



Industry Review

Economics, Transportation
&
Commercial Vehicles

Presented by Penske Transportation Solutions



Webinar Overview

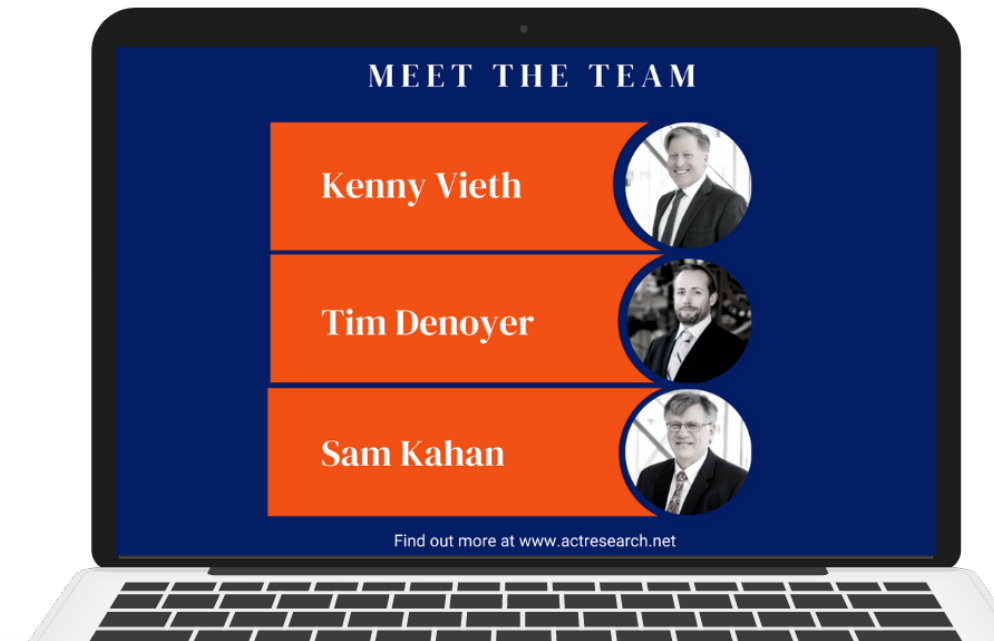
Introduction – Ian McGriff

N.A. Economy – Sam Kahan

Freight Transportation, Used Trucks – Tim Denoyer

Medium Duty, Class 8 & Trailers – Kenny Vieth

Q&A– All



HAVE YOU COMPLETED YOUR RENEWAL?

Execute your renewal to maintain access to your current reports or to gain immediate access to your new reports. Contact Debby Steinbarger with questions at 812.379.2085 or djsteinbarger@actresearch.net.



CHARGING FORWARD

2020 - 2040 BEV & FCEV FORECAST & ANALYSIS

Classes 4-5 Vehicles

14 Market Sub-Segments

23 Application Types

275+ Page Written Analysis Covering:

Infrastructure

Battery Technology

Fuel Cell Technology

Hydrogen Technology

Regulations

and More...

Comprehensive Plug & Play TCO Model

AVAILABLE NOW

Contact Ian McGriff, imcgriff@actresearch.net





WE'RE TAKING ON THE WORLD

In partnership with Knibb, Gormezano & Partners, we're utilizing the foundation of our North American results from CHARGING FORWARD to deliver a global BEV and FCEV forecast.

With a focus on 4 regions and more than 20 countries, this study will work to understand the dynamics of electrification for the global commercial vehicle market.

- Infrastructure
- Battery Technology
- Fuel Cell Technology
- Hydrogen Technology
- Regulations
- Comprehensive TCO Model

Are you interested in participating?
Contact Ian McGriff, imcgriff@actresearch.net



SAVE THE DATE

OUTLOOK WEBINAR

01/11

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ACT 
Research





REGISTRATION IS NOW OPEN

FEBRUARY 22-24, 2022

**IN PERSON || LIVESTREAM
COLUMBUS, IN**

FEATURED GUESTS FROM:

**FORD
TUSIMPLE
BLUE BIRD
EPA**



ACT OFFICE HOLIDAY HOURS

THANKSGIVING 11.25 & 11.26.21: CLOSED

CHRISTMAS EVE 12.24.21: CLOSED

SHUT DOWN 12.27.21 - 12.31.21: CLOSED

THE OFFICE WILL REOPEN ON MONDAY 1.3.22 WITH REGULAR BUSINESS HOURS.



WELCOME PAUL TRAUB



ACT's next Chief Economist starting 1.3.22

Before joining ACT Research:

Business Economist – Federal Reserve Bank of Chicago
Senior Economist – Chrysler

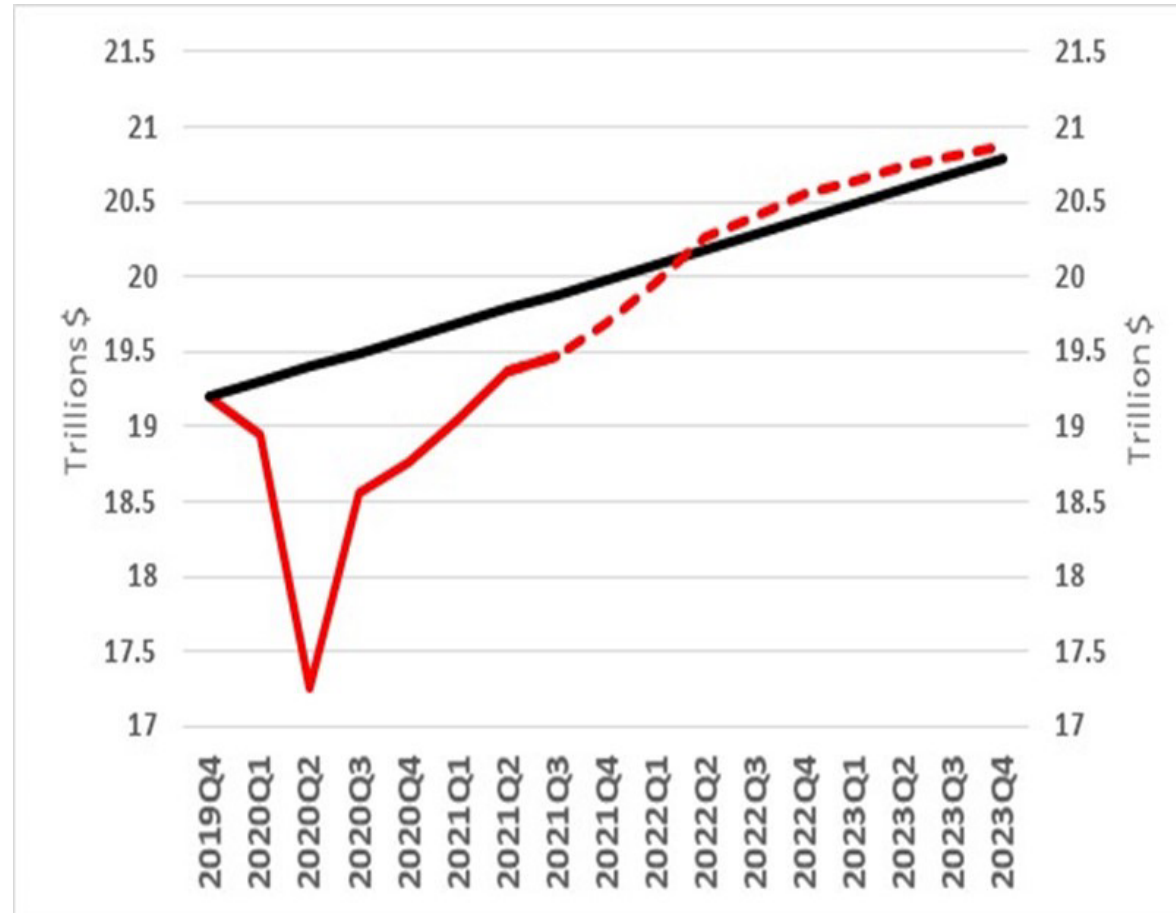
Overview

- **Real Economic Growth Still Positive.**
 - **Strengths:**
 - Solid Household balance sheets, supportive fiscal policy, accommodative monetary policy.
 - **Weakness:** near-term (but diminishing)
 - Covid resurgence, supply chain disruptions, semiconductor shortages
 - **Weakness:** longer-term and developing
 - Inflation accelerating and labor market stalling
- **Robust Transportation and Freight Activity.**



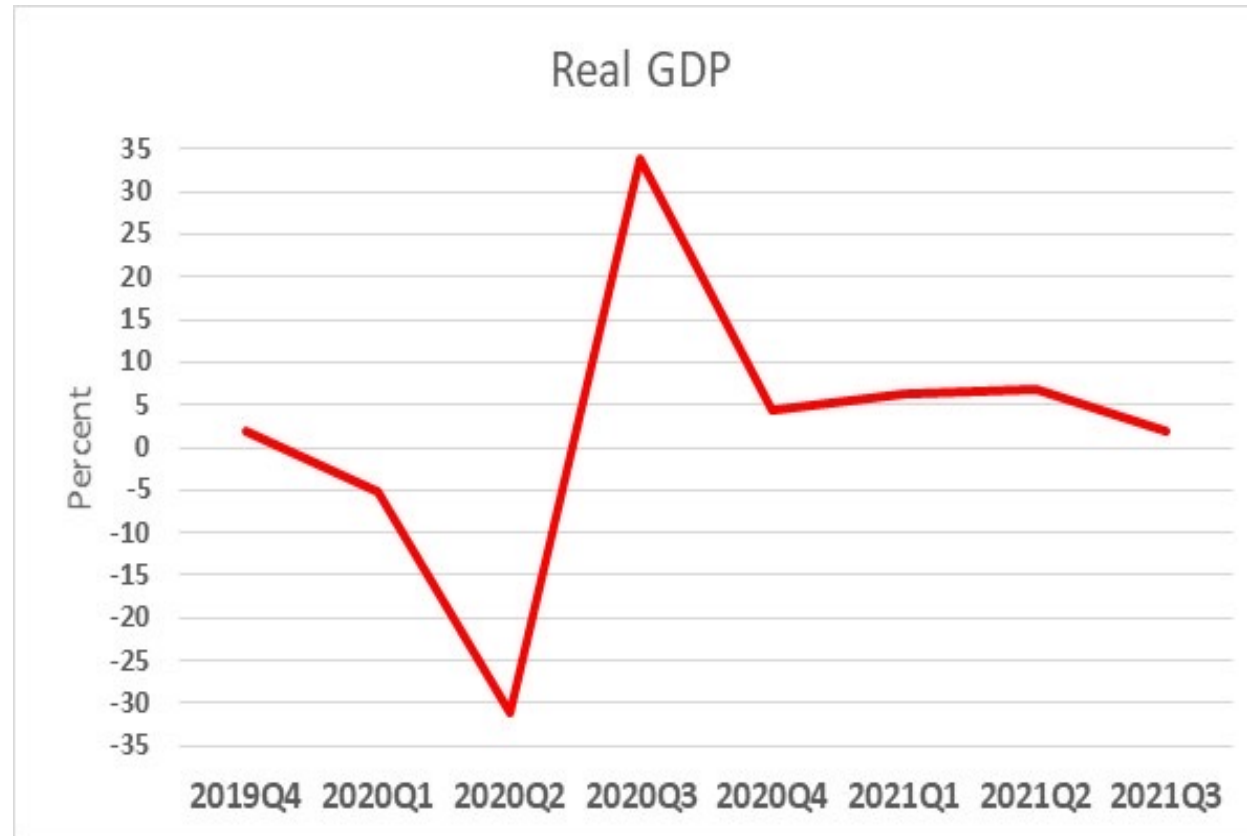
Economy: Where are we (2019 to present)

1. Pandemic causes sharp 2Q recession.
2. Aggressive policy response starts recovery.
3. By 2021Q2 we are back at pre-Covid levels.
4. By 2022Q2, we should have caught up to 2% trend growth.



Economy: Recent History.

1. 2021Q1 growth 6.3%
2. 2021Q2 growth 6.7%
3. 2021 Q3 growth 2.0%
4. Covid, Supply Chain problems, and semiconductor shortages.
5. Expected to diminish but timing uncertain.

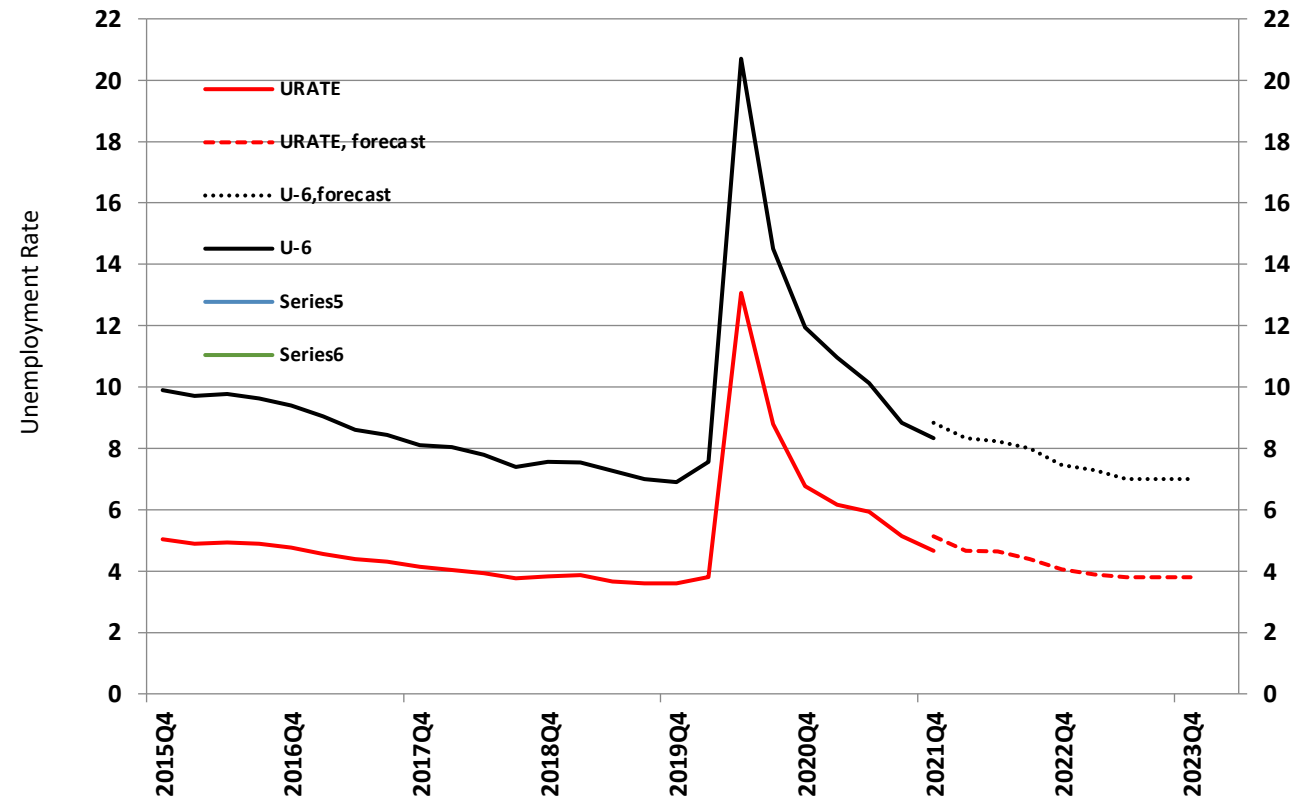


Unemployment Rate (quarterly, 2015 to 2023)

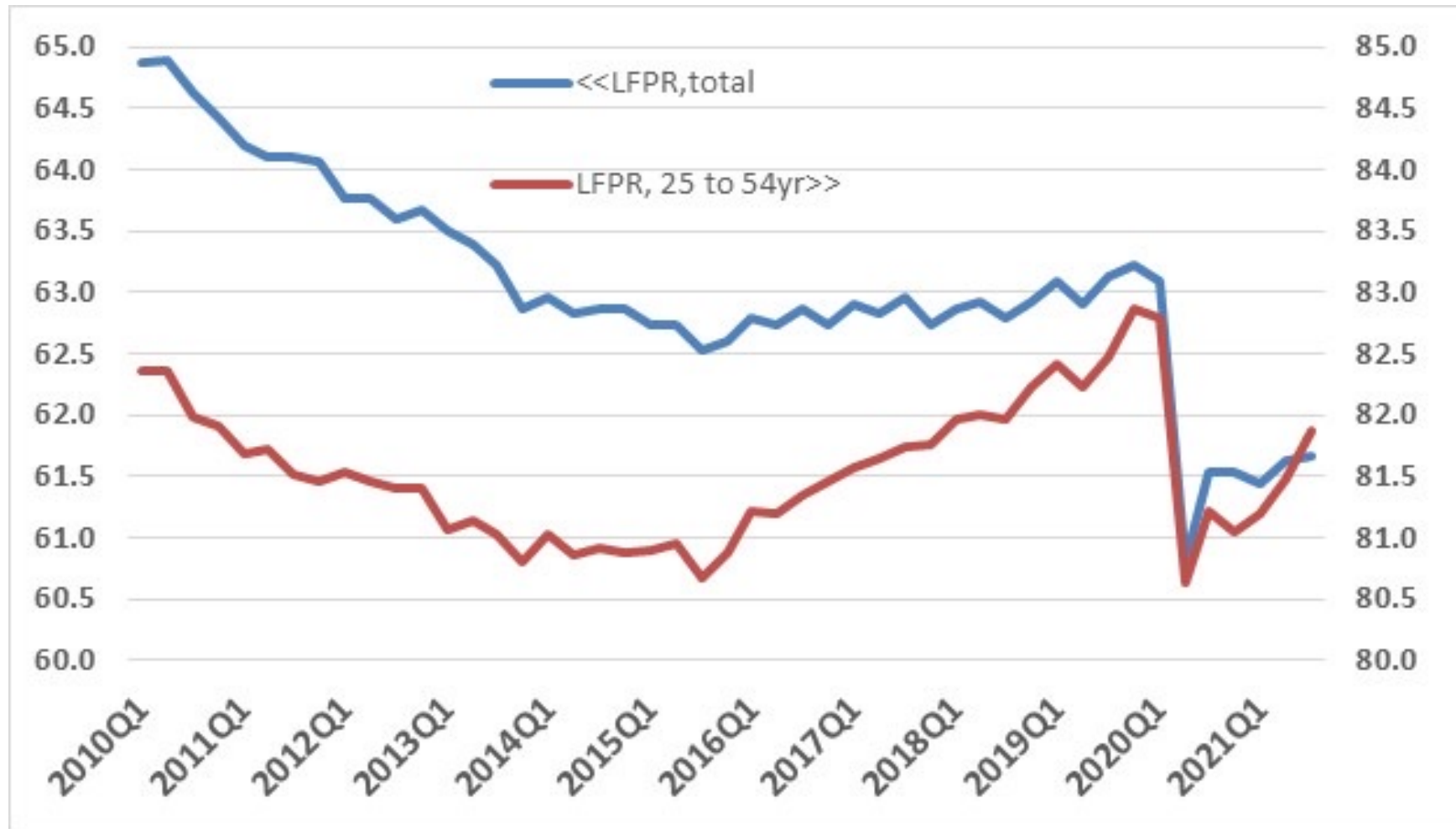
The standard unemployment rate, U-3. Also the U-6 rate which adds underemployed and discouraged workers. Remain above the 3.5% achieved in pre-Covid era.

