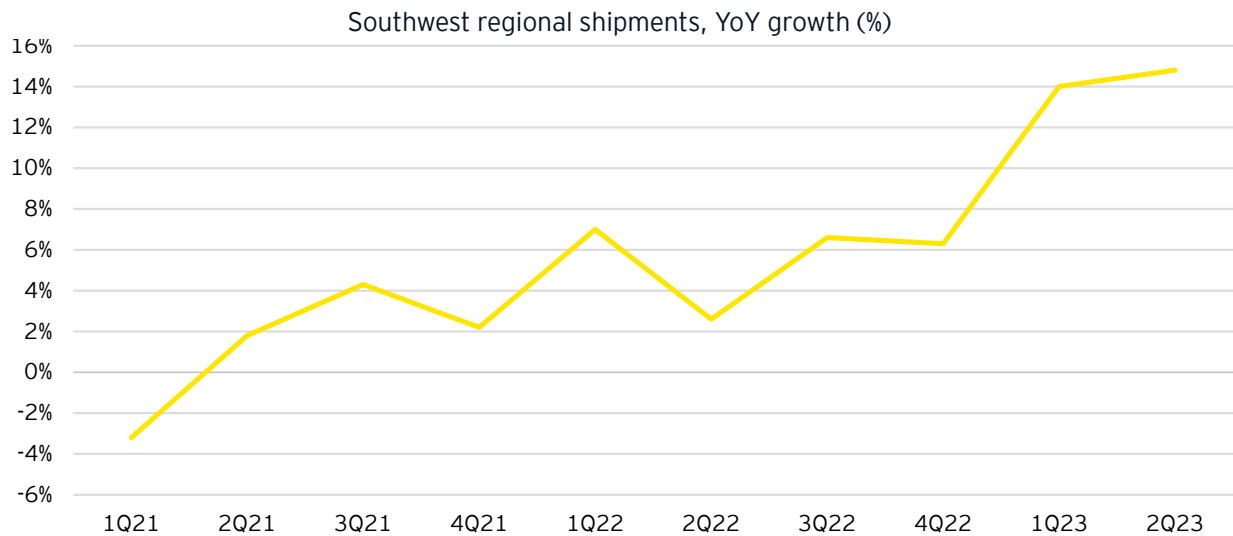
Consequently, the South has witnessed an uptick in road freight and logistics activity. Companies are actively recruiting drivers to move containers coming into Houston and ports in the Southeast, as well as investing in warehousing facilities. According to DAT Freight & Analytics, truckload carriers have seen an 81% surge in dry van loads destined for Fort Worth, Texas, between January 2019 and June 2023. Similarly, inbound, and outbound loads in Phoenix, Arizona, have grown by 60% during the same period.¹⁶ Also, according to the US Bank Freight Payment Index,¹⁷ in 2Q23, the Southwest region outperformed other regions in regard to truck freight shipment volume. The region witnessed eight consecutive quarters of YoY spending and volume growth driven by increased cross-border trade with Mexico and regional demand.

Another demographic trend is observed at the city level. The pandemic brought remote work into the mainstream and made it easier for people to leave city centers in favor of the

suburbs, which typically have lower housing prices and larger homes. This has led to the emergence of a so-called “donut effect,” in which the population has shifted from urban cores to the suburbs and exurbs. The durability of this trend is uncertain as remote work becomes less prevalent.¹⁸ But the donut effect has nevertheless resulted in three challenges for transportation and logistics companies.

First, densely populated urban zones allow delivery companies to accomplish a higher number of trips in less time, whereas deliveries in suburban and rural areas incur higher costs owing to longer distances and delivery times. In response to the added expenses, couriers have raised delivery area surcharges (DAS) for such deliveries.¹⁹ Simultaneously, several companies are partnering with small businesses to handle last-mile deliveries in these regions to reduce their capacity investment.

Southwest region outperformed other regions in regard to truck freight shipment volume



Note: The US Bank Freight Payment Index measures quantitative changes in freight shipments and spend activity based on data from transactions processed through US Bank Freight Payment.

