



# Seeking supply chain stability in an era of volatility

The rising frequency and intensity of crises  
calls for new insights

September, 2022

# Crisis mode is the new normal

Market volatility has always generated a level of uncertainty that supply chain organizations have had to contend with. Following the financial crisis of 2008, the United States experienced periodic supply chain disruptions from forces exerted by external events. The most common of which was extreme weather, often delivered in the form of a major hurricane or winter storm. While events like these dealt extensive damage to our nation's economy, the impacts to corporate supply chain performance were more targeted in scope and more manageable in recovery. Moreover, occurrences were often discrete, and far and few between.

Fast forward over a decade, and the list of market volatility drivers has grown. They now encompass a much wider set of events including cybersecurity; disease; environmental, social, & corporate governance (ESG); and geopolitical conflicts such as the Russia-Ukraine war.

The rate of incidence and concurrence of overlapping market events have amplified the impact on supply chain operations across the globe. So much so, that experts are viewing this as a new normal -- at least for the time being. Companies should get used to the idea of crisis being more or less the new normal due to market drivers like soaring inflation and climate change.<sup>i</sup>

<sup>i</sup> Unilever CEO sees crisis as new normal for industry, Reuters, Jun 2022

## A new norm of volatility

Market volatility continues to impair supply chain performance, driving some of the highest levels of variability in recent history.



<sup>1</sup> Delivery issues jumped 50% as Florence hit, SupplyChainDive, Sep 2018

<sup>2</sup> Resilinc EventWatch, Annual Report 2020

<sup>3</sup> Shanghai port grapples with increasing congestion, South China Morning Post, Apr 2022

<sup>4</sup> The cost of the Suez Canal blockage, BBC News, Mar 2021

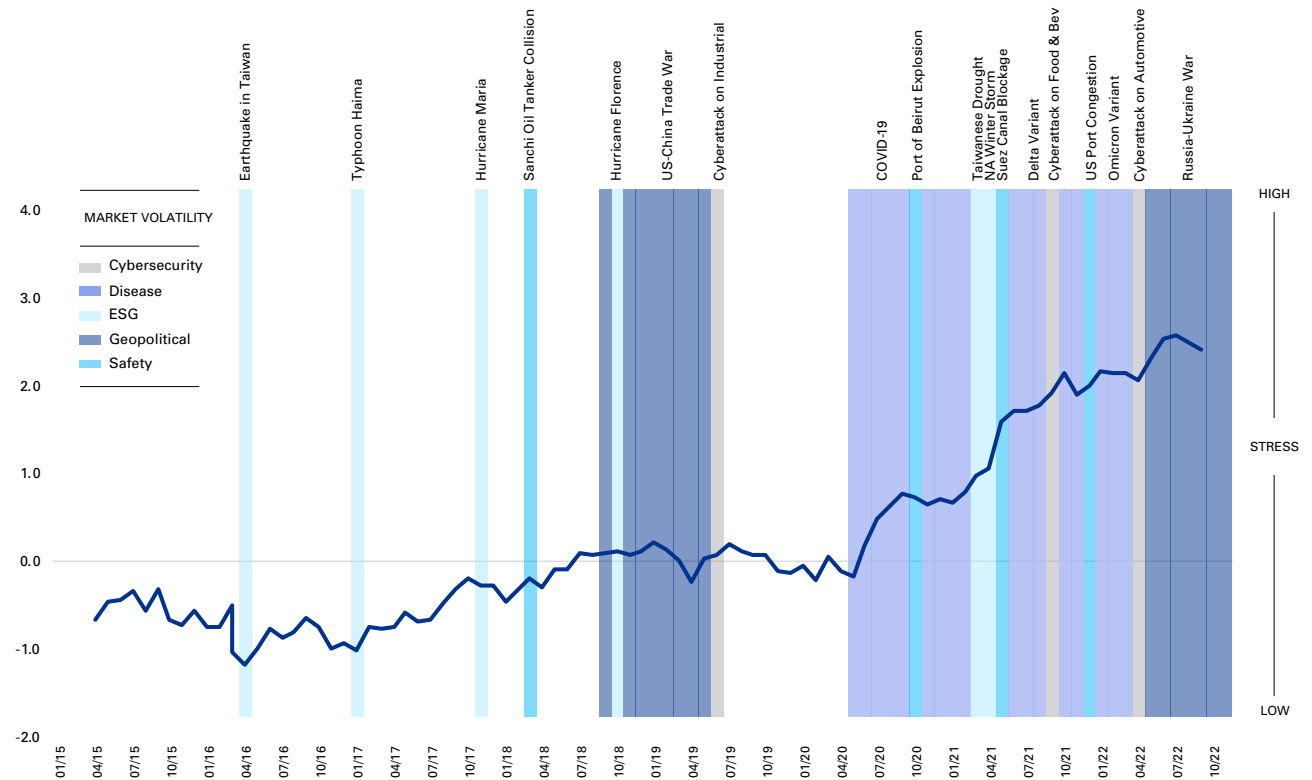
Given this unprecedented level of volatility levied upon supply chains, KPMG established a set of machine learning algorithms to help gain insight into the new behaviors that companies are taking to adjust to the new norm.