After spiking to 14% the rate has been declining. It now is at 4.6% and forecast to be in the low 4% by end of next year.

The pre-Covid rate was 3.5%.



Labor Participation Rate (quarterly, 2010 to present)

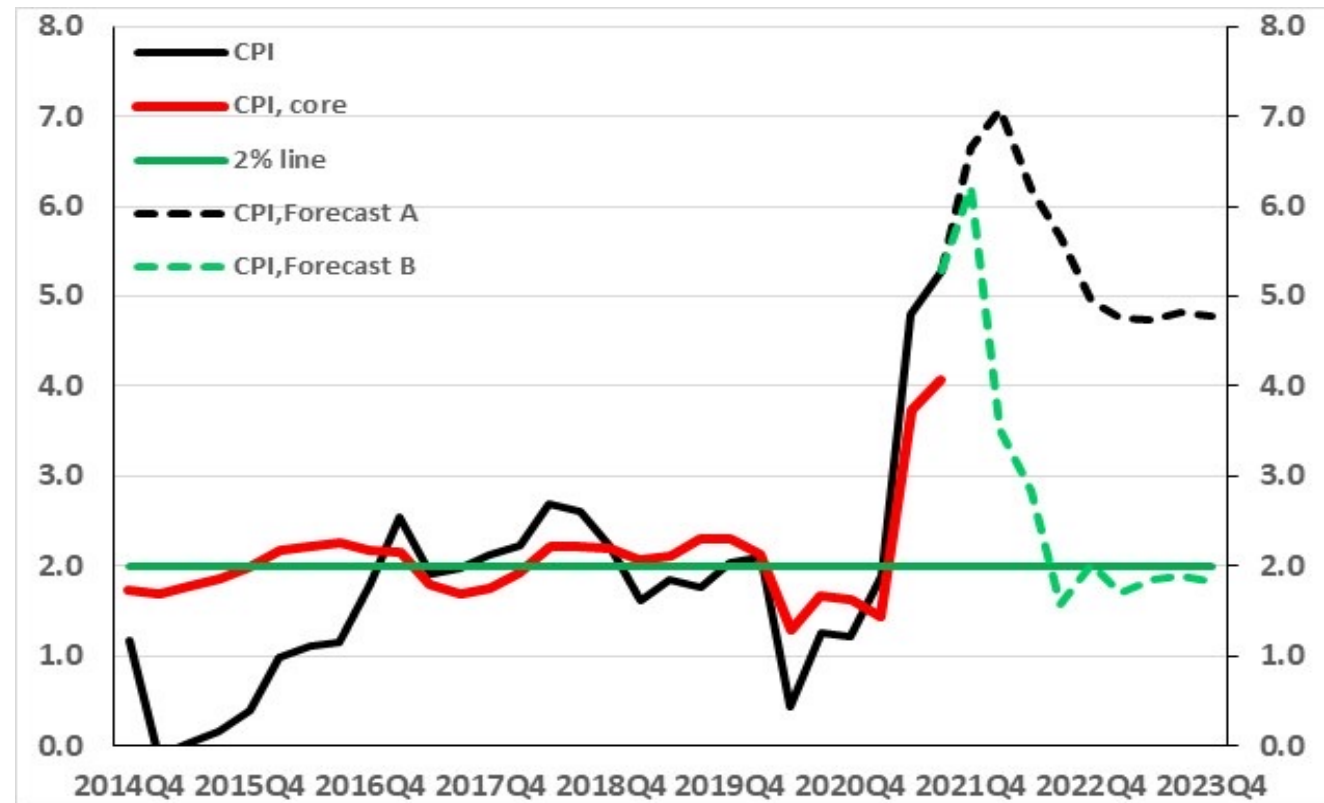


Inflation Rate (quarterly, 2014 to 2023)

Inflation rate has surged since last March.

Temporary or more fundamental?

Some worry but Fed and financial markets are complacent. Will that attitude change soon?

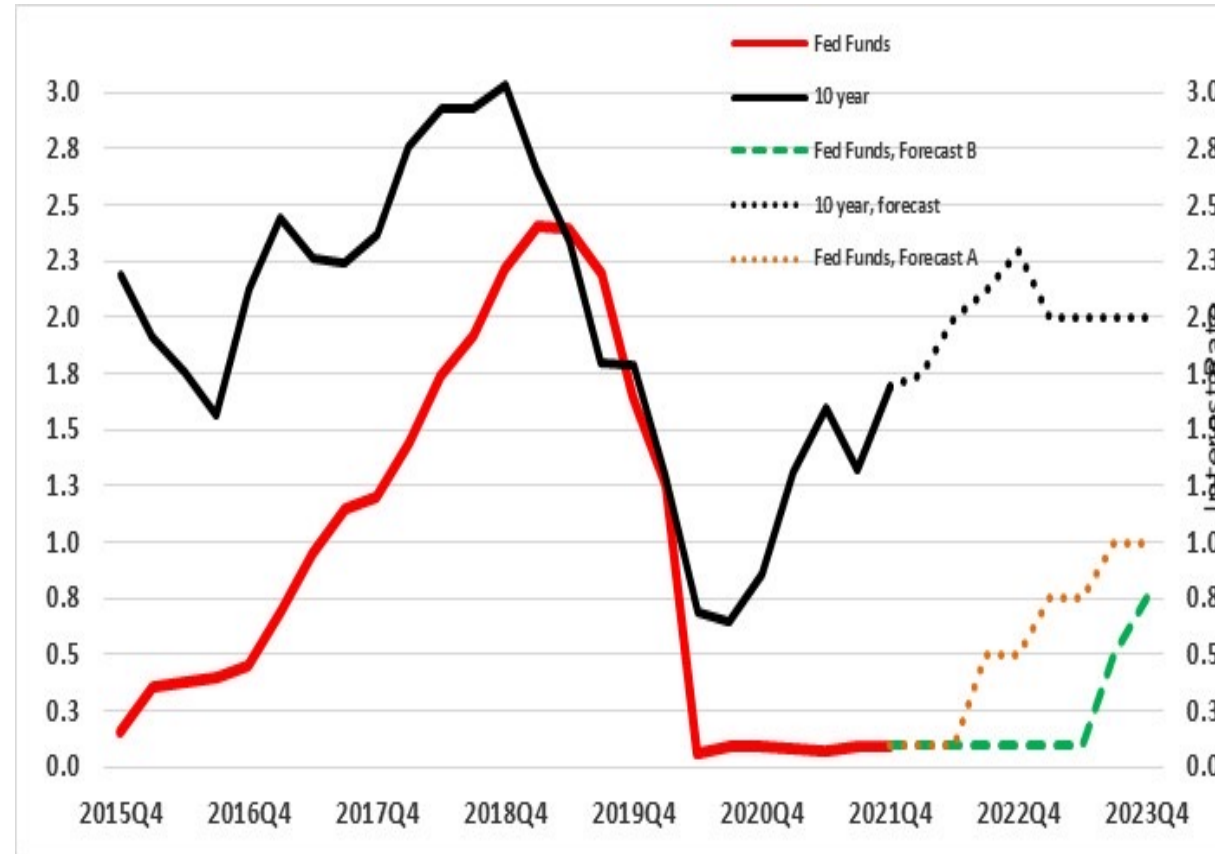


Interest Rates (quarterly, 2015 to 2023)

Fed's tapering is about to commence and run through mid-2022.

Currently, Fed is patient and watching. But is ready to move if necessary.

Long-term rates are well below the inflation rate and should move up somewhat.



Key Points

- **US Economic Growth solid**
 - Consumer spending and household balance sheet positive.
 - Expenditure mix to shift towards services.
 - Emphasis on investment growth likely but not a sure deal
- Major Uncertainty: Inflation and labor market.
 - What is “Temporary”?
- Supply Disruption rather than Demand Weakness is current issue.
- Outlook positive for Transportation and Freight Activity.



Freight Overview

Trucking:
great visibility
continues

- Stronger-for-longer freight cycle: consumer/restock
- Volumes capacity-constrained
- Longer-term fiscal support & pent-up demand

Ocean:
freight as far as the
eye can see

- Record containership queues
- Port congestion lengthening dwell times
- Extreme imbalance part of rate spike

Rail / Intermodal:
stymied by chassis
shortage

- Intermodal downturn on network constraints
- Auto production issues ongoing but improving
- Chassis shortage 6-12 month problem



Ocean Spot Rates Off the Charts

Freightos Baltic Index (FBX) Global Container Index

FBX Global Container Freight Index

05-Nov-21 / \$10,525



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fbx.freightos.com

“First world problems”

PACIFIC

FBX01

**China/East Asia to
North America West Coast**

\$18,730

↑ 7%

FBX02

**North America West Coast to
China/East Asia**

\$1,098

↑ 3%

FBX03

**China/East Asia to
North America East Coast**

\$19,895

↓ 1%

FBX04

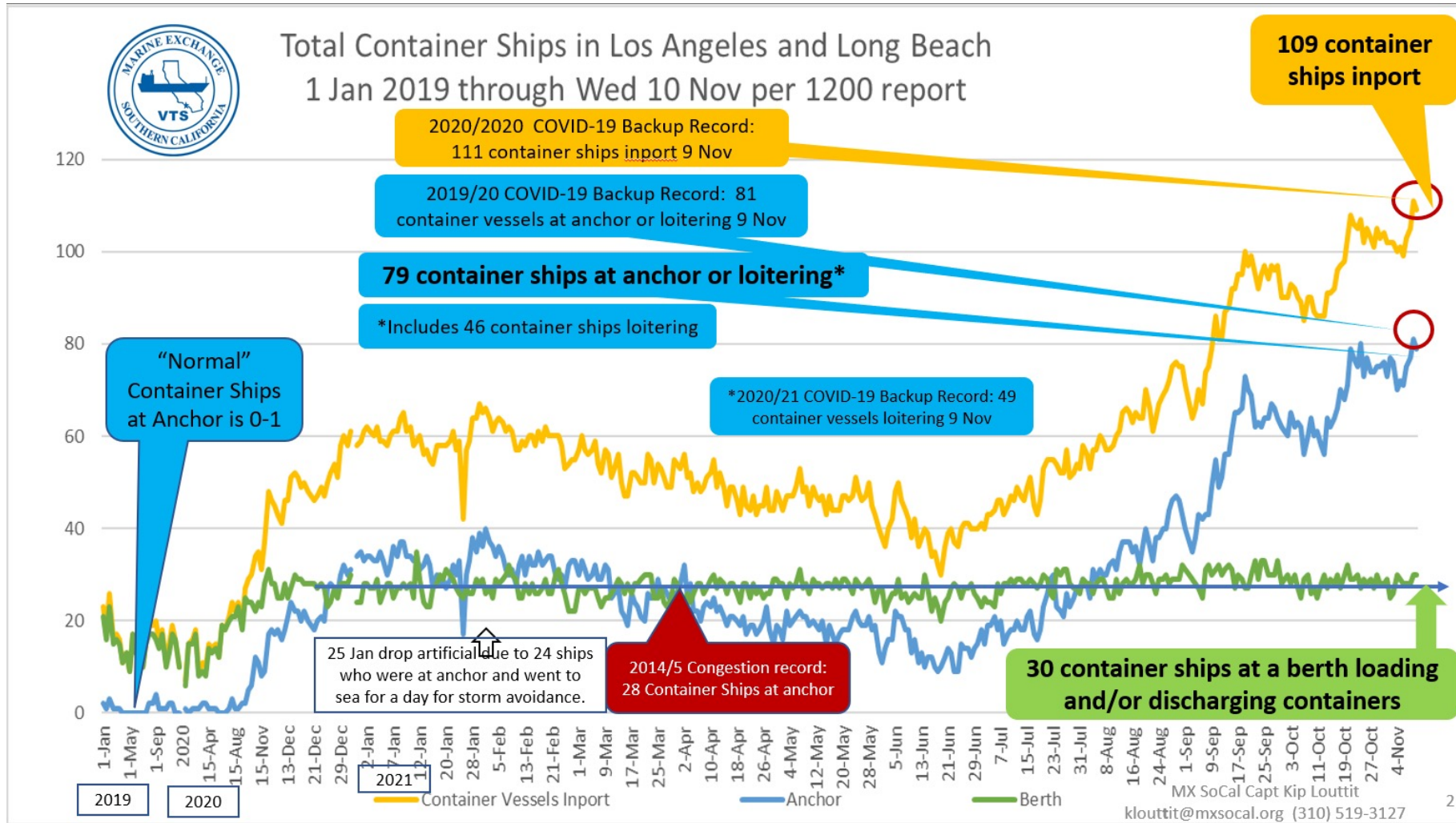
**North America East Coast to
China/East Asia**

\$1,237

↑ 4%



Port Congestion Provides Freight Visibility



NA Ports Still Swamped

Freight backlog into 2022



Slowdown Reflects Supply Bottlenecks

North American Class I Rail Volumes by Segment

	y/y % change											
	Q1'19	Q2'19	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20*	Q1'21	Q2'21	Q3'21	Q4'21TD
Intermodal	-1.3%	-4.5%	-4.7%	-7.4%	-7.9%	-12.9%	1.3%	9.7%	13.6%	22.9%	-1.3%	-7.4%
Chemicals	-0.3%	1.1%	-2.3%	-4.8%	2.2%	-11.4%	-4.5%	2.5%	-3.1%	14.2%	4.8%	4.8%
Metals	0.7%	-2.1%	-4.6%	-10.5%	0.0%	-23.0%	-15.1%	1.9%	-1.4%	32.6%	28.0%	9.9%
Automotive	-1.9%	0.2%	-0.4%	-5.8%	-5.3%	-69.3%	-4.8%	-2.0%	-8.1%	134.5%	-25.4%	-20.3%
Petroleum	18.8%	24.1%	9.8%	2.7%	14.4%	-32.1%	-29.6%	-23.0%	-18.9%	16.5%	13.3%	3.4%
Minerals/Sand	-5.8%	-9.8%	-4.4%	-6.5%	-7.5%	-22.0%	-20.6%	-8.8%	-9.0%	12.4%	11.7%	8.1%
Paper/Lumber	-0.8%	-4.8%	-8.2%	-7.6%	-3.3%	-11.5%	-6.9%	0.7%	0.9%	11.2%	5.8%	3.1%
Grain/Food	-1.7%	-1.0%	-3.4%	-2.8%	-0.5%	-6.1%	4.0%	14.6%	13.2%	8.9%	-9.9%	-4.4%
Coal	-6.4%	-1.0%	-8.7%	-14.8%	-16.7%	-36.3%	-25.9%	-16.5%	-5.3%	33.6%	17.5%	12.0%
Total	-1.5%	-2.4%	-4.2%	-7.3%	-5.6%	-19.5%	-6.4%	2.5%	4.5%	22.6%	1.7%	-2.6%
Carloads, ex-Intermodal	-1.6%	-0.5%	-3.8%	-7.2%	-3.5%	-25.2%	-13.2%	-4.1%	-3.3%	22.3%	4.8%	2.5%

Source: Company reports; ACT Research Co. LLC. Copyright 2021

*Excludes unusual 53rd week. Q4'21TD thru week 44.

Weekly North American Rail Volumes by Segment

	y/y % change													
Week ending:	8/7/21	8/14/21	8/21/21	8/28/21	9/4/21	9/11/21	9/18/21	9/25/21	10/2/21	10/9/21	10/16/21	10/23/21	10/30/21	11/6/21
Intermodal	-0.2%	-1.0%	-2.6%	-3.2%	-5.7%	-6.6%	-6.0%	-6.8%	-4.9%	-6.4%	-8.5%	-8.3%	-7.4%	-7.4%
Chemicals	8.1%	4.7%	4.1%	4.7%	-4.7%	0.9%	2.7%	0.3%	1.5%	2.6%	3.9%	6.3%	6.8%	3.6%
Metals	27.0%	25.9%	23.5%	24.4%	14.9%	18.7%	12.9%	19.0%	15.3%	6.0%	6.3%	7.7%	30.0%	22.5%
Automotive	-22.8%	-24.5%	-20.5%	-23.9%	-32.6%	-36.1%	-36.1%	-33.6%	-25.2%	-24.6%	-19.9%	-18.1%	-12.9%	-22.8%
Petroleum	12.5%	10.4%	18.3%	21.1%	11.4%	16.4%	4.7%	7.6%	2.4%	3.7%	7.5%	-0.5%	0.8%	3.2%
Minerals/Sand	12.4%	12.4%	12.9%	12.1%	11.1%	11.8%	7.0%	13.2%	10.4%	10.3%	8.6%	8.6%	7.8%	6.7%
Paper/Lumber	4.2%	4.9%	1.0%	7.5%	3.1%	5.4%	7.9%	5.5%	5.0%	4.1%	2.1%	6.3%	2.5%	1.8%
Grain/Food	-12.5%	-13.9%	-15.1%	-15.5%	-16.7%	-12.8%	-10.7%	-9.0%	-1.1%	-8.0%	-2.8%	-3.4%	-5.5%	-3.8%
Coal	18.3%	22.0%	5.7%	15.8%	13.5%	18.3%	14.0%	20.8%	13.2%	15.0%	1.0%	15.1%	16.2%	15.5%
Total	2.5%	1.6%	-0.4%	0.3%	-3.3%	-2.2%	-2.9%	-2.0%	-1.1%	-2.4%	-3.9%	-2.4%	-1.4%	-2.2%
Carloads, ex-Intermodal	5.2%	4.3%	1.9%	4.1%	-0.7%	2.2%	0.4%	3.0%	2.9%	1.7%	0.9%	3.9%	5.0%	3.3%

Source: Company reports; ACT Research Co. LLC. Copyright 2021

- Chassis shortage, terminal congestion, protests in Mexico slowing intermodal volume