Source: US Bank Freight Payment Index Q2 2023 Pg 5 ([Link](#)).

Period: 1Q 2021 – 2Q 2023

¹⁶ <https://www.dat.com/blog/dry-van-report-freight-volume-growth-follows-population-shift-to-the-south>.

¹⁷ The US Bank Freight Payment Index measures quantitative changes in freight shipments and spend activity based on data from transactions processed through US Bank Freight Payment, 2Q23 US Bank Freight Payment Index Q2 2023.

¹⁸ <https://www.bls.gov/opub/ted/2023/employees-teleworked-at-least-some-of-the-time-at-27-5-percent-of-private-establishments-in-2022.htm>.

¹⁹ <https://www.freightwaves.com/news/vice-likely-to-tighten-around-ups-shippers-in-2022>.

Second, some suburban populations and governments have pushed back on the presence of heavy-duty trucks and logistics operators. Various cities across the US have passed laws to inhibit truck parking, causing an inconvenience for drivers to park trucks even at home.²⁰ Residential neighborhoods often oppose the development of truck parking facilities, and new ordinances in some places have blocked the construction of distribution centers and warehouses in suburban and exurban areas.²¹

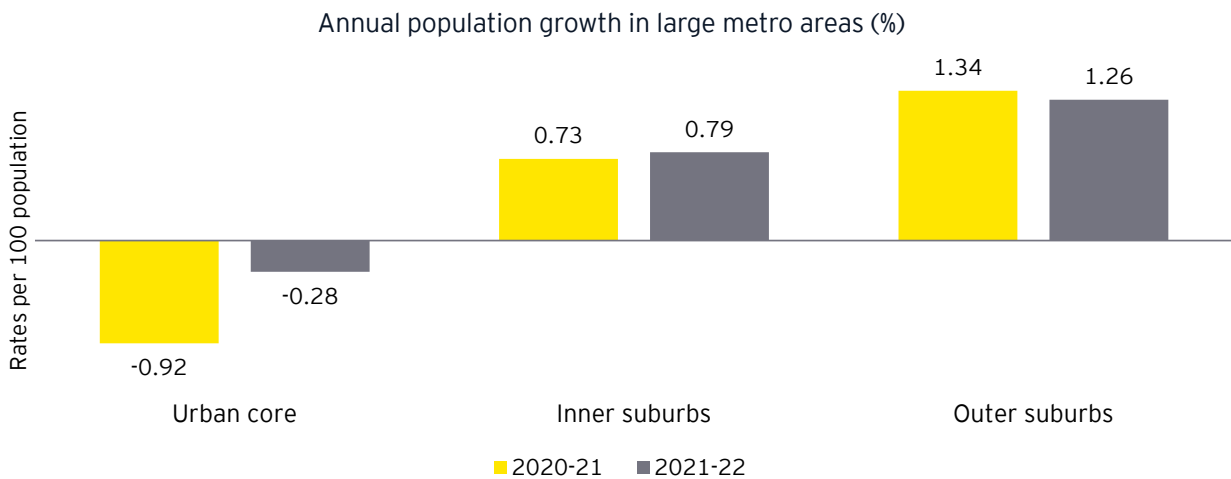
Third, truck bottlenecks²² have risen due to higher commuter traffic thanks to more people traveling from the suburbs to the city for work. The confluence of both of these demographic trends means that the South has been particularly affected, with the region representing 38% of the US total bottlenecks in 2022.²³ This has led to adjustments in planned hours-of-service breaks and the adoption of route optimization

software. Also, crashes involving large trucks have risen by about 3% from 2019 to 2022, hitting 5,230.²⁴ This uptick is attributed to more centralized freight volume toward distribution centers and manufacturing facilities on the outskirts of metropolitan areas, as well as pressure on truck drivers to clock in more miles due to reduced vehicle miles traveled (VMT) and trip length.

Metrics to watch as this trend evolves:

- US population growth by region
- US economic growth by region
- US job growth by region
- Urban vs. suburban population growth
- Trucking and warehousing capacity addition

Major US cities are witnessing “donut effect”, with people moving out of urban core to suburban areas



Note: Annual estimate from 1'Jul to 1'Jul of successive years; Counties within metropolitan areas >500,000 population classed by topology developed by Brookings Metro.