Fueling these algorithms is 14 years of data representing nearly 30 variables and key performance indicators (KPIs) that characterize end-to-end performance of U.S. supply chains. These are variables that describe service level, cost, working capital, and labor performance.

The resulting output of this advanced analytics initiative is the Supply Chain Stability Index.<sup>ii</sup> Stability is defined as the ability for a supply chain to achieve key performance targets on a consistent basis. It measures how well a supply chain deals with the ups and downs of market volatility. In the figure shown, the less erratic the line, the more stable the supply chain.

## Understanding stability

The Stability Index measures variability across U.S. market indicators of service level, inventory, material & logistics cost, and labor



The index not only visualizes stability, but it also quantifies it by providing data-driven insights that substantiate the evolving behavior of supply chains. In this report, we share these insights, which include:

**The root of all stress.** Logistics is the predominant cause of stress in the supply chain, accounting for 71 percent of variability, followed by Capacity (19 percent) and Supply (10 percent).

**The driver in the driver's seat.** Freight cost has become a top driver of customer service level, increasing its strength to affect order fill rate by more than 100 percent.

**People make the difference.** Availability of skilled logistics and manufacturing professionals is a critical enabler of stability, driven by the need to mitigate supply constraints and adapt to volatile consumer demands.

<sup>ii</sup> KPMG Supply Chain Stability Index, in association with ASCM. All percentage references in this report are derived from this source unless otherwise noted.

# The root of all stress

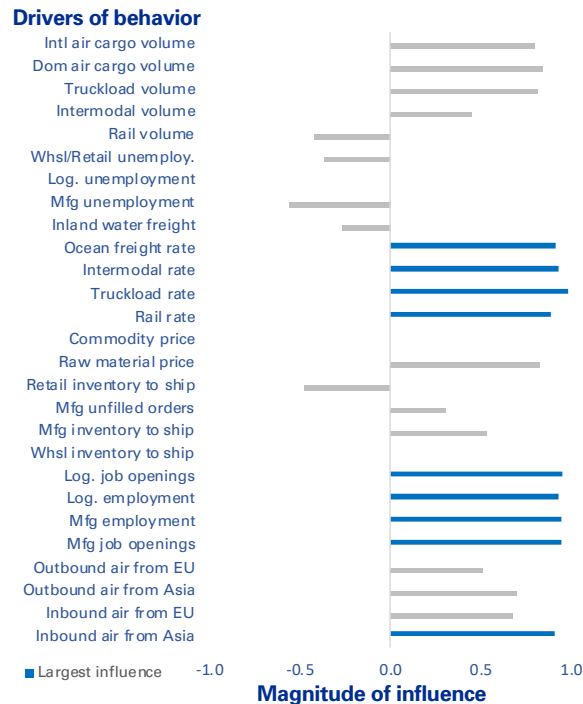
The Stability Index is comprised of three factors that serve as primary causes of performance variance: logistics, capacity, and supply. Each factor is a sub-index that contains variables that are drivers of behavior.

Logistics is the predominant cause of stress in supply chains across the United States, accounting for 71 percent of variability on average. Of that percentage, freight cost and labor are the primary drivers.