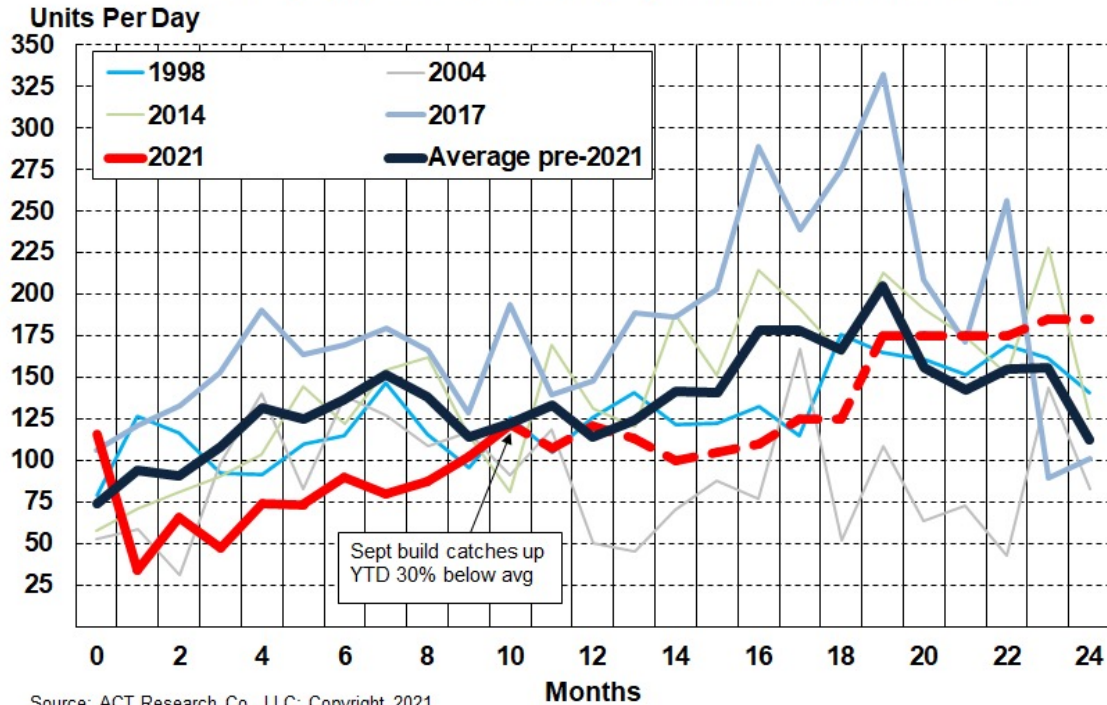
- Chip shortages slowing auto & truck manufacturing rebound

- Consistent past 10 weeks, but not in a good way

Chassis Shortage Snarls Intermodal Traffic

US Chassis: Arc & Duration of Peak Demand Cycle

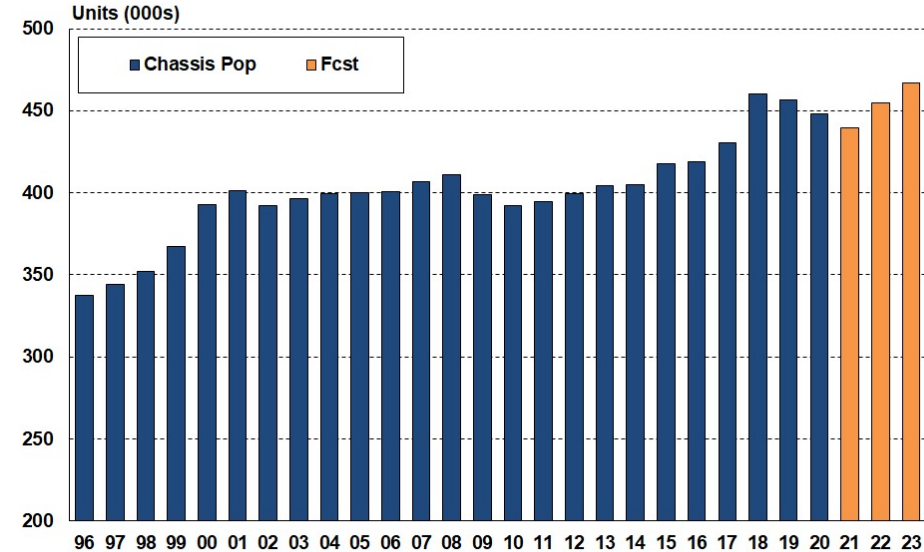
Build rate progression following cycle-initiating order intake



Source: ACT Research Co., LLC: Copyright 2021

U.S. Chassis Population

1996 - 2023E



Source: ACT Research Co., LLC: Copyright 2021

ACT Fleet Forecasts:

2% decline in 2021
5% drop since 2018
3% growth in 2022 & 2023

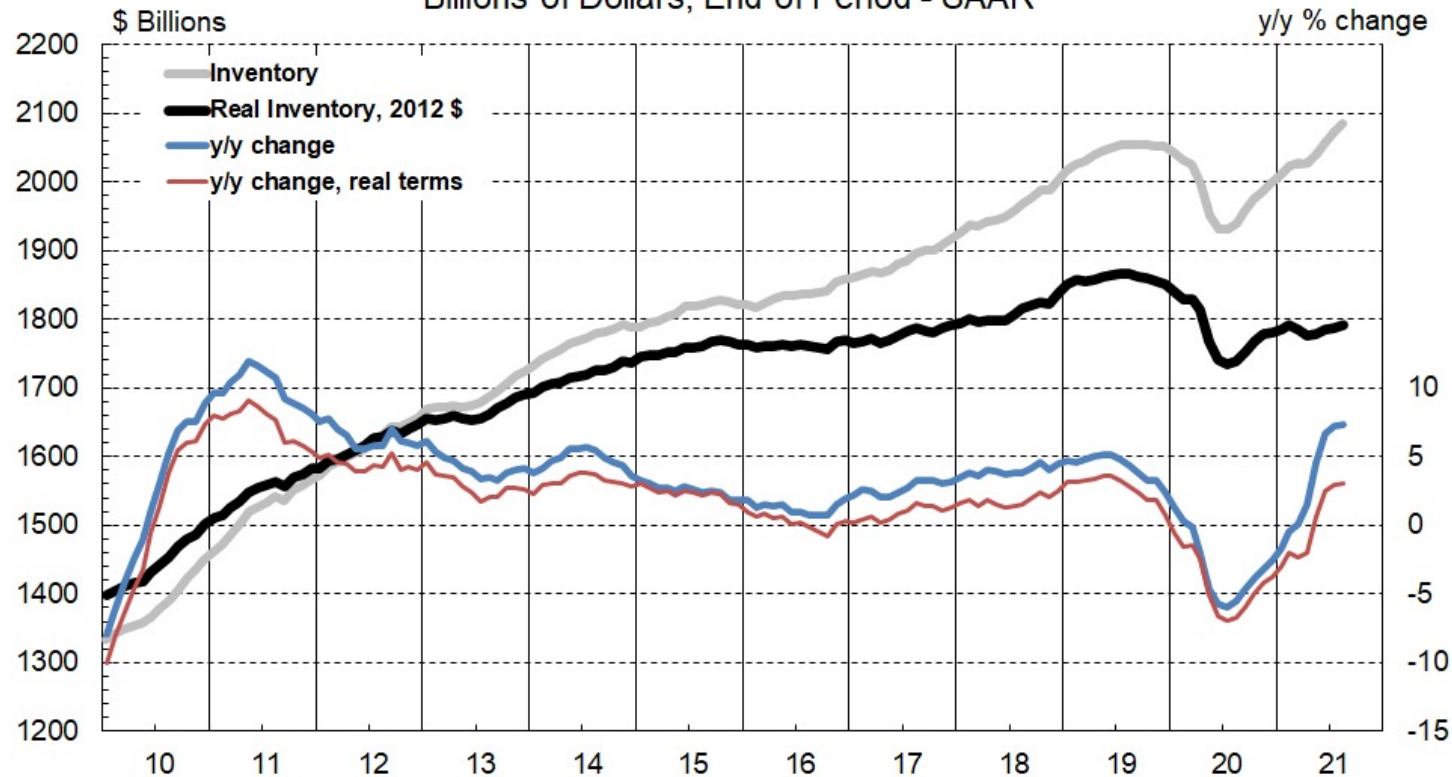
Implications: more freight on the highways & intermodal volume constraints to persist

Restock Challenged by Capacity Strains

Inventories: Total Business

January 2010 - August 2021

Billions of Dollars, End of Period - SAAR



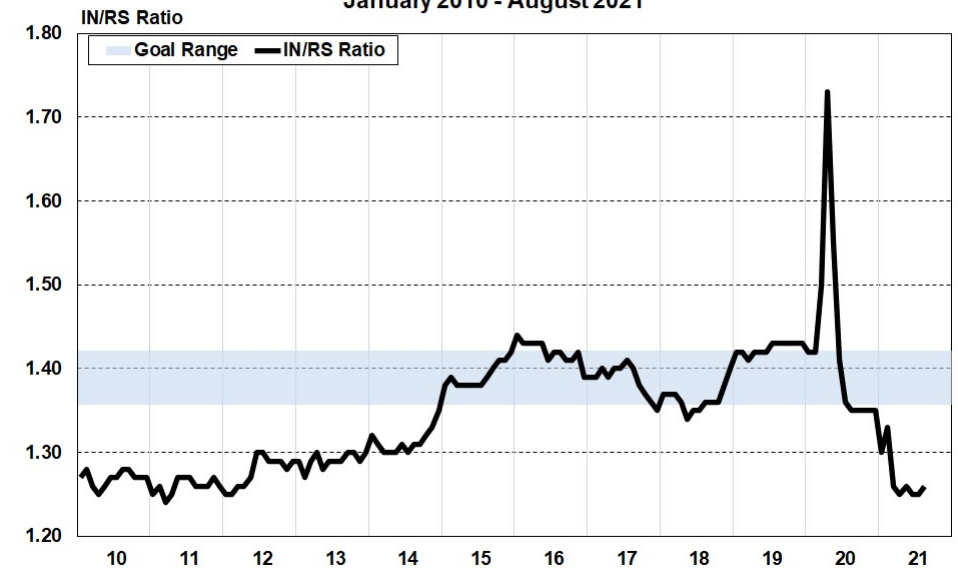
Source: Census Bureau, ACT Research Co., LLC: Copyright 2021

Great Restock of 2020-2022 driving ~1% US freight volume growth in 2021, 2%-3% in 2022

Inventory to Sales Ratio: Total Business

Index - SAAR

January 2010 - August 2021

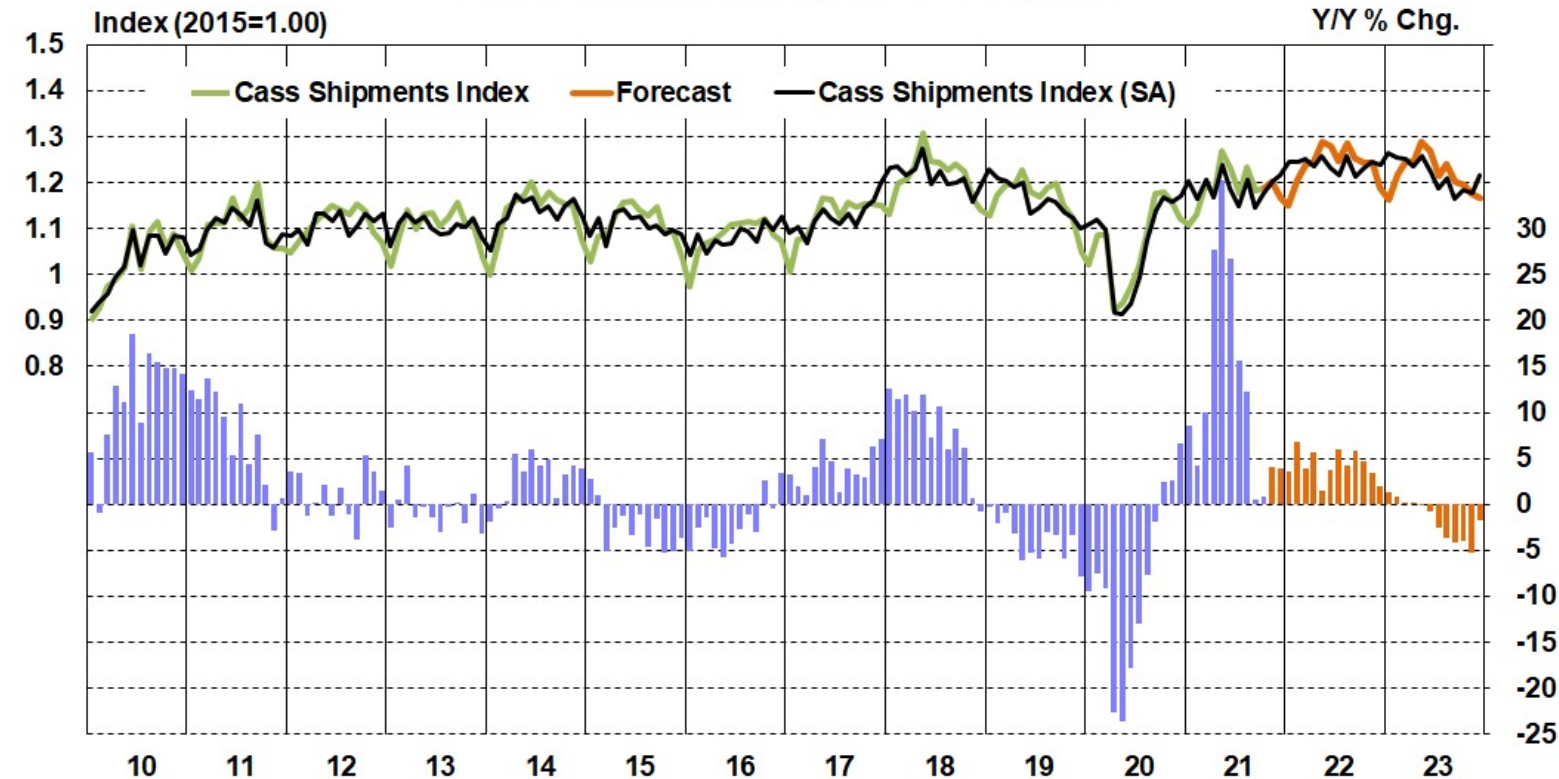


Source: Census Bureau, ACT Research Co., LLC: Copyright 2021

Freight Volume Outlook

Cass Shipments Index ^(R)

January 2000 - December 2023 Forecast



Source: Cass Information Systems, Inc., ACT Research Co., LLC: Copyright 2021

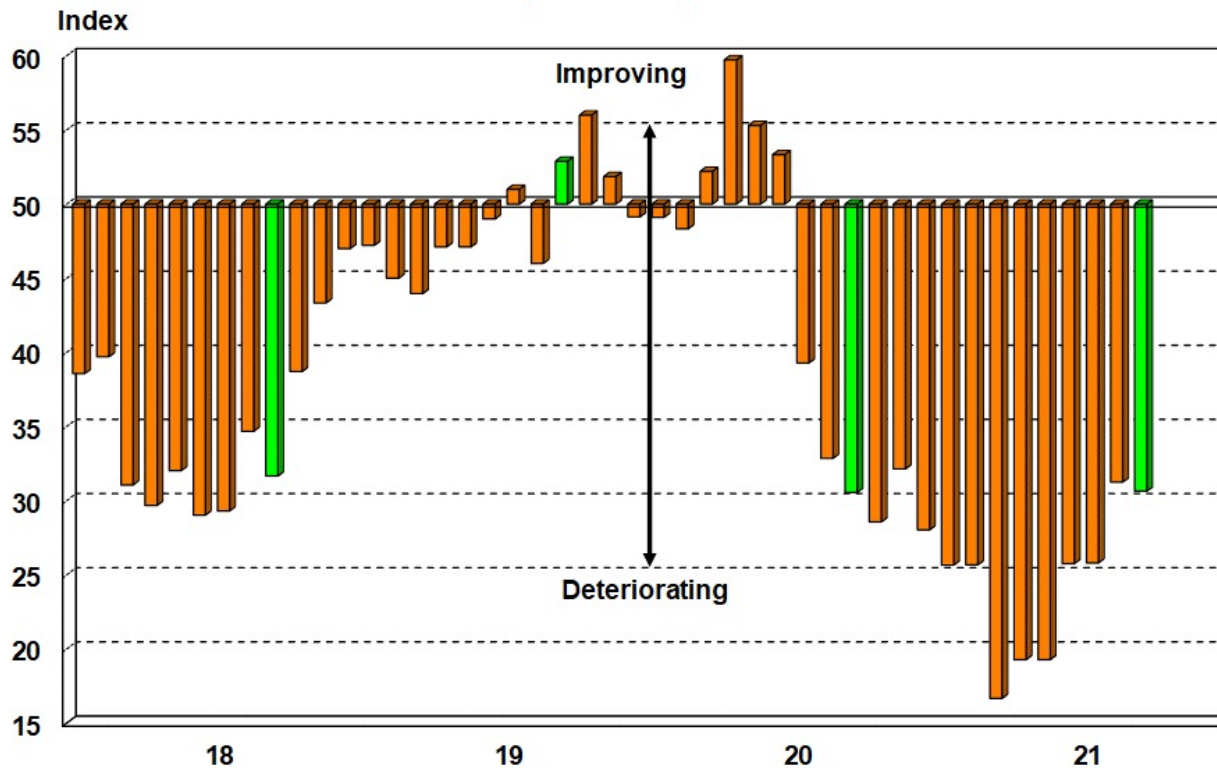
Stronger-for-longer freight cycle

- Led by goods demand, inventory restock
- Supply chain constraints holding volumes back
- Pent-up demand building in manufacturing / infrastructure
- Truck picking up slack from rail
- Substitution of spending back to services, private fleet growth, eventual end of restock to slow for-hire freight cycle in '22/'23***

Driver Availability Gradually Improving

ACT For-Hire Trucking Index: Driver Availability

January 2018 - September 2021



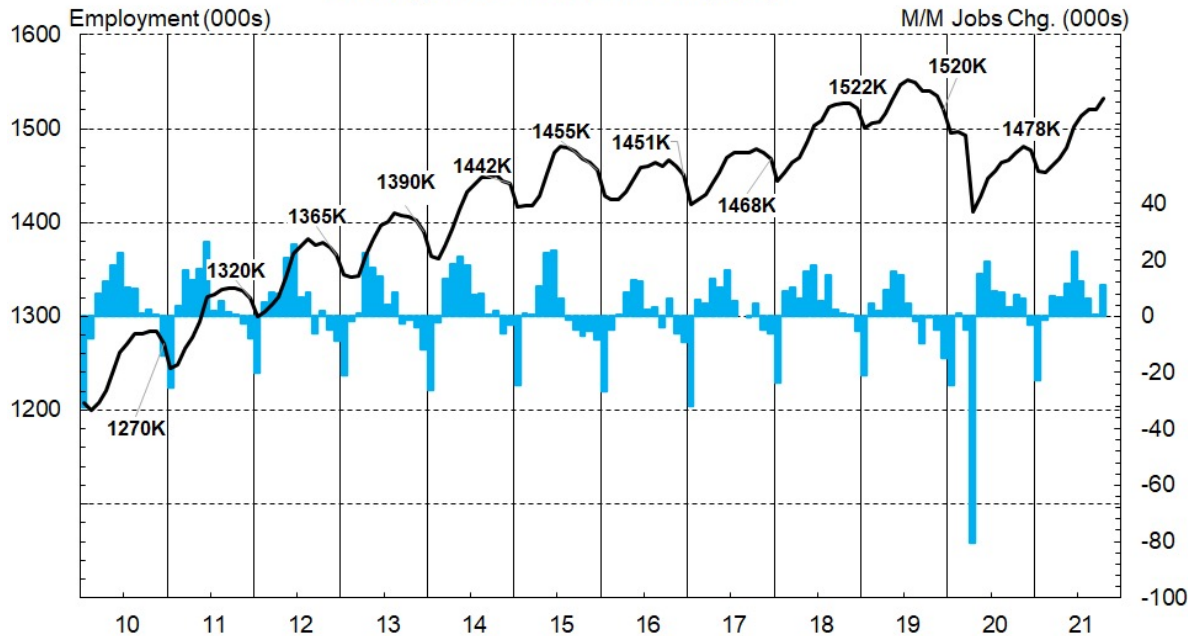
Source: ACT Research Co., LLC: Copyright 2021