Source: William H. Frey analysis of US Census Bureau population estimates released 30 Mar'23, Brookings Metro ([Link](#), Figure 5).

Period: 1 July 2020 – 1 July 2022

²⁰ <https://www.overdriveonline.com/parking/article/15301353/local-bans-on-truck-parking-an-outrage-for-many-independents>.

²¹ <https://www.nytimes.com/2022/10/10/business/economy/warehouses-moratorium-california.html>.

²² The American Transportation Research Institute (ATRI) collects and process GPS data to quantify the impact of truck congestions on truck-borne freight at over 300 specific locations.

²³ <https://truckingresearch.org/2023/02/top-100-truck-bottlenecks-2023/>.

²⁴ <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813428>.

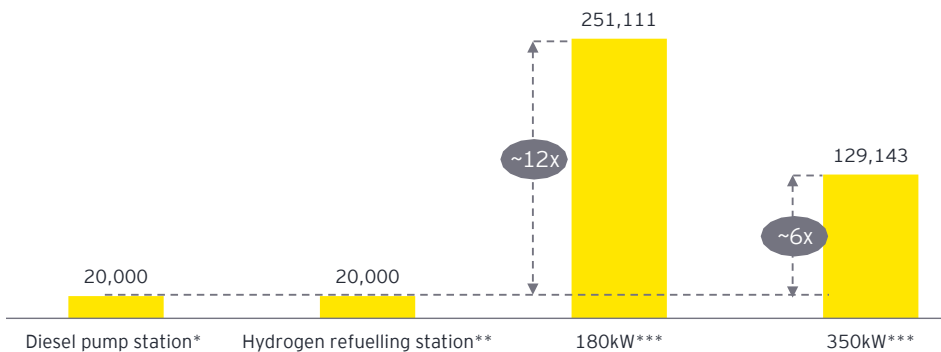
4 Increased focus on sustainability

The convergence of various factors – including public attention to climate change, government policies encouraging carbon emissions reductions, investor focus on sustainability practices and market dynamics around fuel cost savings – is propelling companies to adopt more environmentally sustainable practices. These factors are driving manufacturers to locate near demand hubs and promote shifts in transportation modes, with a particular emphasis on rail and zero-emission fleets. As a result, transportation companies are undergoing network redesigns as they aim to decrease their own, their suppliers' and their customers' greenhouse gas (GHG) emissions.

In terms of government policies and regulations, California continues to be a leader in sustainability. In September 2023, California passed legislation that would require businesses that operate in the state with revenue of more than US\$1 billion to disclose their supply chain GHG emissions.²⁵ In addition, the California Air Resources Board has adopted the Advanced Clean Fleet (ACF) regulations, which necessitate that all new medium- and heavy-duty vehicles in the state be zero-emission by 2036 and all trucks be zero-emission by 2042.²⁶ This is meant to address the fact that medium- and heavy-duty trucks make up about 5% of US vehicles, but they account for about 23% of US transportation GHG emissions.²⁷

Battery electric trucks need 6-12 times more space for charging compared to hydrogen-powered

No. of refueling pumps/charging outlets required for Class 8 trucks



Note: *Calculations based on ~2,000 truck stops in the US with assumed 10 lanes per truck stop.
 **Time to refuel hydrogen assumed to be same as diesel at 15 minutes.
 ***Time to refuel battery electric 60-90 minutes. 550kWh battery assumed on a Class 8 battery electric truck; recharging times based on charging from 0-100% at rated power for charger.
 Source: Hyzon presentation ([Link](#) page 15).

²⁵ https://www.wsj.com/politics/policy/carbon-disclosure-rules-for-u-s-companies-are-coming-sooner-than-expected-aa1fd74d?st=134m0kqycnt4daq&reflink=desktopwebshare_permalink.

²⁶ <https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-fleets-regulation-summary>.

²⁷ <https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions>.