Ocean freight is the most cost-effective mode of transportation for international shipping. Over recent years, those rates increased while 44 percent of North American ports struggled at the bottom third in container port performance.<sup>iii</sup> This in turn drove companies to the costly yet speedier mode of air freight, which carries the highest carbon footprint amongst all modes. But the stress felt here was even more acutely targeted, where price and volume of U.S. inbound flights from Asia had the larger impact on stability—more so than any other air freight from any other region.

## Drivers of logistics variance

Freight price and labor needs have the largest influence



<sup>iii</sup> The Container Port Performance Index 2021, S&P Global Market Intelligence, 2022

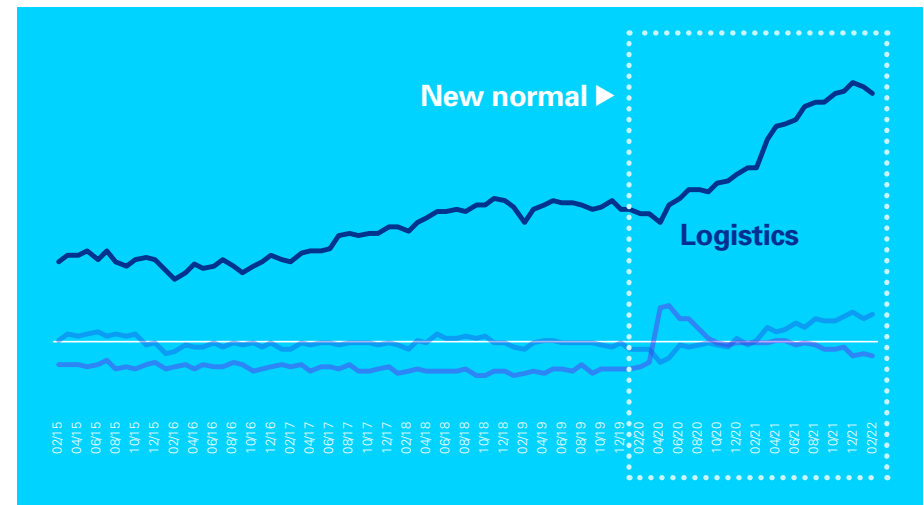
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We find a similar trend with regards to trucking, where rates and volumes have the most dominant effect on domestic shipping. Since 2008, the trucking industry has experienced a two percent year-over-year (YoY) increase in price. In the past two years those prices increased by more than 45 percent,<sup>iv</sup> much of it being escalated by the Russia-Ukraine conflict and its impact on fuel commodity prices. During the same period, transportation job openings grew in response to ongoing shortages of truck drivers, which further compounded the stress on logistics operations.

But as it pertains to intermodal freight, the analytics attributes stress to higher rail prices, not volumes. Rail freight is known for efficiency and scale, but the tradeoff is speed and flexibility as it consumes more days in transit and lacks options with origin-destination (OD) pairs and schedules. Hence, shippers chose the customer responsiveness of truckloads over the cost efficiency and lower carbon footprint of rail, even in the face of inflationary pressure.

## Logistics variability over time

Logistics stress levels have accelerated in recent years



<sup>iv</sup> Producer Price Index by Industry: Truck Transportation, U.S. Bureau of Labor Statistics, Sept. 2022

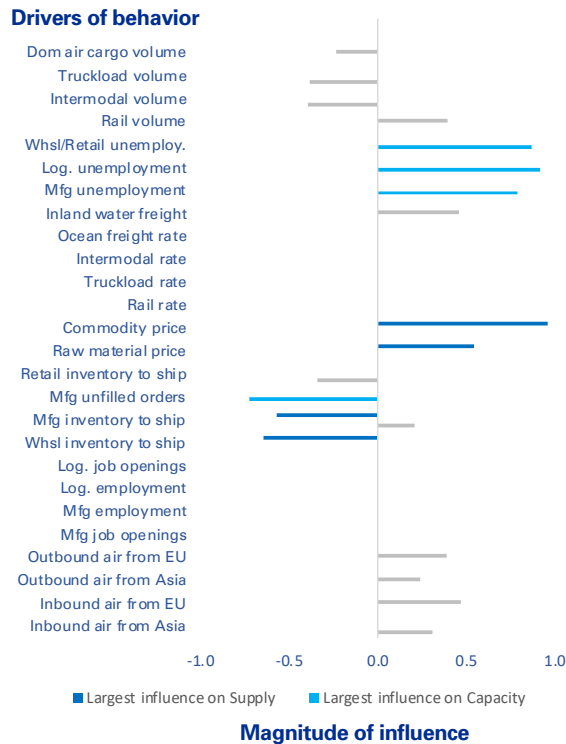
Capacity underutilization contributes 19 percent of the variance present in the index and is defined as the lack of labor efficiency in the job market. It is primarily driven by unemployment rates in manufacturing and logistics, which have been on a healthy decline since peaking in 2020.