- Considerable rise since curtailment of extended unemployment in June
- Trend maybe slowed by vaccine mandate
- Higher pay, rising vaccination rates and new COVID treatments should help further recovery

Improving Employment Trend

Truck Transportation Employment

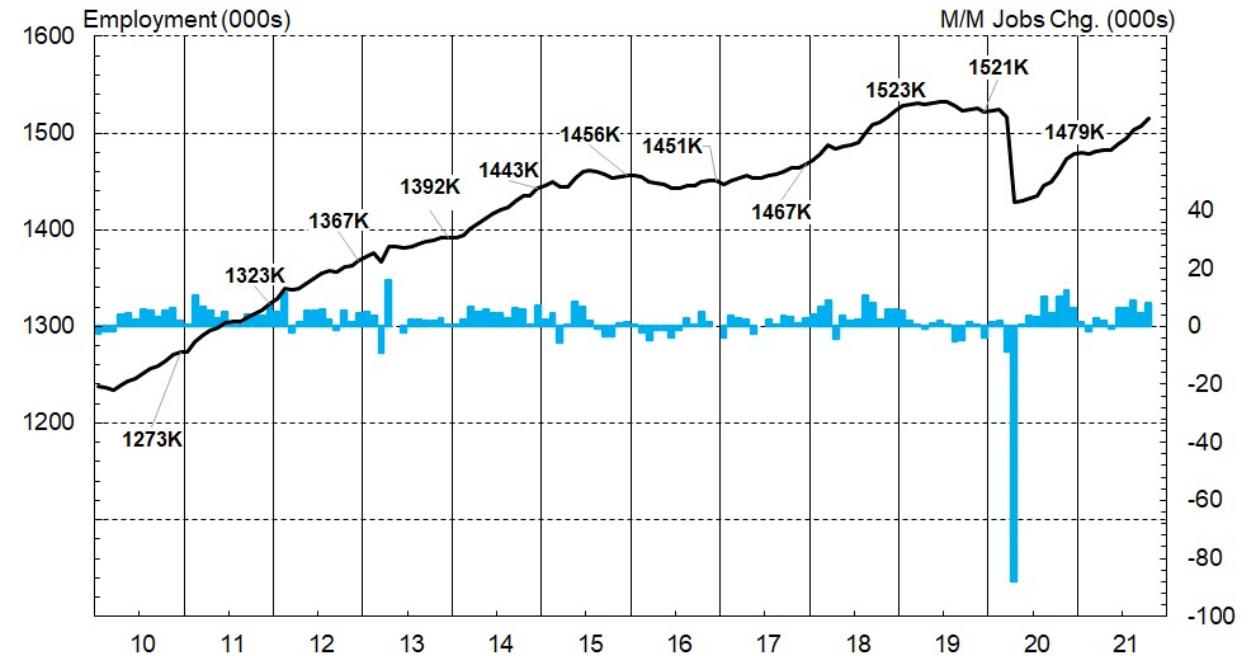
January 2010 - October 2021 (NSA)



Source: BLS, ACT Research Co., LLC: Copyright 2021

Truck Transportation Employment

January 2010 - October 2021 (SA)



Source: BLS, ACT Research Co., LLC: Copyright 2021

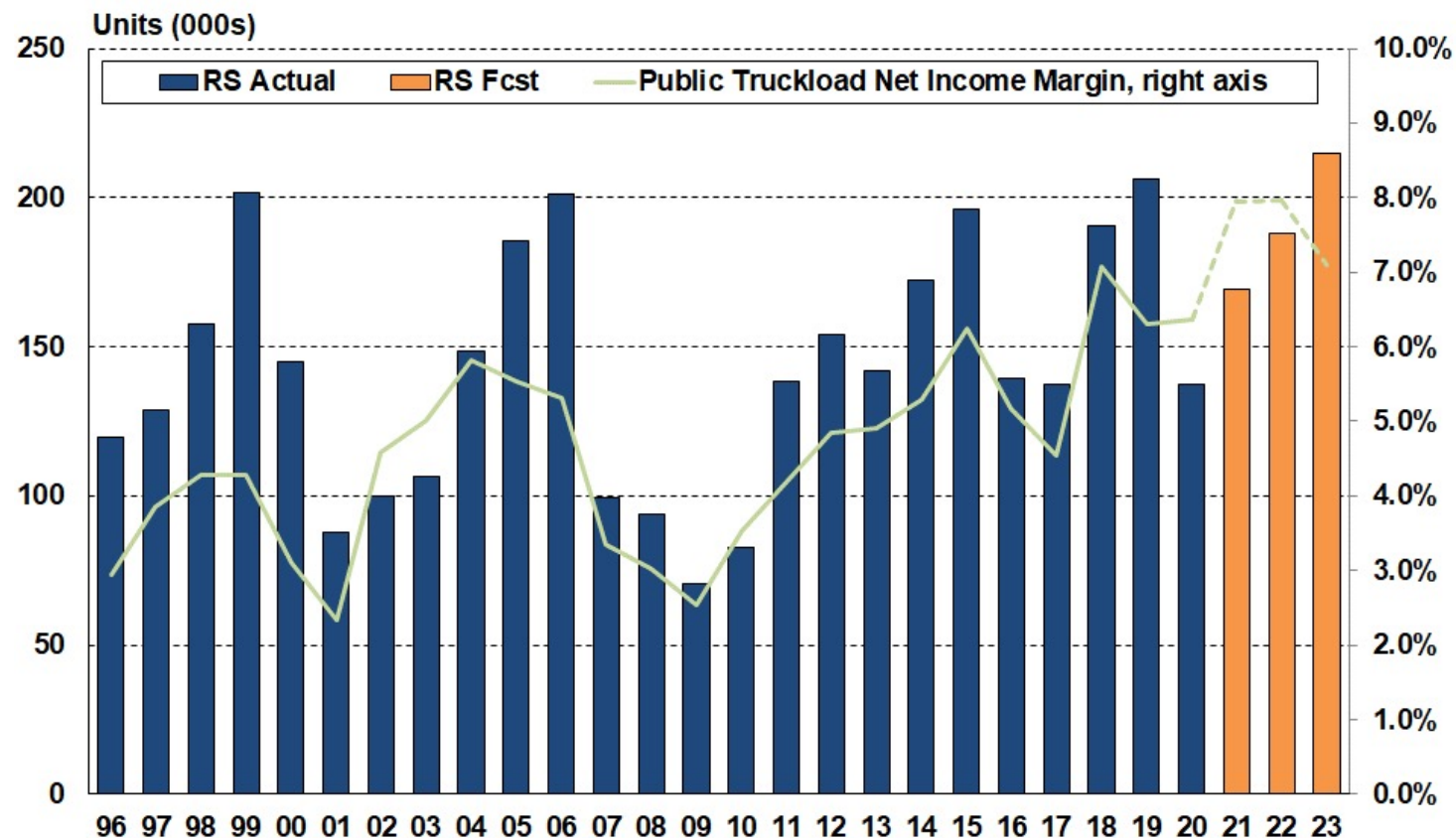
- June - October rate = 5.4% SAAR
- Pre-pandemic level likely next month



Record Carrier Margins = Record Truck Demand

U.S. Class 8 Tractor Retail Sales

1996 - 2023E



Source: ACT Research Co., LLC: Copyright 2021

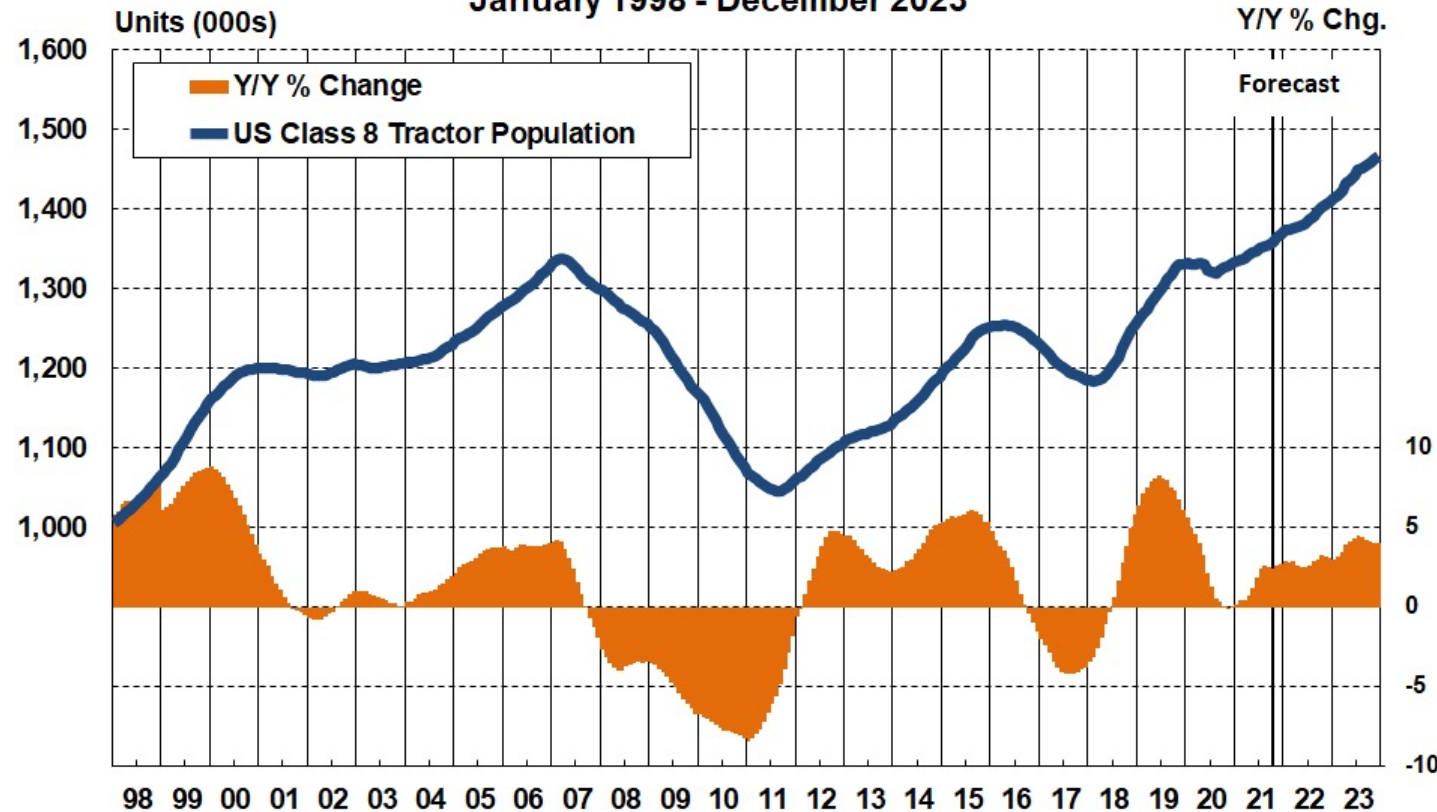
**C8RS well below demand,
keeping TL market
tighter-for-longer**

**Build constraints
persistent**

Tractor Population Growth Constrained Near-Term

U.S. Class 8 Active TL & LTL Tractor Population

January 1998 - December 2023



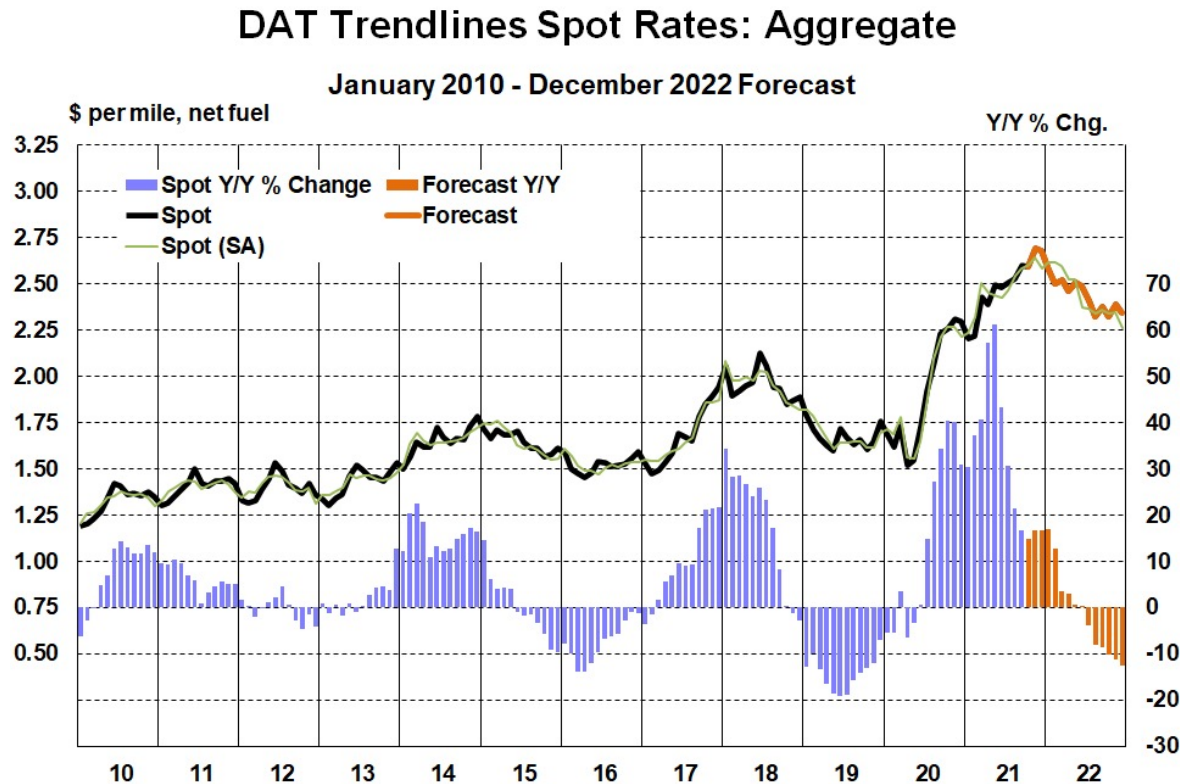
Source: ACT Research Co., LLC: Copyright 2021

Chip shortages slowing production and aftermkt, sidelining equipment

Capacity growth will accelerate into 2022



Truckload Spot Rate Forecasts

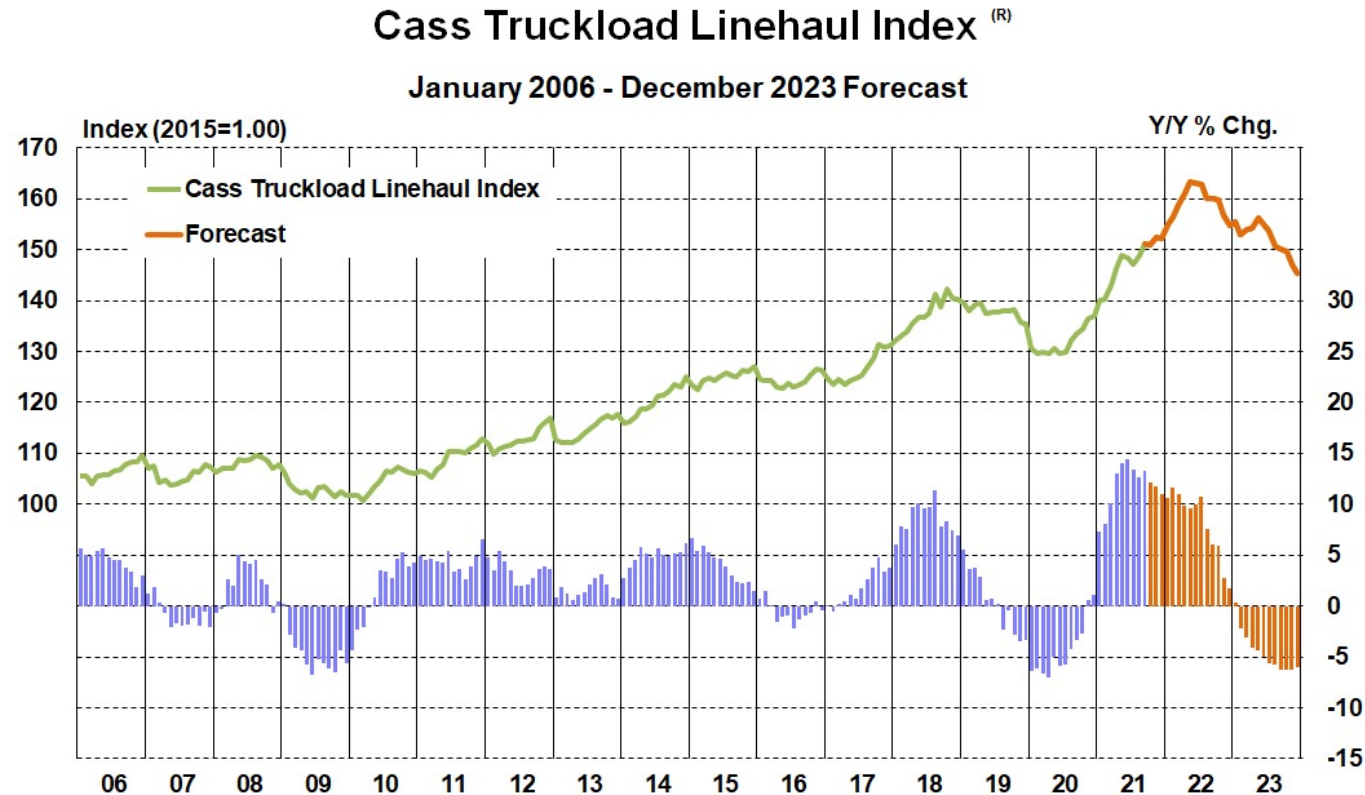


Source: DAT Solutions, ACT Research Co., LLC: Copyright 2021

- Upward pressure continuing near-term with labor/equipment constraints and strong peak
- Trajectory to change as capacity recovers and freight demand slows