The US federal government and select states, including California, are also providing tax credits to reduce the upfront cost for zero-emission heavy-duty trucks. Policymakers see such interventions as necessary to accelerate decarbonization, since battery trucks can cost up to 3x their diesel counterparts. Multiple carriers are exploring battery electric, hydrogen fuel cells and biofuel-powered trucks to reduce their emissions. However, most fleets are still hesitant to overhaul their trucks due to operational issues – such as the high cost of truck and fuel, payload penalty, unavailability of charging/refueling stations and low range – and the uncertain future regulatory environment.

Technological innovation and digital adoption are also playing a role in driving greater sustainability in the industry. In parallel with government efforts, private-sector participants are introducing innovations, such as megawatt charging, high-density batteries, hydrogen combustion engines and hydrogen storage solutions. The trend is expected to pick up pace as OEMs introduce new business models (e.g., truck-as-a-service, EV consultancy) to ease carriers' transition to sustainable operations. These shifts are done in part to respond to the demand of freight customers' ambitious emissions targets. But, while some shippers are willing to pay a premium for greener deliveries, others are not. This has prompted carriers to adapt other cost-effective and environmentally friendly strategies to cut down on long-haul truck miles and emissions.

One emerging strategy is boosting intermodal transport, particularly rail. According to a White House report, rail accounts for about 28% of US freight movement by ton-miles,

but it accounts for only about 2% of total transportation emissions. This translates into an average 60% reduction in a shipment's carbon footprint when converted from over-the-road highway freight to rail intermodal.²⁸ Logistics providers are partnering with railroad companies to enhance their intermodal offerings.²⁹ Select carriers have also announced ambitions to increase the size of their intermodal capacity in a bid to reduce emissions.³⁰ However, there are notable barriers that can impede the growth of multimodal transportation, including the need for investments in intermodal connectors and terminals for transloading, network inefficiencies (such as irregular frequencies and changes in railroad operators during interstate travel), and the risk of damage and theft during the intermodal shipping process.

Another emerging strategy is the use of predictive analytics to drive greater sustainability. Carriers are utilizing predictive analytics for regional order sourcing, consolidating smaller shipments into larger loads, and load bundling head-haul and backhaul bookings to reduce deadhead mileage.

Metrics to watch as this trend evolves:

- ▶ Share of trucking miles powered by diesel
- ▶ Emissions/carbon reductions regulations (state and federal)
- ▶ Rail and intermodal freight as a share of total freight
- ▶ Share of deadhead in carrier miles (%)
- ▶ US GHG emissions from domestic freight transportation

Storage volume required to store different forms of hydrogen compared to diesel



Source: Committee for European Construction Equipment (CECE).



Average reduction in a shipment's carbon footprint when converted from over-the-road highway freight to rail intermodal.

Source: Freightwaves, JB Hunt estimates ([Link](#)).

²⁸ <https://www.freightwaves.com/news/jb-hunt-clean-transport-program-focuses-on-carbon-offsets>.

²⁹ <https://www.freightwaves.com/news/canadian-pacific-kansas-city-touts-partnerships-with-schneider-knight-swift>.

³⁰ <https://www.truckinginfo.com/10159988/schneider-to-expand-intermodal-service-with-union-pacific-rail-partnership>.

A white semi-truck is driving on a road towards the viewer. The sun is low on the horizon to the left, creating a golden glow and long shadows. The sky is filled with dramatic, dark clouds. The road has a white line on the left side. The truck is a modern model with a large cab and a long trailer.

Framing future scenarios

Trucking and other logistics companies must adapt to various supply chain shifts brought about by geopolitical, market, demographic and sustainability trends. Organizations can remain resilient in the face of a volatile environment if they consider a range of scenarios for how the future can unfold. Each of the trends discussed above could unfold in different directions in the years ahead. Based on an analysis of the interaction of those trends, we developed three scenarios for supply chain dynamics that may unfold over the next five years. Companies in, and adjacent to, the trucking sector can use these scenarios to test their investment plans and business models to strategically position themselves for what may come next.

1 Friendshoring and nearshoring explodes

Trends



Nearshoring and friendshoring



Shifts in inventory management



Demographic shifts



Sustainability

Legend: Arrow sign indicates strength of the trend.