This gradual stabilization of capacity stems from ongoing levels of attrition in what continues to remain a tight labor market in the United States.

In the new norm, there is a steady trend of voluntary attrition that is best characterized by the Great Resignation, and involuntary attrition that can be attributed to organizational “right sizing” measures taken to achieve cost efficiencies. A good example is Amazon, where earlier this year it reduced headcount by nearly 100,000 employees to help counter the pandemic-induced overstaffing of its fulfillment and distribution network.<sup>v</sup>

# Drivers of capacity and supply variance

Attrition and commodity prices have the most influence



<sup>v</sup> The confusing job market: Tech and finance brace for the worst, retail is mixed, travel can't hire fast enough, CNBC, Aug 2022

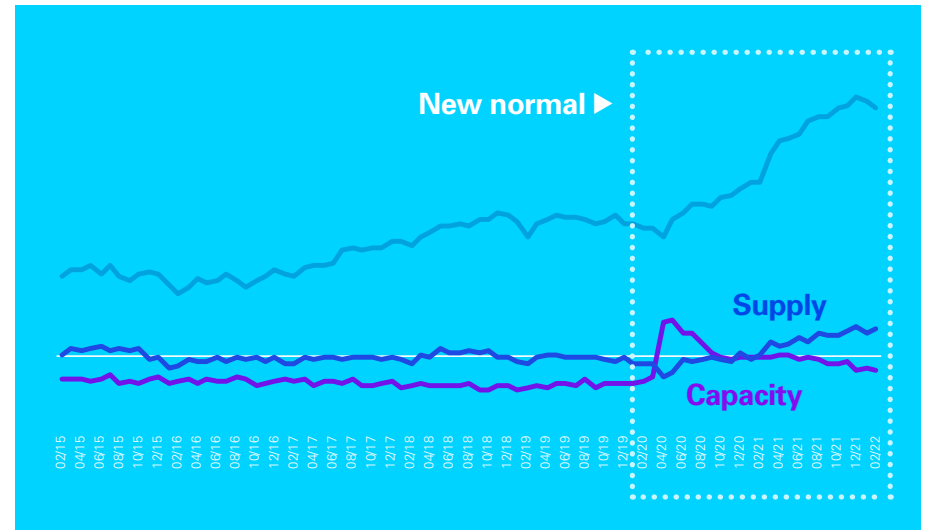
With regards to tightness in the job market, as of July 2022 there is a 1.9 ratio of job openings to workers seeking work<sup>vi</sup>. Two job openings for every unemployed person means that workers who resign or lose their jobs are landing new ones almost immediately.<sup>vii</sup> Hence, workforce utilization remains strong with capacity continuing to regress back towards a more stable state of pre-pandemic behavior.

Supply is responsible for 10 percent of variability in the index but follows a trend line that is opposite to capacity. It is driven by the commodity and material costs required to produce inventory. And overall, it is on a gradual rise, having more than doubled in magnitude on an annual basis for the past two years.

Supply chain globalization has helped U.S. companies realize their ambitions of higher cost efficiency through low-cost sourcing, but it has also created a substantial dependency on offshore supply. And now, market volatility has turned that dependency into vulnerability, disrupting supply lines for commodities and raw materials.

# Capacity and supply variance over time

Capacity and Supply are now moving on divergent paths



<sup>vi</sup> Monthly Economic Updates: Workers Return in August, Chief Economist, KPMG LLP, Aug 2022

<sup>vii</sup> The Surprise in a Faltering Economy: Laid-Off Workers Quickly Find Jobs, Wall Street Journal, Aug 2022

The recent frequency and intensity of global market volatility has exposed what was once considered acceptable risks associated with a global supply base. As volatility increases, the premise of supply chain globalization diminishes.