Truckload Linehaul Rate Forecasts



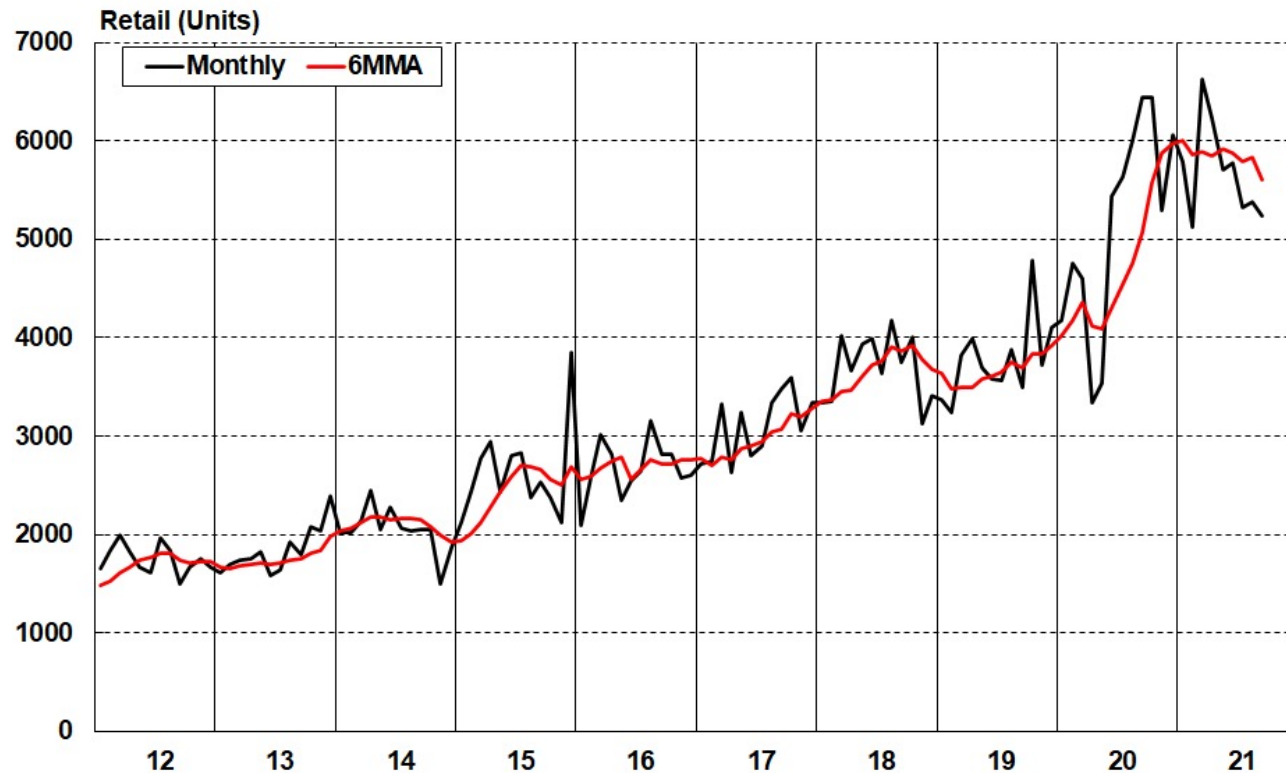
Source: Cass Information Systems, Inc., ACT Research Co., LLC: Copyright 2021

- Broad market rate measure follows spot rates, includes both spot and contract
- On track for high-single-digit increase in 2022, but trend change into 2023

Used Truck Volumes Under Pressure

Class 8: U.S. Used Truck Sales

January 2012 - September 2021 (Not Seasonally Adjusted)



Source: ACT Research Co., LLC: Copyright 2021

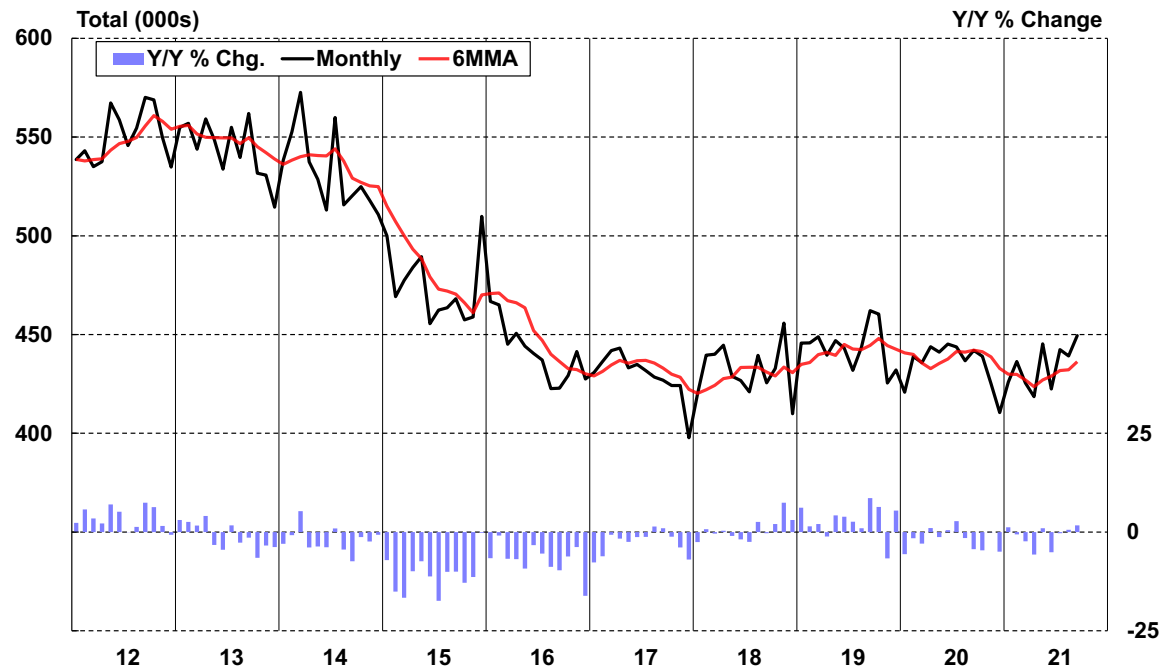
Volumes starting to trend down on lack of inventory



Miles and Age Trending Subtly Higher

Class 8: U.S. Used Truck Average Miles

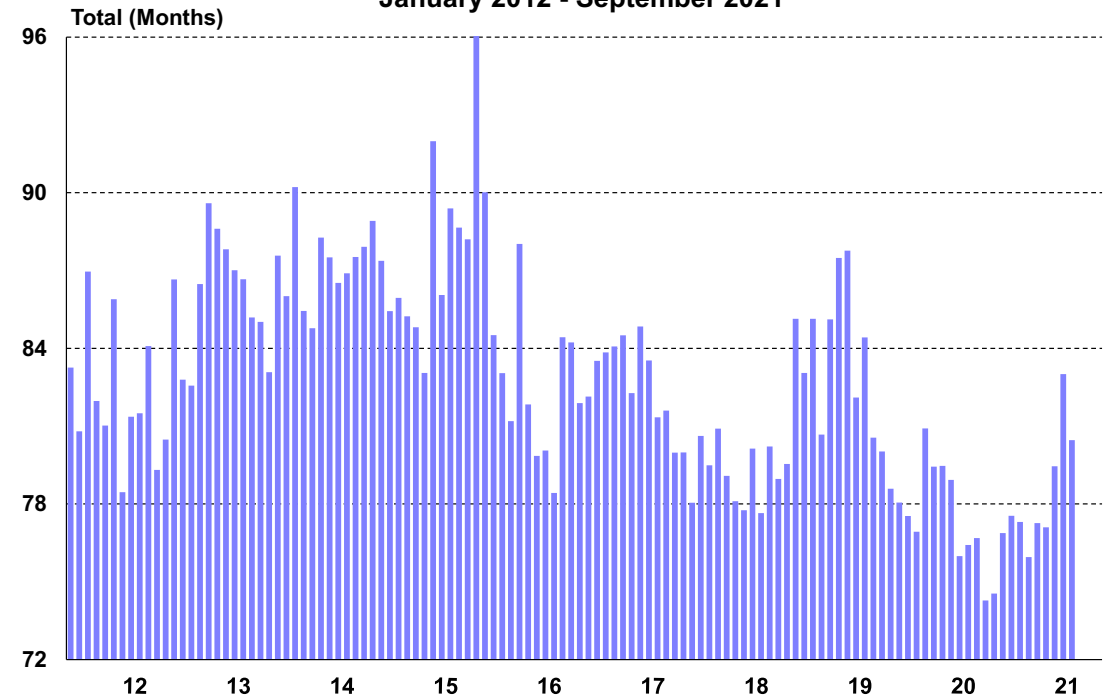
January 2012 - September 2021



Source: ACT Research Co., LLC: Copyright 2021

Class 8: U.S. Used Truck Average Age

January 2012 - September 2021



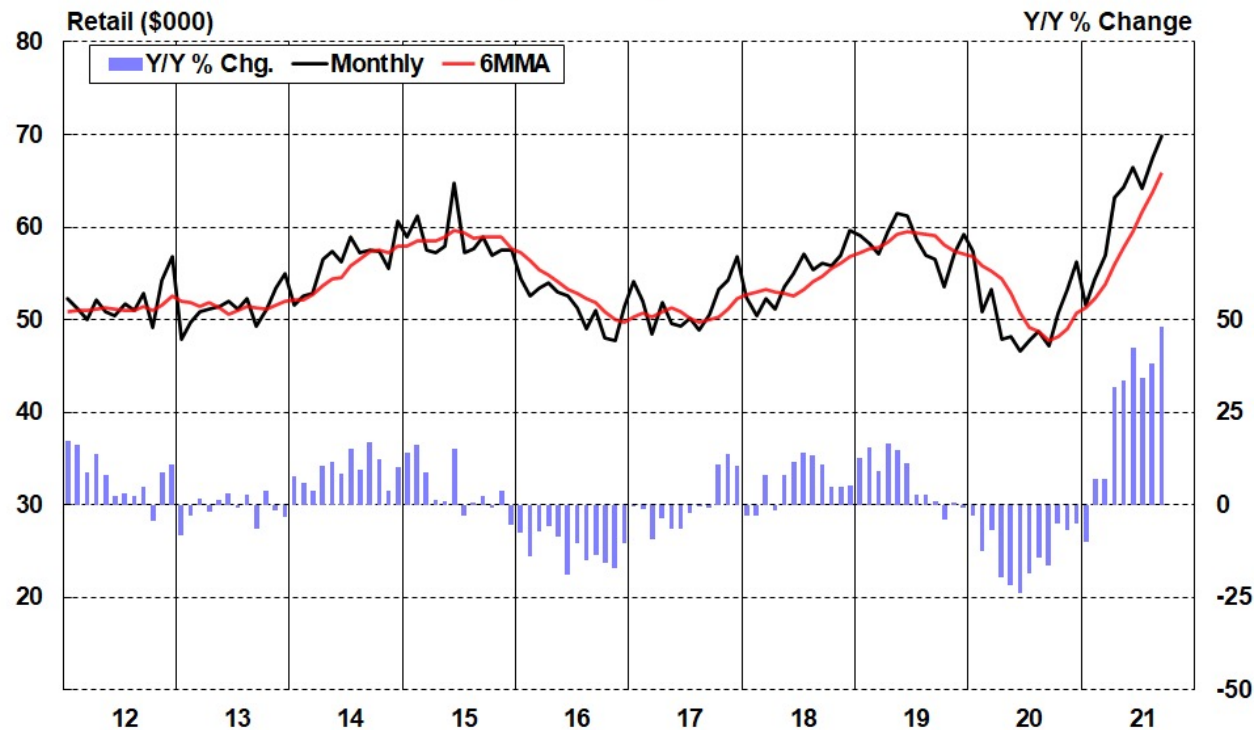
Source: ACT Research Co., LLC: Copyright 2021



Class 8 Used Truck Prices on Fire

Class 8: U.S. Used Truck Average Sale Price

January 2012 - September 2021

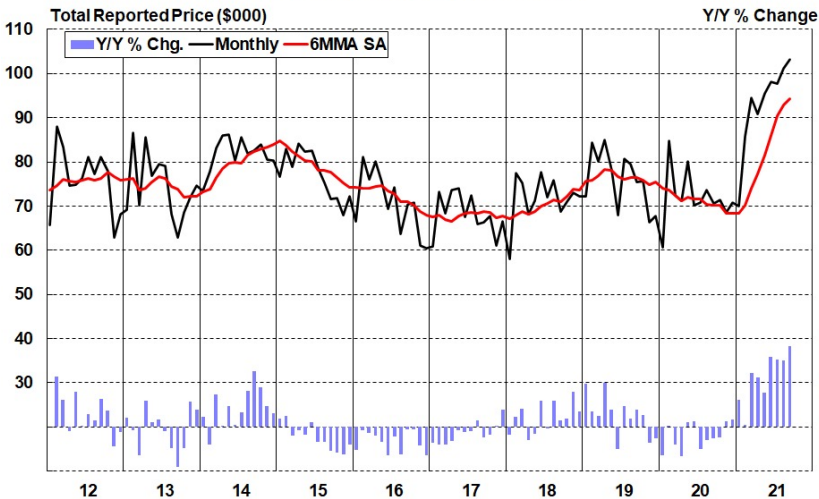


Source: ACT Research Co., LLC: Copyright 2021

**Record Class 8 Used
Truck prices – and it's
not over**

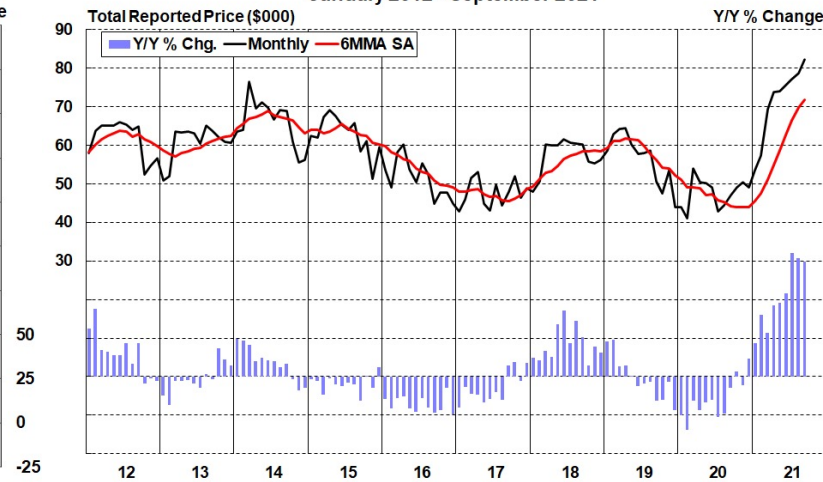
Class 8 Used Truck Prices on Fire

Class 8: U.S. 3 Year Old Used Truck Average Sale Price
3 year old, 300-400,000 miles
January 2012 - September 2021



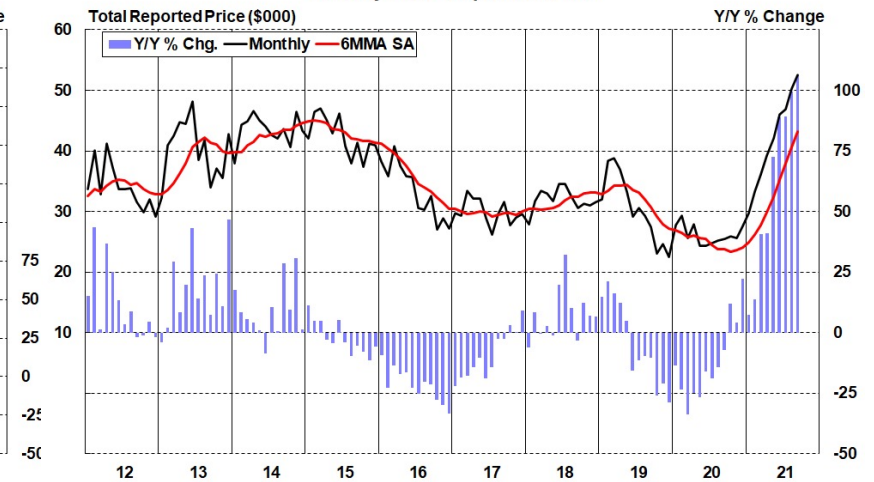
Source: ACT Research Co., LLC. Copyright 2021

Class 8: U.S. 4 to 5 Year Old Used Truck Average Sale Price
4 to 5 year old, 400-500,000 miles legacy
January 2012 - September 2021



Source: ACT Research Co., LLC. Copyright 2021

Class 8: U.S. 6 Year Old Used Truck Average Sale Price
6 year old, 600-700,000 miles
January 2012 - September 2021



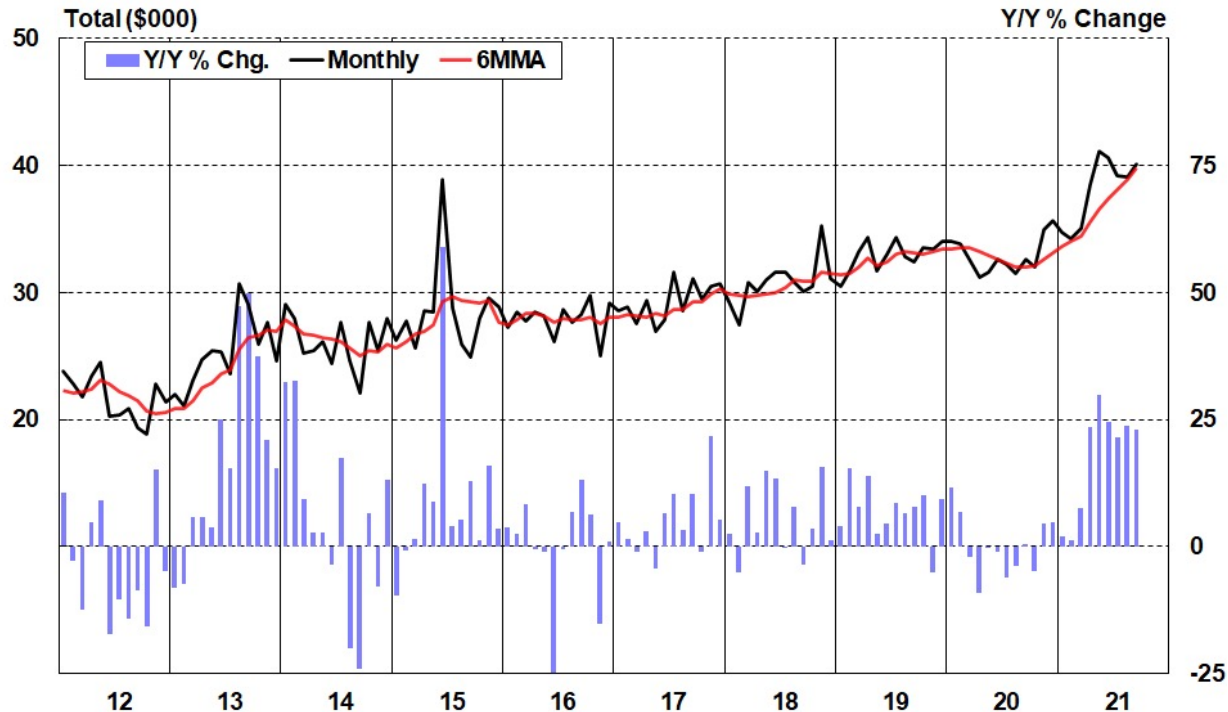
Source: ACT Research Co., LLC. Copyright 2021