Select metrics that may indicate that this scenario is occurring:

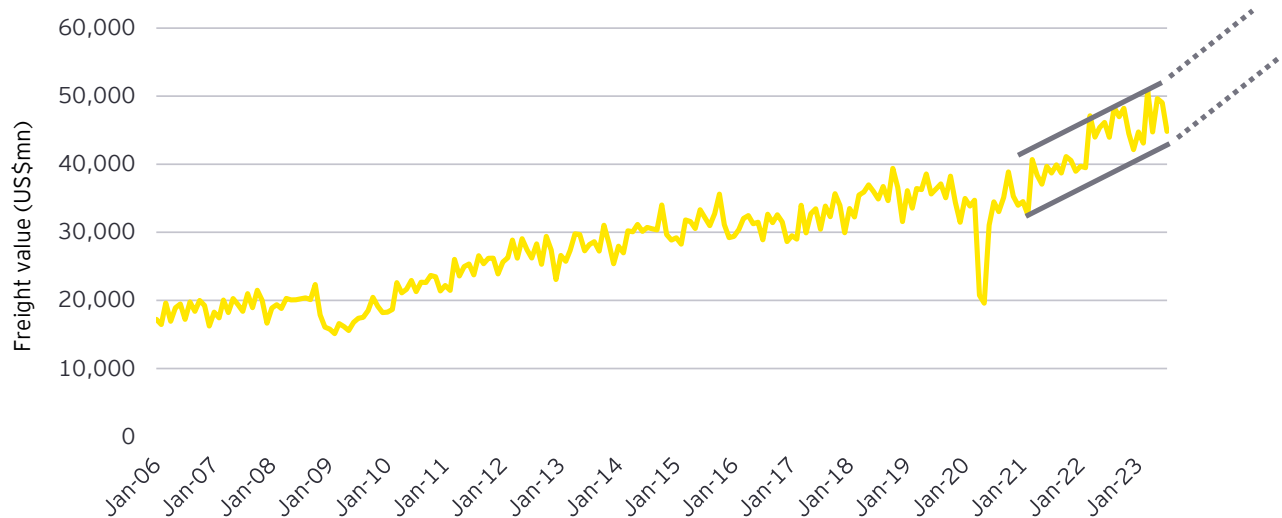
- ▶ Increase in truck border crossings
- ▶ Increase in inventory-to-sales ratio
- ▶ Stable urban vs. suburban population growth
- ▶ Stable emissions/carbon reduction regulations (state and federal)

In this scenario, protectionism and economic security drive US policymaking far more than cost rationales. Global supply chains are influenced by wide-ranging industrial policies that incentivize or compel businesses to trade primarily with neighboring and allied countries. Nationalist policies, including trade barriers, price controls and other restrictive measures, further reduce the cost benefits of offshoring. This policy stance leads to significant nearshoring or friendshoring of operations, which, in turn, drives a steep decline in freight imports from China as tensions between the US and China increase.

Mexico and Canada account for a greater share of the overall manufacturing trade, with their share increasing from its current 30% to near 45%-50%. The increase is driven by significant nearshoring of automobile and electronics manufacturing in Mexico. Texas's share of overall US freight trade value jumps significantly from 22.7% to 35%-40%. Cross-border trade with Mexico increases, as trucks continue to be the most favored mode of transport.

At the same time, other countries throughout Central and South America that have free trade agreements with the US also become more significant suppliers and manufacturing hubs. These include Costa Rica, Panama, Peru, Chile and Colombia. The US also continues to have strong trading relationships with allies, including Japan, South Korea, the European Union and the UK. Some US ports, including New York/New Jersey and Seattle, retain high volumes as a result of these growing trade relationships, supporting demand for trucking and other modes of transport from these ports.

Freight flow value between US and Mexico through trucks (US\$m)



Source: US Department of Transportation ([Link](#)).
 Period: January 2006 – July 2023

Other cross-border modes, including vessels and rail, also have considerable volume growth as they capitalize on shifts in supply chains and trading partners. This necessitates a build-up of infrastructure to service expanded freight at certain ports and border crossings through multimodal interlinkage between rail, vessel and road freight transportation.