# How volatility impacts global supply

In the new norm where volatility is more pervasive, impacts to global supply networks become nearly unavoidable

Driver	Event	Response and implication	Magnitude of impact on supply
Disease	COVID-19, variants	Zero COVID policy in China stifles production of goods and commodity exports to the U.S.	China is the world’s largest producer of phones and computers, and supplies 50 percent of the world’s steel and coal
ESG	Forced labor	UFLPA* prevents goods from entering the U.S. if produced with forced labor in China	Over 20 percent of the world’s cotton comes from China, and of that percentage, 85 percent is from Xinjiang <sup>viii</sup>
Geopolitical	Russia-Ukraine War	Sanctions ban the U.S. import of several key commodities sourced from Russia	Russia and Ukraine account for more than 30 percent of the global wheat market, and Russia is the third-largest oil producer in the world <sup>ix</sup>

<sup>viii</sup> Reports of forced labor are driving brands to abandon Chinese cotton, Fortune, Jul 2021  
<sup>ix</sup> What Does Russia’s Invasion of Ukraine Mean for the U.S. Economy? The New York Times, Feb 2022  
<sup>x</sup> Uyghur Forced Labor Prevention Act, 22 U.S.C. §6901 (2021)



# The driver in the driver's seat

Transportation behavior has evolved in this new norm of volatility, both in terms of domestic and international freight. It has changed the way it influences the supply chain and how it is impacted in return.

Domestic trucking rates have become a new leading indicator for order fill rate performance. As truckload prices rise, unfilled orders gradually follow suit.

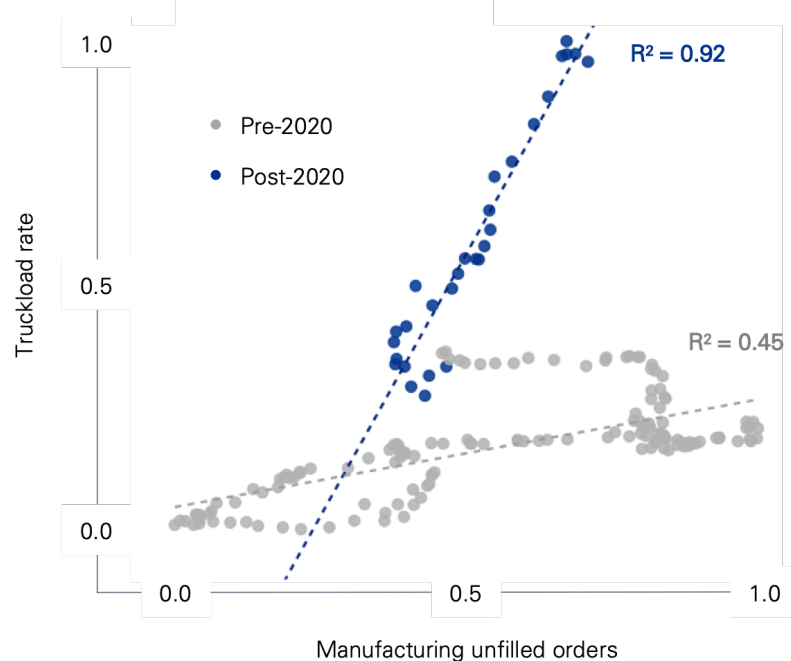
Prior to 2020, carrier rates for truckloads and unfilled orders from customers sat somewhat independent of each other. Both were measures of logistics performance and indirectly related with a low coefficient of determination (correlation) of 0.45. But since then, a more direct relationship has emerged where the correlation has increased to 0.92. This represents a 104 percent increase in ability for freight price to drive service level performance.

Rates for deep sea transportation are now moving in lock step with raw material price variation. Since 2020, the correlation between the two prices has risen by 151 percent. As prices for processed goods increase, rates for container ships follow a proportional path.

As the economy expands and demand for goods exceeds commodity and raw material supply, shipping prices increase to help manage demand for cargo space, and to cover costs from unprofitable periods when prices fall.<sup>xi</sup> The relationship between raw material and ocean freight has become much more pronounced due to the effects of market volatility.