Record Class 8 Used Truck prices – and it's not over

Record MD Used Truck Prices

Classes 6-7: U.S. Used Truck Average Sale Price

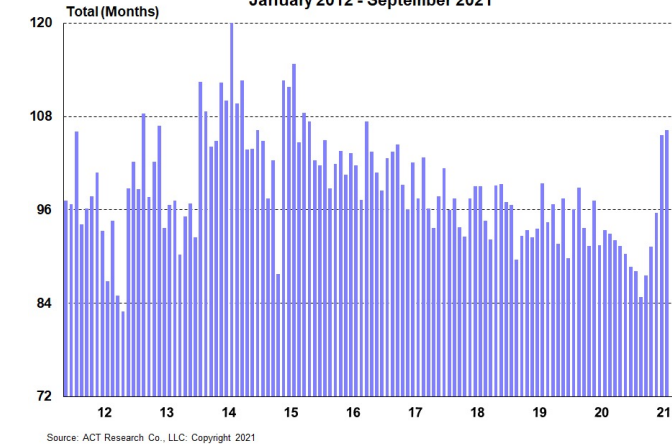
January 2012 - September 2021



Source: ACT Research Co., LLC: Copyright 2021

Classes 6-7: U.S. Used Truck Average Age

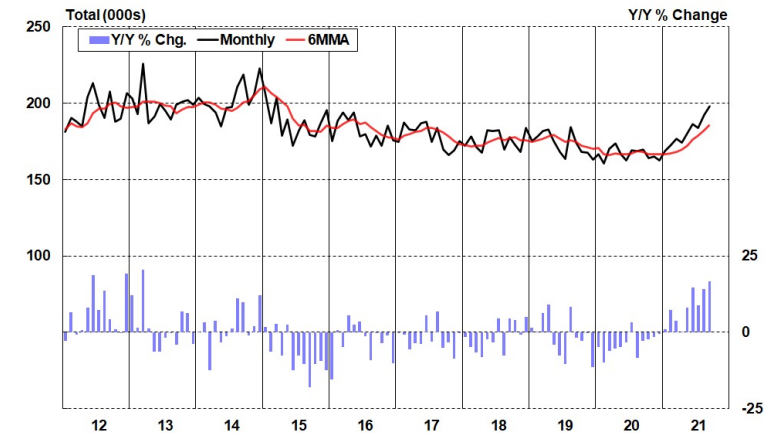
January 2012 - September 2021



Source: ACT Research Co., LLC: Copyright 2021

Classes 6-7: U.S. Used Truck Average Miles

January 2012 - September 2021



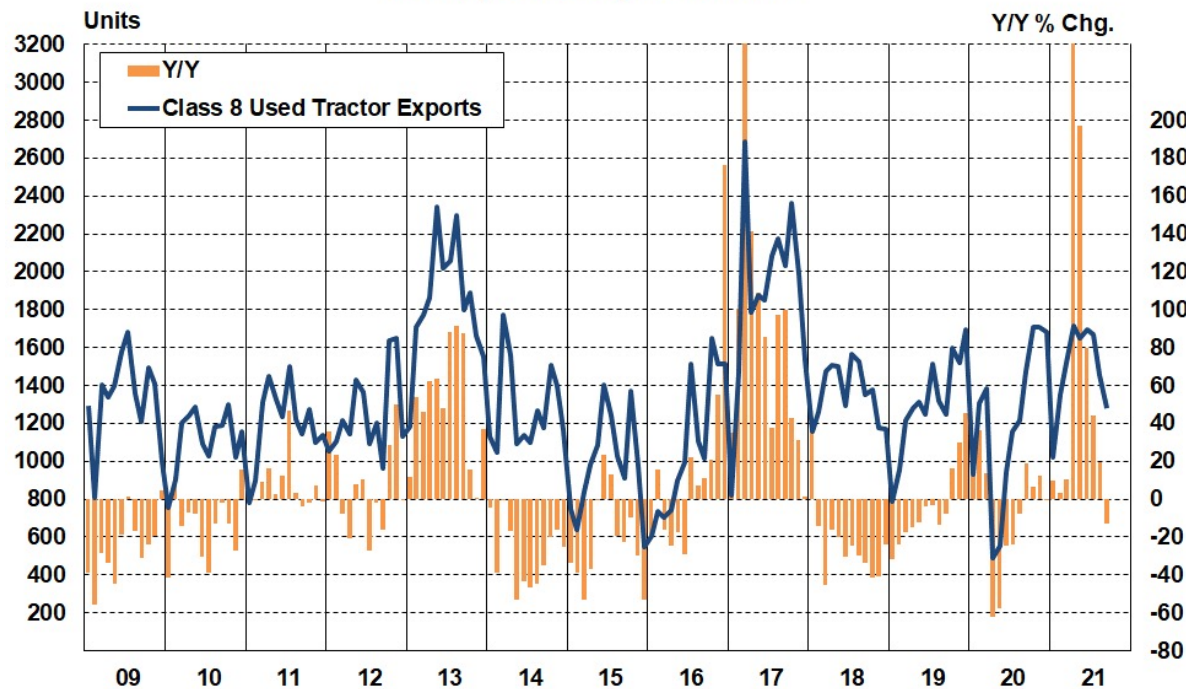
Source: ACT Research Co., LLC: Copyright 2021

New record MD prices, despite rising age and mileage

Exports Trending Up 20%-25% in 2021

Used Class 8 Tractor Exports

January 2009 - September 2021

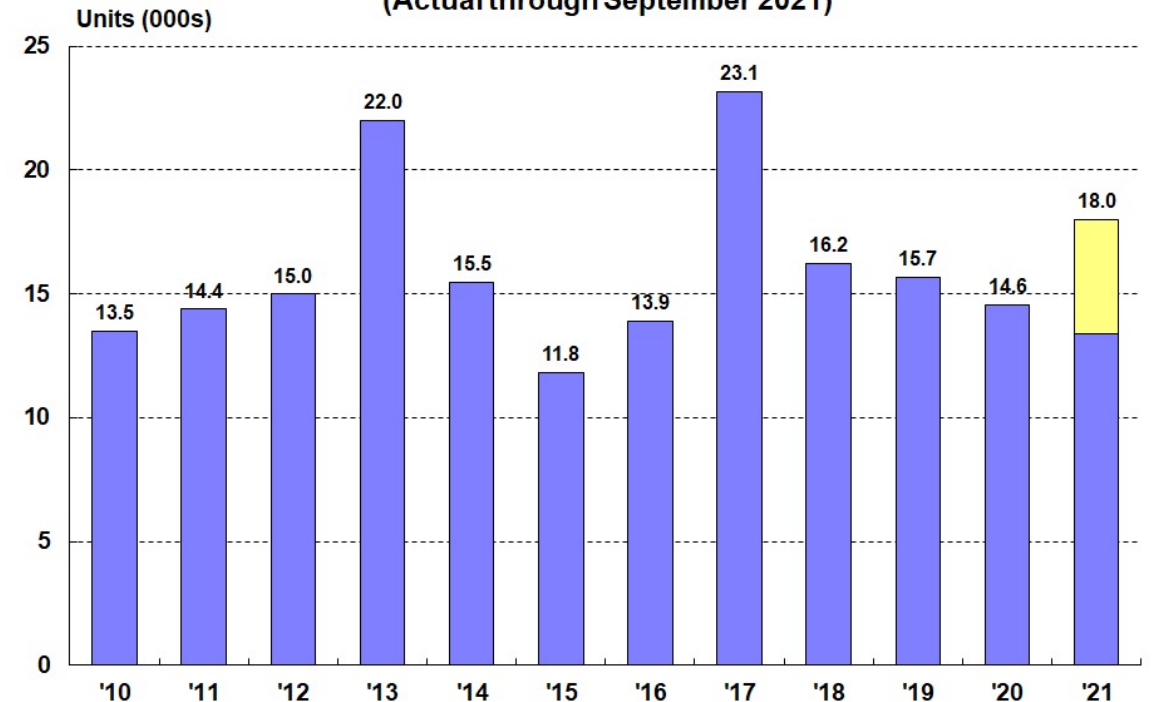


Source: ITC, ACT Research Co., LLC: Copyright 2021

Used Class 8 Tractor Exports

2010 - 2021

(Actual through September 2021)



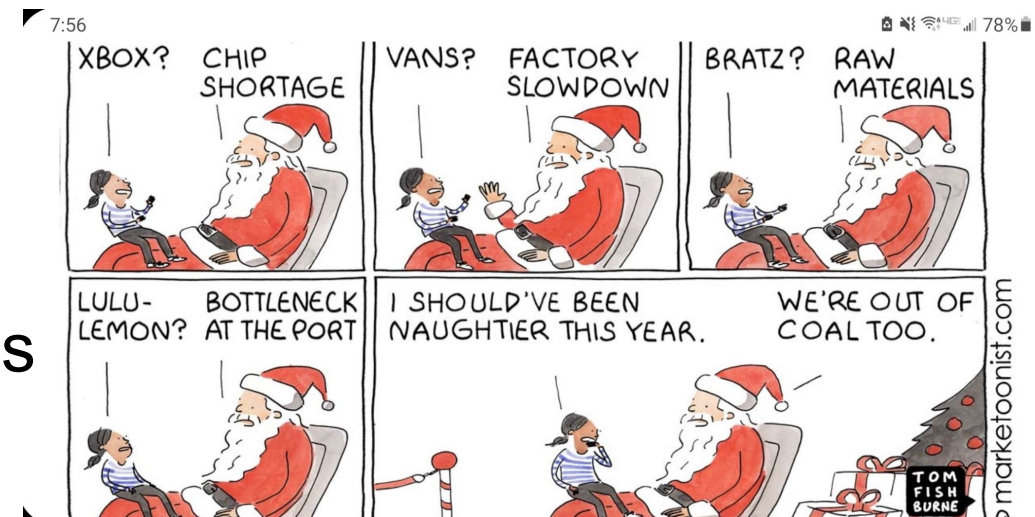
Source: ITC, ACT Research Co., LLC: Copyright 2021

Export volume to be pressured by price/ inventory



Known Unknowns

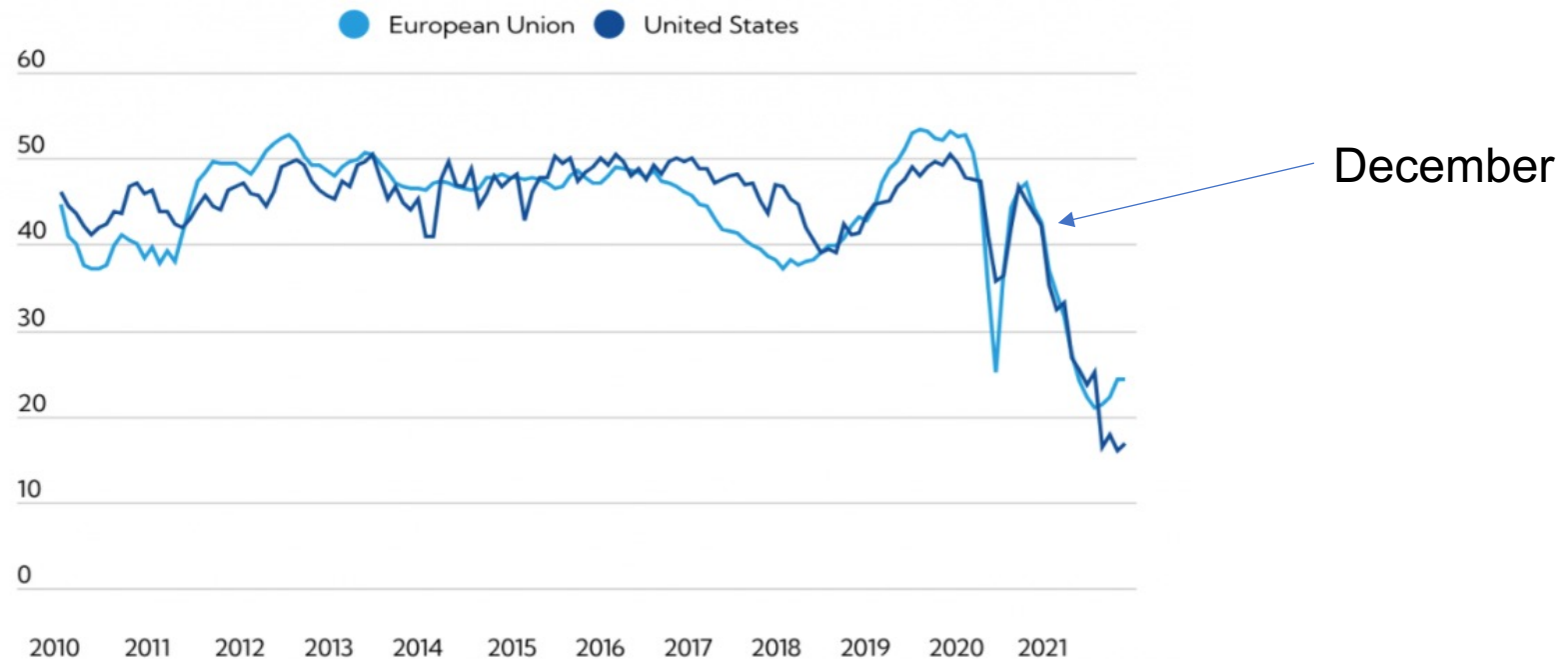
- Semi-conductors
 - ~24 months to bring a new silicon fab-shop online
 - ~15% silicon capacity coming on-line in 2021-2022
 - Reports: Mothballed Chinese 100mm fabs coming back
 - Reports: Double-ordering occurring
- From raw materials to sub-assemblies
 - Scores of SKUs reported as short ...
 - ... while other SKUs swim in capacity
- Labor
 - Secular and cyclical issues
- Domestic & *global* transportation challenges
- Equipment inflation



Supply-Chain Blues

Backlogs and bottlenecks: supply chain turmoil

Suppliers' delivery times in the US and EU have slowed considerably — a lower index reflects longer delivery times.
(Manufacturing PMI, suppliers' delivery times)



Sources: IHS Markit.

Note: PMI=Purchasing Managers' Index. Readings above 50 indicate faster delivery times, readings at 50 signal no change, and readings below 50 indicate slower.

IMF



Semiconductors 1

IBM CEO Arvind Krishna: Chip Shortage 'More Likely' Continuing Until 2023 Or 2024

Krishna said he sees any suggestion that a resolution could come by 2022 as 'optimistic,' and called upon the U.S. government to do more to support a larger return of semiconductor manufacturing to the country.

By [Kyle Alspach](#)

October 11, 2021, 06:04 PM EDT

The ongoing global chip shortage is going to be a problem for a lot longer, according to Intel CEO Pat Gelsinger, who reiterated today ahead of the company's Q3 earnings that he expects the shortage to extend until **at least 2023**. Oct 21, 2021

Tesla CEO Elon Musk recently called the semiconductor chip shortage a "**short-term**" problem, saying that "there's a lot of chip fabrication plants that are being built and I think we will have good capacity by next year." Oct 3, 2021

PUBLISHED SUN, OCT 3 2021 10:18 AM EDT



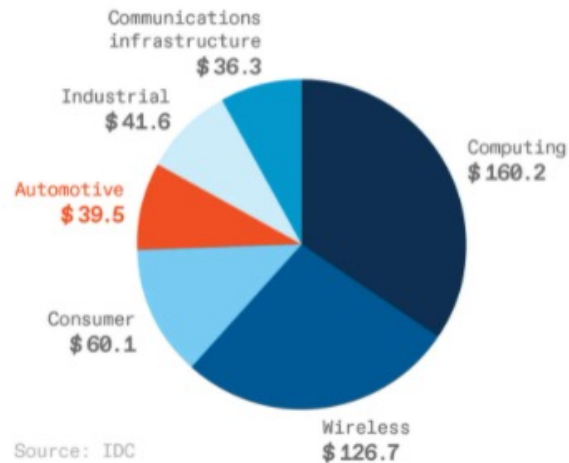
potentially beyond that, the CEO of semiconductor company [Marvell Technology](#) said.

"Right now, every single end market for semiconductors is up simultaneously; I've been in this industry 27 years, I've never seen that happen," said Marvell CEO Matt Murphy during a [CNBC Technology Executive Council](#) event on Thursday. "If it stays business as usual, and everything's up and to the right, this is going to be a very painful period, including in 2022 for the duration of the year."