At the same time, trends toward e-commerce and using retail locations as inventory management centers accelerate. Customers demand quick fulfillment of orders, so holding inventory close to customers becomes more common. Creative inventory management is key, raising demand for short-haul and last-mile delivery services.

Implications for trucking:

- ▶ **Long-haul volume:** Outbound and inbound truck volumes at the US southern border grow as trade with and through Mexico increases. However, the average truck trip length is reduced due to the vicinity of the southern border to the emerging demand centers and manufacturing hubs in the US South.

- ▶ **Share of intermodal and rail:** US and Mexican regulations limiting how far a carrier's tractor can travel past the border do not apply to intermodal containers moved through rail, which increase the competitiveness of rail and intramodal for large-volume loads. At the same time, heightened traffic at ports that receive vessels from South America increase demand for both rail and long-haul trucking, depending on the intermodal infrastructure available.
- ▶ **Truck stop demand:** Truck stop operators increase their focus on serving growing trade routes from Mexico to manage growing cross-border truck traffic across the southern border and from different ports than in the past. Demand for truck stops also increases within and near urban areas due to the growing share of short-haul and last-mile trips.

2

Aggressive climate change actions accelerate supply chain shifts

Trends



Nearshoring and
friendshoring



Shifts in inventory
management



Demographic
shifts



Sustainability

Legend: Arrow sign indicates strength of the trend.

Select metrics that may indicate that this scenario is occurring:

- ▶ Increase in share of imports from friendly countries
- ▶ Stable truck trip frequency between distribution centers and warehouses (Big Box Retail Index)
- ▶ Increase in urban vs. suburban population
- ▶ Increase in emissions/carbon reductions regulations (state and federal)

In this scenario, sustainability and decarbonization are elevated to urgent priorities as consumers and businesses alike take environmental protection to another level. Manufacturers strive for shorter supply chains with more efficient transportation routes, and firms relocate to be closer to demand centers and to optimize their logistics to reduce their overall carbon footprint. Sustainability, rather than cost and time, becomes a key criterion for choosing suppliers and logistics partners.

Consumers prioritize products with lower environmental impact, and companies scrutinize vendors on their carbon emissions. Decision-making is driven by heightened regulator, investor and societal pressure to reduce GHG emissions at an accelerated rate. The US government reinforces this movement through a climate tax based on carbon emissions. Shippers and customers agree to pay a premium and wait for the sake of low-carbon deliveries, while major cities implement low-emission zones to prevent entry of heavy-polluting trucks.

Due to the low technological maturity of zero-emission trucks, carriers are forced to adapt alternate strategies to limit GHG emissions. Certain modes of transportation, including rail, thrive with lower emissions per metric ton compared to trucks. An uptick occurs in intermodal deals between railway companies, and truckload carriers replace long-haul truck miles with rail, driving local dray to ramps.

The design of cities also experiences an overhaul as people move back to city centers, opting for smaller homes near their place of work, with an aim to reduce their environmental footprint. Urban planners change cityscape plans to integrate e-cargo bikes and e-bikes in a bid to reduce reliance on medium-duty trucks for last-mile deliveries. This gives rise to local delivery hubs that allow delivery trucks to transfer loads to smaller low-emission vehicles for last-mile deliveries.

A greater focus on emissions drives carriers to reduce deadhead mileage and associated emissions. This leads to increased data sharing between carriers and shippers, as well as accelerated adoption of trailer pools and drop-and-hook to minimize dwell time and empty miles.

Implications for trucking:

- ▶ **Long-haul volume:** Long-haul truck trip distance decreases as shippers and carriers strive to reduce delivery emissions with lower trucking frequency. The proximity of manufacturers and suppliers to demand centers also negatively impacts total trip length.