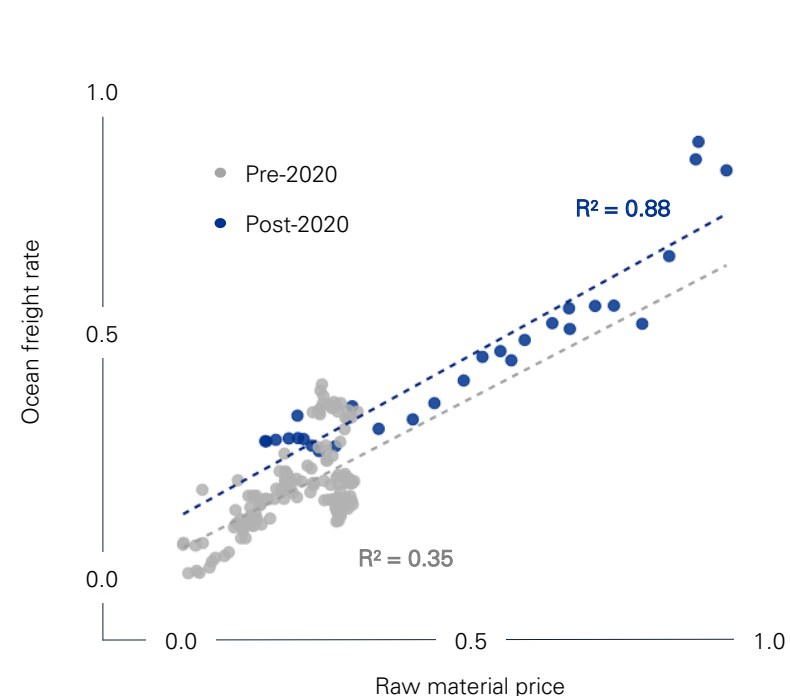
## General trucking rate vs. order fill rate

Variable correlation has doubled in strength in the new norm.



## Ocean freight price vs. raw material price

Price variation behavior is now moving in sync in the new norm.



<sup>xi</sup> Why Shipping Prices Have Recently Increased, CATO Institute, Nov 2021

# People make the difference

The supply chain workforce has quickly become a key lever for regaining stability. Logistics and manufacturing organizations have always relied heavily on their employees to navigate through periods of complexity created by uncertainty. But in an era of continuous market volatility, the demand on the workforce is even greater.

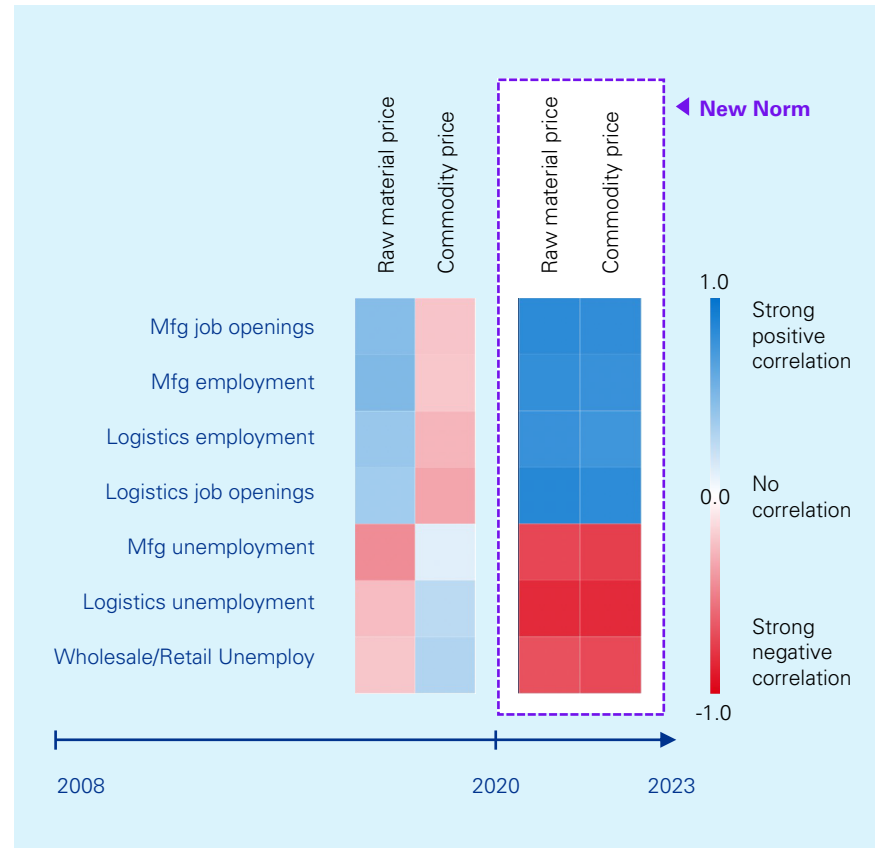
Prior to 2020, job openings in manufacturing and logistics were greatly influenced by the variability experienced in transportation, namely in ground and ocean freight. And while this continues to be the case, there are new drivers of job growth that contribute to the 10.5 percent increase in transportation and warehousing jobs since February 2020.<sup>xii</sup>