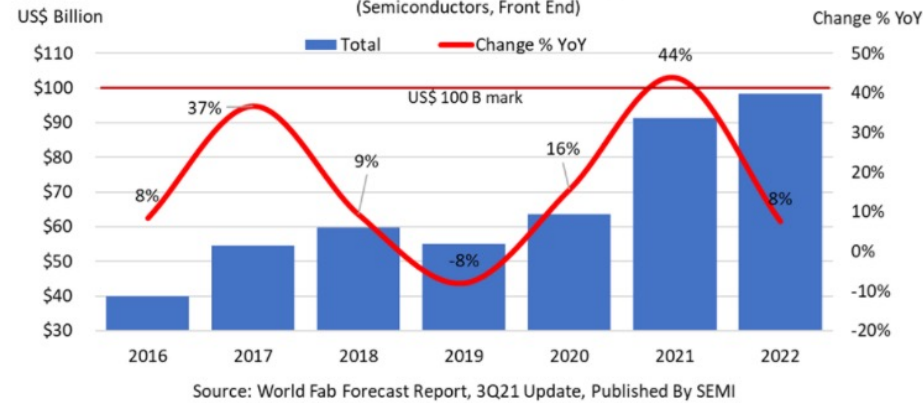
Semiconductors 2

CHIP DEMAND BY REVENUE
(U.S. \$billions)

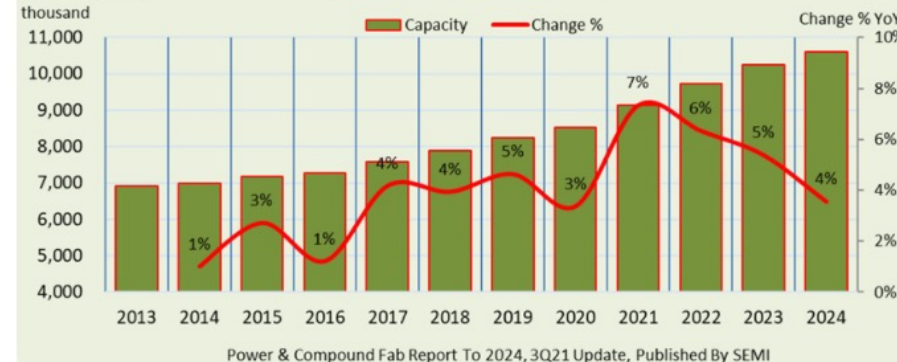


**200mm wafer
capacity forecast**

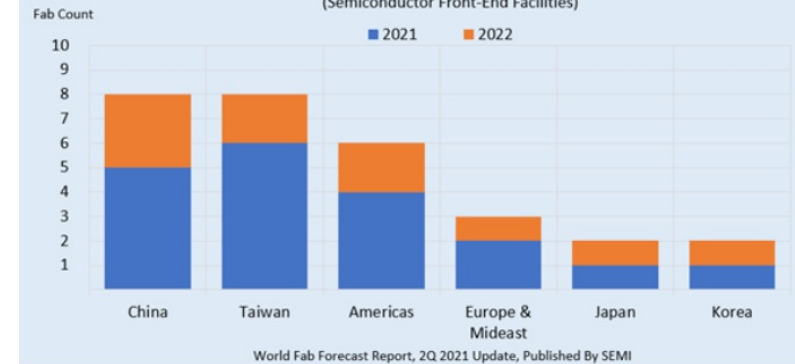
Fab Equipment Spending
(Semiconductors, Front End)



Power & Compound Capacity & Change %
(excluding EPI, probability >50%)



Projected High-Volume Fabs Starting Construction
(Semiconductor Front-End Facilities)

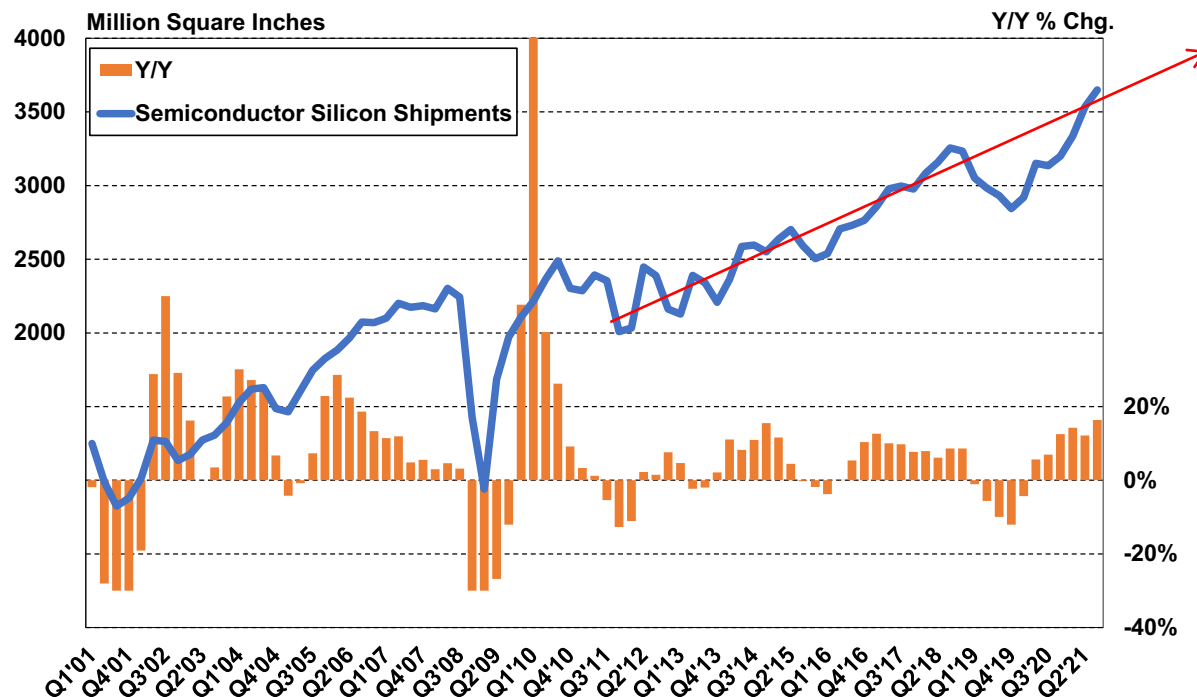


**31 new fabs breaking
ground in 2021-2022**

Semiconductors 3

Shipments of Silicon for Semiconductor Applications

Q1'10 - Q3'21



Source: SEMI, ACT Research Co., LLC: Copyright 2021

— Worldwide silicon wafer shipments increased 3.3% to 3,649 million square inches in [Q3'21], the SEMI Silicon Manufacturers Group (SMG) reported ... silicon wafer shipments grew 16.4% from the 3,135 million square inches last year.

3 questions:

- Are the 200mm fab capacity additions sufficient?
- How long does it take [parts] of the industry to migrate to 300mm fabs, thereby freeing up 200mm capacity?
- Where is the NA CV market in the global pecking order for semiconductors?

Chips Push Commodity Prices Past Peak?



STEEL



US HRC: Prices drop to lowest since July

Published date: 09 November 2021 US hot-rolled coil (HRC) prices dropped this week on lower sales and offers, amid continued limited spot market activity.

Share:



The Argus weekly domestic US HRC Midwest assessment dropped by \$70/short ton to \$1,840/st, the first time below \$1,900/st since 10 August and the lowest level since 20 July. The southern HRC assessment fell by \$55/st to

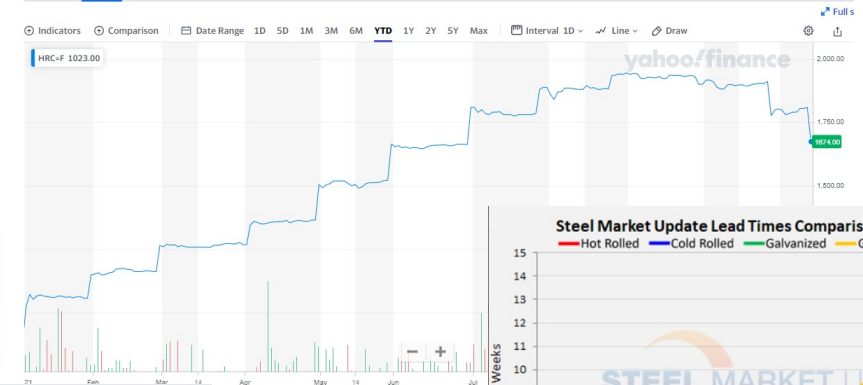
U.S. Midwest Domestic Hot-Roll (HRC=F)

COMEX - COMEX Delayed Price. Currency in USD

1,674.00 0.00 (0.00%)

As of 3:13AM EST. Market open.

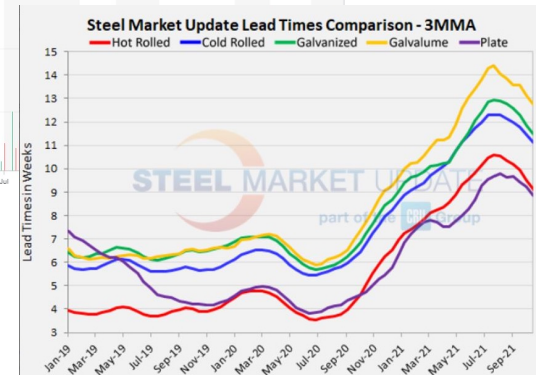
Summary Chart Historical Data Futures



Resin Report: Market Fundamentals Push Resin Prices Lower

NOV 09, 2021

Further price erosion at the start of the month brought all commodity PE grades below a dollar for the first time since February 2021.



Heavy Duty

- Backlogs in place. “Everything shortage” constrains build
 - Demand potential remains at record levels
- IN/RS ratio for tractors at particularly low levels
 - Vocational Class 8 inventories at the low end of normal
 - Inventory as misnomer: *Built but not delivered*
- Models indicate large under-build in 2021 and 2022
 - **Based on current assumptions, pent-up NA demand will be around 150k units by the end of 2022: US @120k; CN @15k; MX @10k**
- CARB Clean Truck likely 2023 prebuy in CA, NY, NJ
 - Question for 2023: **What is sustainable industry capacity?**
 - **Potential for production cliff in Q1'24**



Tractor Dashboard: Indicator of Indicators

Designed to provide 3-6 months of forward visibility on orders

ACT Research Class 8 Tractor Dashboard

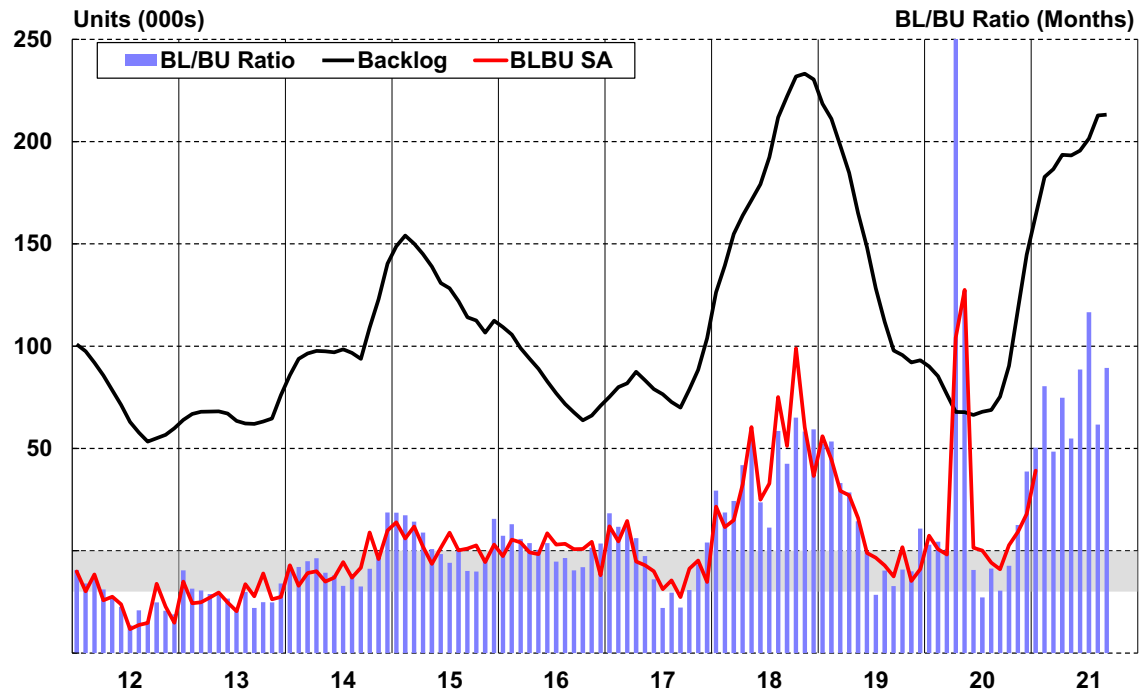
Category	Metric	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21
	Green Minus Red Tally	-5	-7	-10	-11	-8	-4	0	3	5	7	10	8	13	14	13	15	15	12	14	15	10
	Positive Indicators (Green)	3	2	1	2	2	3	7	8	9	9	11	11	13	14	13	15	15	13	14	15	10
	Neutral Indicators	4	4	3	0	3	5	1	2	2	4	3	1	2	1	2	0	0	1	1	0	5
	Negative Indicators (Red)	8	9	11	13	10	7	7	5	4	2	1	3	0	0	0	0	0	1	0	0	0
Macro &	ISM Mfg PMI Index	50.9	50.1	49.1	41.5	43.1	52.6	54.2	56.0	55.4	59.3	57.5	60.7	58.7	60.8	64.7	60.7	61.2	60.6	59.5	59.9	61.1
Financial	Non-Auto Durables Mfg Output**	-1.6	-1.4	-2.6	-9.5	-13.5	-15.1	-14.9	-13.6	-11.5	-8.5	-5.0	-0.8	5.0	9.7	15.8	19.9	15.1	11.5	10.0	8.9	8.3
	Consumer Spend, Goods only**	4.3	3.8	2.6	-3.4	-3.2	-0.7	2.2	4.8	8.0	10.7	12.3	12.5	15.5	16.1	20.6	22.9	15.4	13.1	11.4	10.5	9.0
	Residential Const Expend (real) **	9.1	10.8	10.9	8.4	4.4	1.3	-0.1	1.1	2.5	5.4	8.7	13.8	19.7	25.5	30.6	34.2	33.0	28.2	22.2	16.2	12.0
	Dow Jones Trucking Stock Index	833.1	779.5	766.6	840.2	974.0	963.4	1058.7	1143.3	1069.3	1034.0	1112.6	1102.4	1073.9	1175.9	1293.1	1340.4	1357.0	1293.7	1331.4	1399.2	1345.7
Freight	Cass Freight Shipments**	-9.6	-12.7	-13.8	-19.1	-22.3	-22.2	-20.8	-16.4	-8.3	1.1	8.6	14.1	15.7	16.3	22.0	26.5	24.6	19.7	12.7	9.1	6.3
	DAT Loads/Truck	4.6	3.4	3.9	1.3	2.3	3.6	6.0	7.4	6.7	6.0	6.4	7.3	8.5	14.9	9.7	9.0	10.7	7.5	10.0	11.2	8.9
	DAT Aggregate Contract/Spot Spread	24	31	23	39	36	19	6	-6	-14	-11	-13	-10	3	3	-11	0	-8	-5	-4	0	-7
	DAT Dry Van Spot Rate*	-5.5	-5.4	3.6	-6.4	-3.4	0.7	14.9	27.3	34.4	40.5	40.3	30.8	30.3	37.2	40.7	57.2	61.2	43.3	30.7	21.4	16.9
	Cass Freight/US Cl8Tractor Pop Growth Gap	-15.1	-17.2	-17.3	-21.5	-23.5	-22.1	-19.6	-14.4	-5.8	3.7	11.0	16.0	17.1	17.1	22.1	25.7	23.1	17.7	10.4	6.8	4.0
ACT data	Cl 8 Cancellations (SA)	1117	1781	5962	3334	1465	1117	1431	1330	1146	916	2600	4019	1017	1520	2427	1954	1215	5628	1044	1933	2120
	Cl 8 I/S ratio (SA)	3.98	3.60	4.19	4.22	4.69	4.12	3.75	2.66	2.78	2.76	2.32	2.83	1.95	2.10	2.21	2.00	1.97	2.23	2.18	2.00	2.25
	Class 8 Inventory Level (000 SA)	82.4	81.3	78.4	65.7	60.3	61.6	61.5	58.3	57.2	57.2	56.7	57.5	56.0	52.2	51.9	50.3	51.1	48.0	42.2	40.6	40.5
	Class 8 Net Orders to Build (6mma,SA)	0.61	0.66	0.66	0.65	0.69	0.76	0.92	1.06	1.38	1.42	1.58	1.69	1.70	1.82	1.78	1.81	1.62	1.57	1.63	1.59	1.58
	ACT For Hire - Volume less Capacity	53.5	48.8	44.9	26.9	50.2	71.1	66.3	69.0	74.1	74.9	67.5	66.6	63.9	60.1	68.1	69.3	63.0	60.5	67.2	62.1	60.8

All measures are levels, except *=Year/Year %
Change and **=12 month CAGR Rate of Change