- ▶ **Share of intermodal and rail:** Carriers increasingly opt for rail and intermodal due to a better emissions profile. This decreases long-haul truck VMT. However, intermodal capacity is inadequate to cater the transition of cargo from long-haul trucking to intermodal without significant investments in cargo-handling capabilities. As such, carriers also seek opportunities to ship via low-emission long-haul trucks.
- ▶ **Truck stop demand:** The demand for truck stops on long-haul routes is reduced due to shorter supply chains and more inventory held close to demand centers. Within urban areas, the diversity of vehicle types for last-mile cargo and goods delivery may also reduce demand for truck stops. In both instances, the truck stops that cater to emerging zero-emission trucking technologies (battery-electric, hydrogen fuel cell, etc.) will have the strongest demand.



3

Reversion to just-in-time inventory and offshoring

Trends



Nearshoring and
friendshoring



Shifts in inventory
management



Demographic
shifts



Sustainability

Legend: Arrow sign indicates strength of the trend.

Select metrics that may indicate that this scenario is occurring:

- ▶ Increase in share of goods imports from offshore countries
- ▶ Decrease in inventory to sales ratio
- ▶ Stable population in urban and suburban areas
- ▶ Stable/decrease in emissions reductions regulations (state and federal)

In this scenario, lower levels of geopolitical tension create a more stable and predictable global trading environment, as trade-driven partnerships become more important to policymakers in the US and elsewhere. Market access and economic growth become significant considerations in governments' economic policy stances. As a result, governments shift away from the industrial policy and supply chain intervention of the early 2020s in all but the most strategic sectors, such as digital technologies.

As a result of the more liberalized trade policy environment, companies revert to globalized supply chain strategies. US trade with China, India and other Asian countries begins to rebound from the lows reached in 2023. This reversion is quick to occur, as most companies had not yet moved significant operations or supplier relationships out of China. So, while some investments related to diversifying supply chains to Mexico and elsewhere come online, China remains the "factory to the world."

Going forward, companies realize the improved cost efficiency, operational flexibility, working capital management and lower lead time benefits for just-in-time (JIT) practices. Investor pressure on profitability, coupled with a decrease in sustainability reporting pressures, propels firms back to a conventional JIT supply chain. Retailers focus on holding lower inventory and lean practices to respond to the seasonal shift in customer preferences.

An aerial photograph of a two-lane asphalt road winding through a dense, green forest. The road has a yellow center line and is flanked by lush trees and vegetation. The lighting is soft, suggesting an overcast day or early morning/late afternoon.

Summary

These shifts increase the need for more frequent deliveries of smaller quantities of goods. This trend may result in an increase in trucking trips, leading to a resurgence of drayage traffic at western ports, as businesses seek supplies from East Asian countries. This would drive focus and capacity away from Mexico and other nearshoring options.

Implications for trucking:

- ▶ **Long-haul volume:** Total truck occupancy volume is reduced as shippers prioritize time over volume and density optimization. This drives an increase in truck delivery frequency and trip length. Long-haul trips also witness an uptick as demand for export drayage services from eastern ports to inland distribution centers located in the US South and Midwest regions increases.
- ▶ **Share of intermodal and rail:** The share of rail and intermodal reverts back to historical figures as carriers choose trucking for their service reliability and cargo-handling capabilities. Inventory slack introduced in the system to avoid shortages due to supply chain interruptions is reduced. Shippers decrease their holding costs by reducing inventory in warehouses and emptying out rail containers being used for storage. Intermodal rail terminals that service West Coast ports witness increased investments toward storage and volume handling capacity as trade with East Asian countries resurges.
- ▶ **Truck stop demand:** Demand for truck stops remains relatively constant to slightly increasing from today as ground transport increases modestly. Truck stops continue to optimize the driver experience and in-store services to compete for market share of over-the-road drivers.

The transportation and logistics sector needs to be prepared for the strategic challenges and opportunities that are unlocked as part of global trade network redesign, changes in inventory management, demographic shifts, and increased focus on sustainability. These external forces have the potential to radically transform US supply chains and therefore long-haul trucking. The future direction of these trends is uncertain though, giving rise to multiple plausible scenarios. Trucking and other logistics companies should monitor key metrics for indications as to which scenario is arising. They should also assess which actions they could take now to position themselves for continued growth in any scenario in the years ahead.

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