Commodity and raw material price volatility were strong influences on the number of jobs opened over the past two years. Ultimately, setting the right level of organizational capacity and talent in areas such as material sourcing, commodity management, and supplier risk has become key for companies to stabilize supply performance.

The increase in unfilled orders for manufacturers also generated more job openings, as a response to production capacity shortages experienced in the new norm. And a downward trend for inventory to shipment ratios in retail and wholesale industries has created more demand for logistics workers, while companies continue to address the shortage of drivers and crews to move inventory.

## Supply chain jobs and supply volatility

Material and commodity price volatility have become indicators of job growth



<sup>xii</sup> Jobs report: U.S. employment data shows continuing strong job gains, with employment in the warehousing and transportation industry well-above pre-pandemic levels, Washington Center for Equitable Growth, Apr 2022



# Moving forward with volatility

The new normal of volatility is rendering operations unstable. External market forces are creating mounting pressures across tiered networks and straining execution beyond expected limits. But as with any complexity faced by a supply chain, out of adversity comes opportunity.

## Maximizing the ecosystem.

Given the scope and magnitude of stress in logistics, it may be some time before operations is able to add capacity at a lesser cost. In the meantime, incremental strategies like asset pooling, may help remediate some of the challenges. Amazon, American Eagle, Gap, and other U.S. companies are doing just that with launches of their own 3rd Party Logistics (3PL) services that offer their network of trucks, warehouses, and inventory systems to the rest of the world.<sup>xiii</sup>

<sup>xiii</sup> Retailers Start Selling Something New: Logistics Services, Wall Street Journal, Sept. 2022

<sup>xiv</sup> Troubling Trend: Great Resignation Versus AI, Robotics And Automation, Forbes, Jan 2022

## Shifting labor tactics.

Utilization of workforce capacity is on a positive trajectory towards stability. Hence, the greater priority is where additional manufacturing and logistic capacity will come from going forward. Labor strategies will require more of a shift from resource utilization to productivity targets, while also accelerating physical and digital automation initiatives. It is no coincidence that the 10-year growth forecast for industrial robots has more than doubled in 2021, from \$16 billion to \$37 billion.<sup>xiv</sup>

## Redesigning supply.

Supply instability has been on a steady rise over the past two years, due to the direct impact that market volatility has had on supply chain globalization. Assuming a continuation of this trend, commodity and material constraints can only worsen. Many companies should continue to employ alternate strategies to curb supply risk, most of which involves a re-engineering of the supply network or of the finished good itself. General Mills reformulated product recipes when packaging and ingredients became scarce<sup>xv</sup>, while Tesla rewrote product software to lessen dependency on semiconductors during chip shortages.<sup>xvi</sup>

<sup>xv</sup> General Mills reformulates products to combat ingredients shortages, SupplyChainDive, Apr 2022

<sup>xvi</sup> Tesla rewrites software to get around chip shortages, SupplyChainDive, Jul 2022

# About KPMG and ASCM

**KPMG LLP and the Association of Supply Chain Management (ASCM) have joined forces to deliver new insights into supply chain performance variability in an era of market volatility. The KPMG Supply Chain Stability Index, in association with ASCM, is used to assess the stability of U.S. supply chains and serves as a helpful barometer for the greater supply chain community.**

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