Key Ratios: Backlog & BL/BU

Class 8 Tractor: N.A. Backlog & BL/BU Ratio

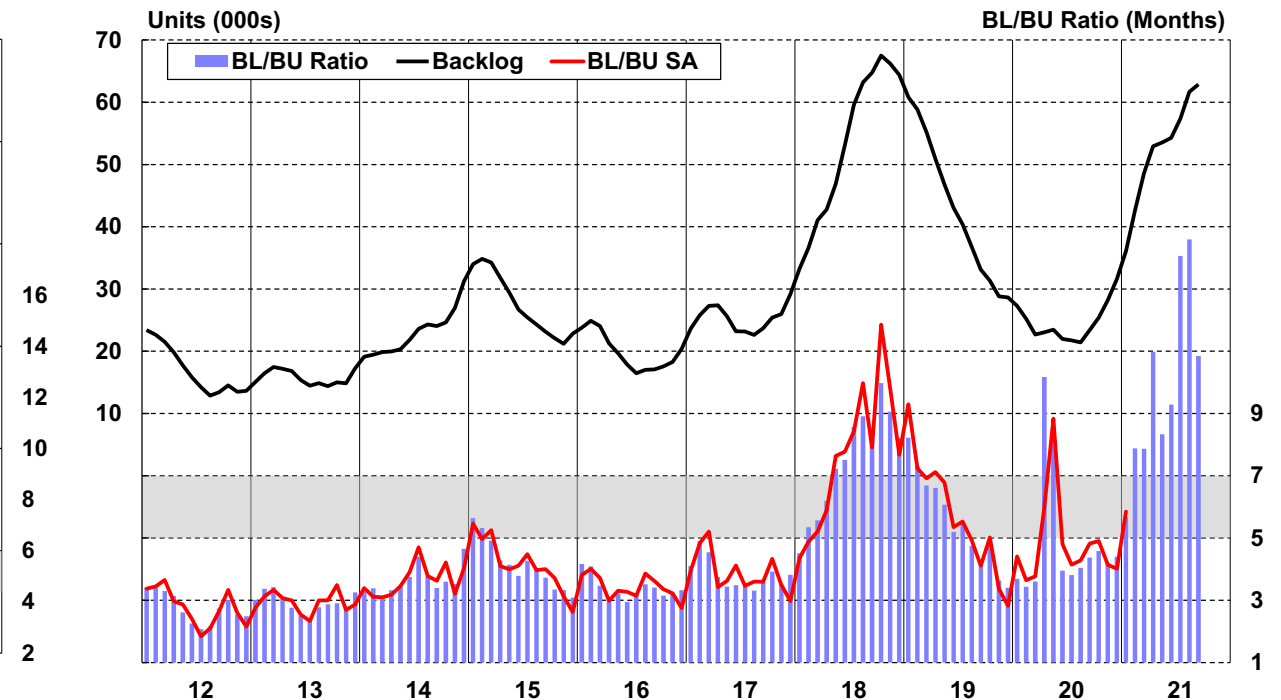
January 2012 - September 2021



Source: ACT Research Co., LLC: Copyright 2021

Class 8 Straight Truck with Day Cab: N.A. Backlog & BL/BU

January 2012 - September 2021

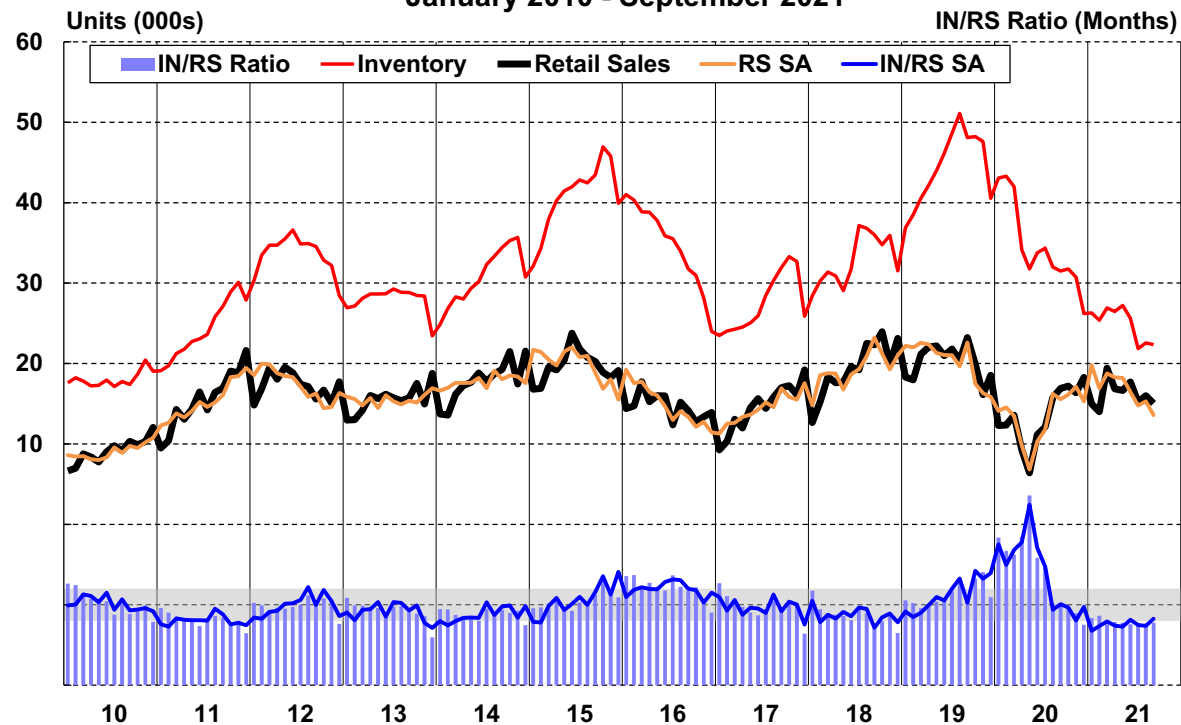


Source: ACT Research Co., LLC: Copyright 2021



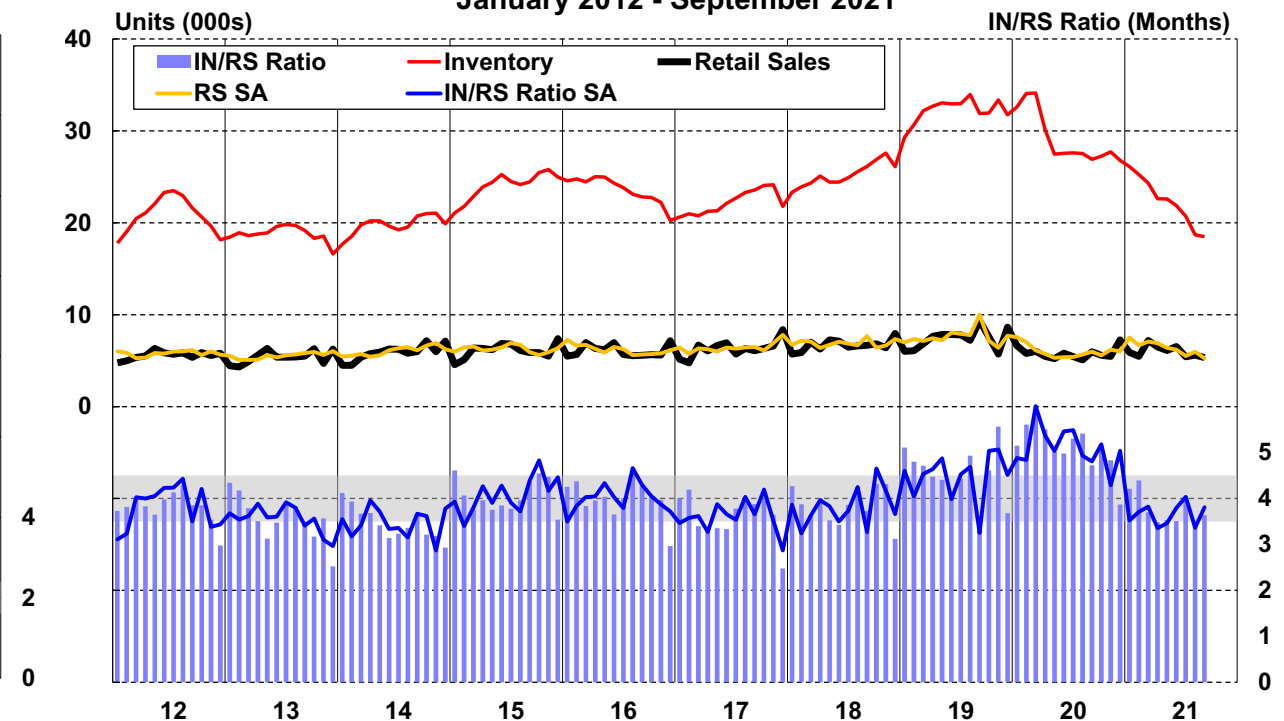
Key Ratios: IN, RS and IN/RS

Class 8 Tractor:
N.A. Inventory/Retail Sales Ratio
January 2010 - September 2021



Source: ACT Research Co., LLC: Copyright 2021

Class 8 Straight Truck with Day Cab:
N.A. Inventory/Retail Sales Ratio
January 2012 - September 2021

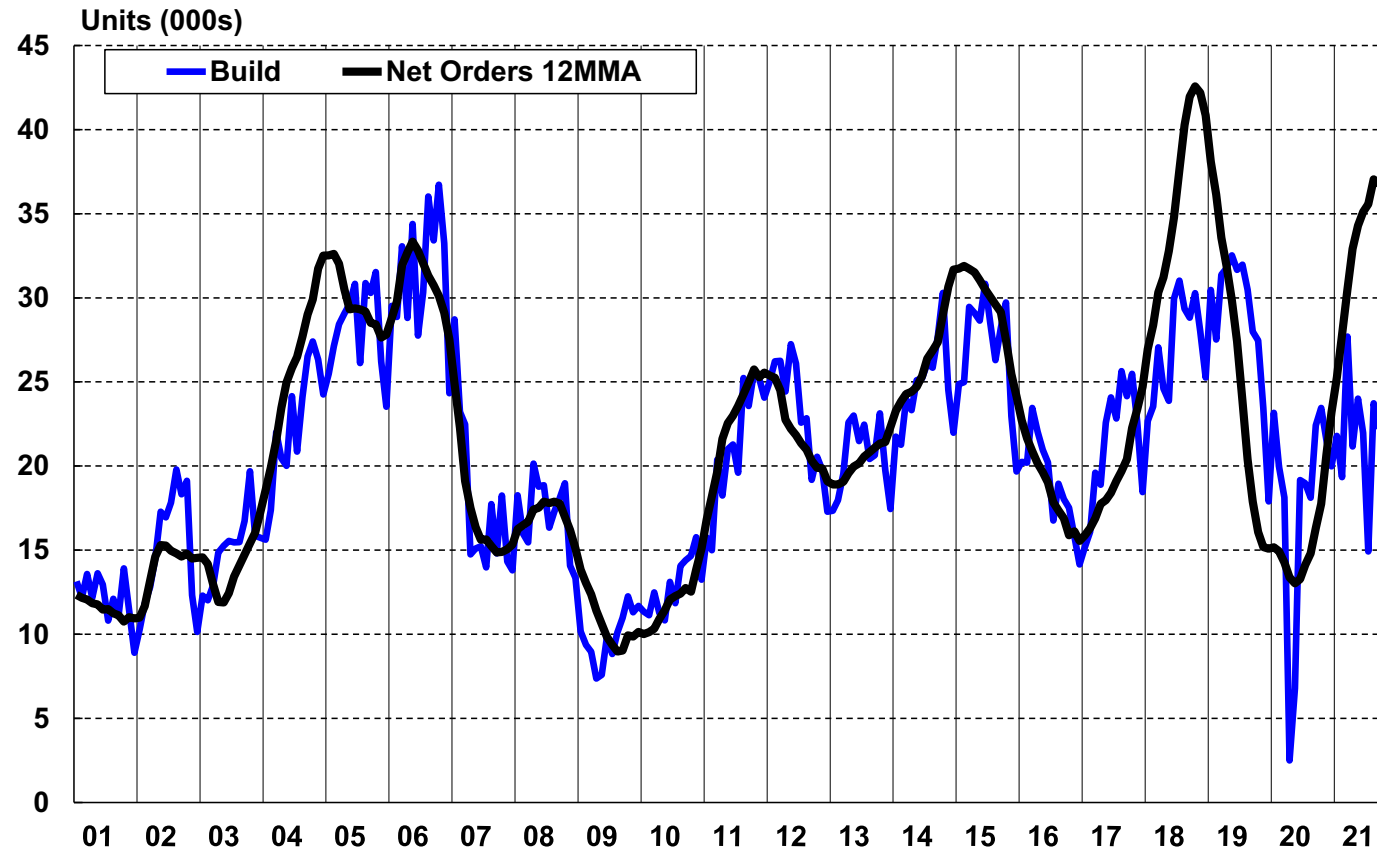


Source: ACT Research Co., LLC: Copyright 2021

Unprecedented Supply-Demand Spread

Total Class 8 N.A.: Net Orders 12 Mo. Avg. & Build

January 2001 - September 2021

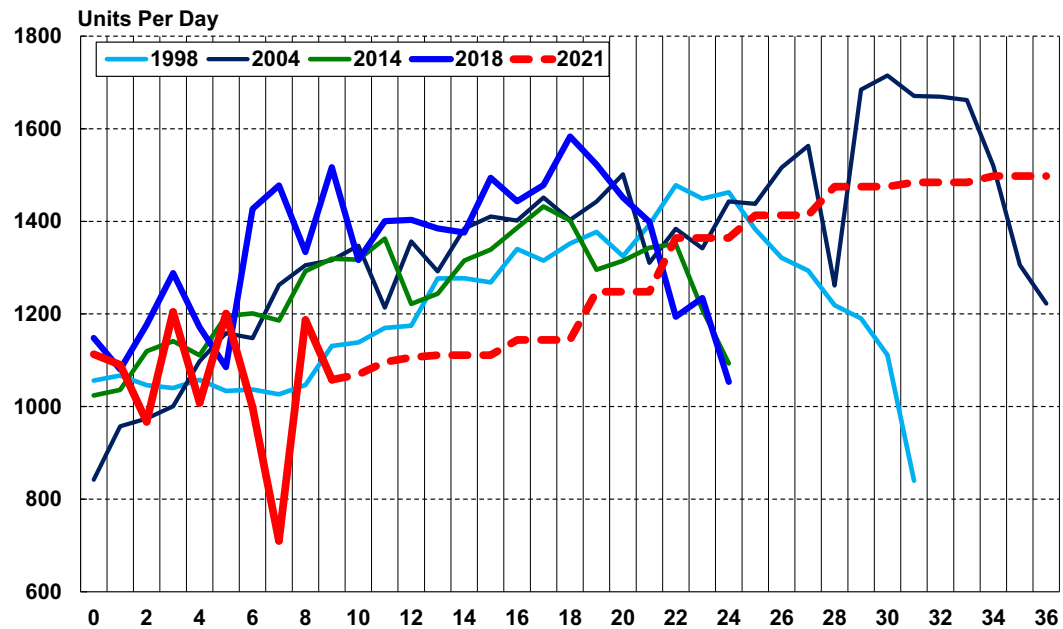


Source: ACT Research Co., LLC: Copyright 2021

Build Rate Assumptions

Total Class 8: Arc & Duration of Peak Demand Cycle

Build rate progression following cycle-initiating order trend shift



Source: ACT Research Co., LLC: Copyright 2021

Per Day Build Rate	Q1	Q2	Q3	Q4
2021	1,093	1,066	982	1,089
2022	1,111	1,144	1,248	1,364
2023	1,413	1,475	1,484	1,498



Medium Duty

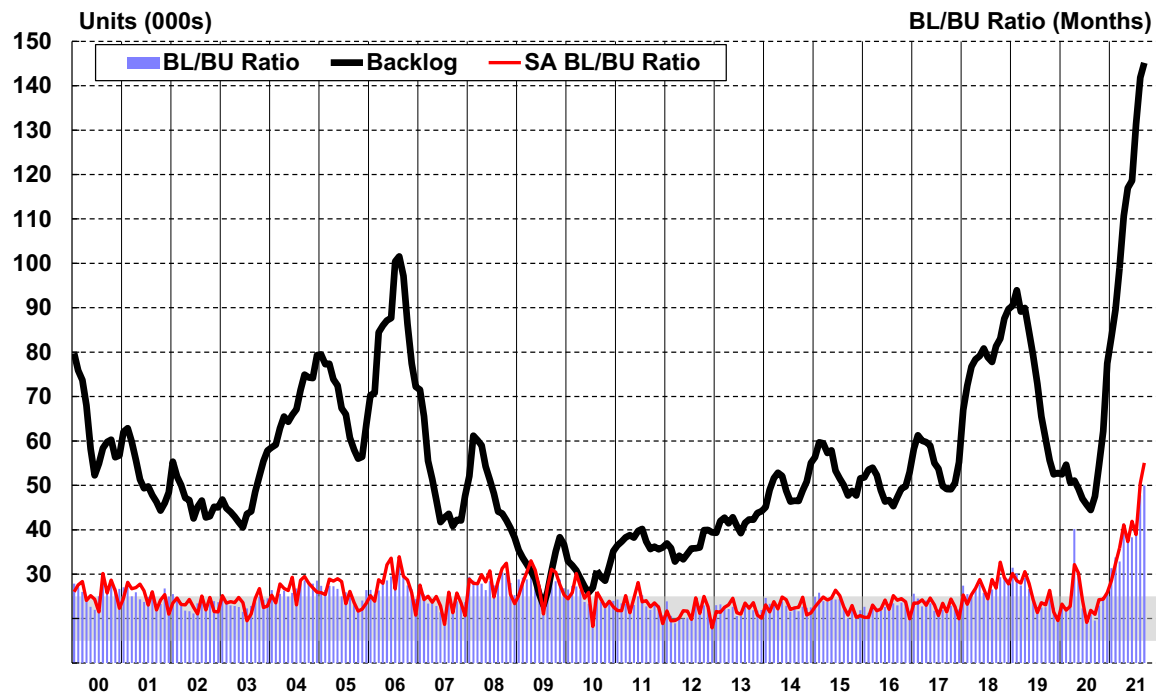
- BL/BU ratio chomping at the bit for higher build
 - Supply chain distress denying increased output
- IN/RS ratio normalizing
 - Below replacement build has reduced inventory
- Market forecast calls for moderate improvement in 2021
 - Build (+4%) and retail sales (+4%)
- Service-centric MD truck demand driving majority of improvement
 - YTD'09 NO: Truck +64%; School Bus +3-%; RV +18%



Key Ratios: BL/BU & IN/RS

Total Classes 5-7: N.A. Backlog & BL/BU Ratio

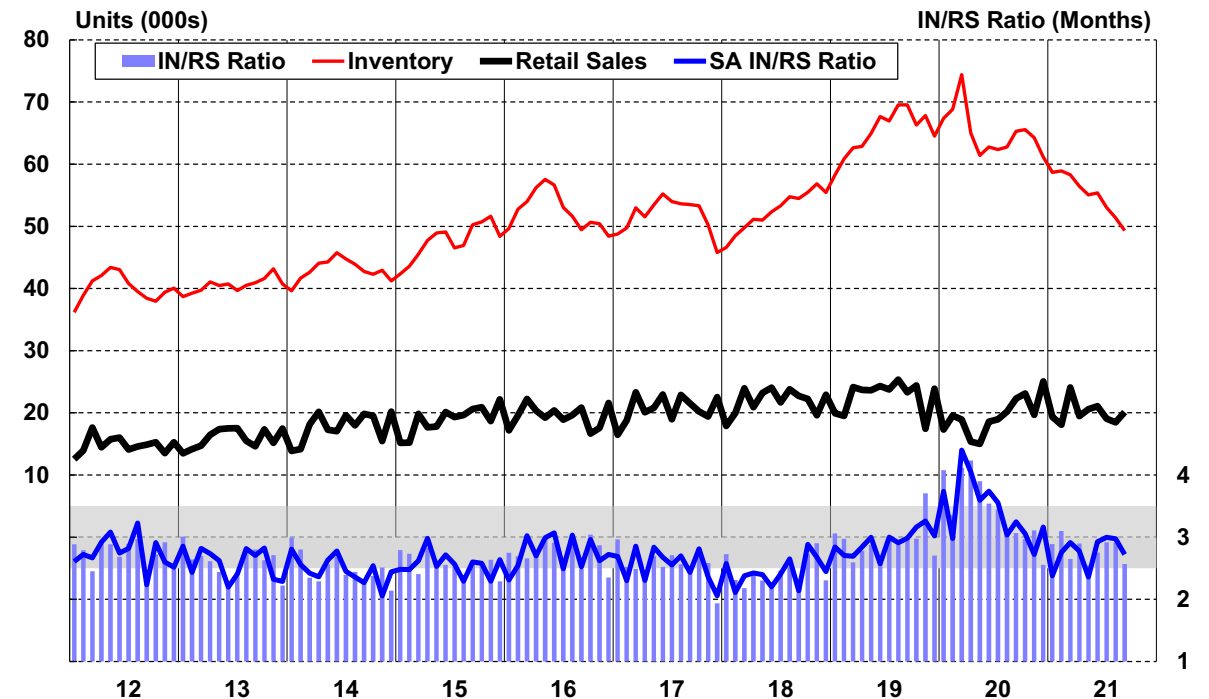
January 2000 - September 2021



Source: ACT Research Co., LLC: Copyright 2021

Total Classes 5-7: N.A. Inventory/Retail Sales Ratio

January 2012 - September 2021



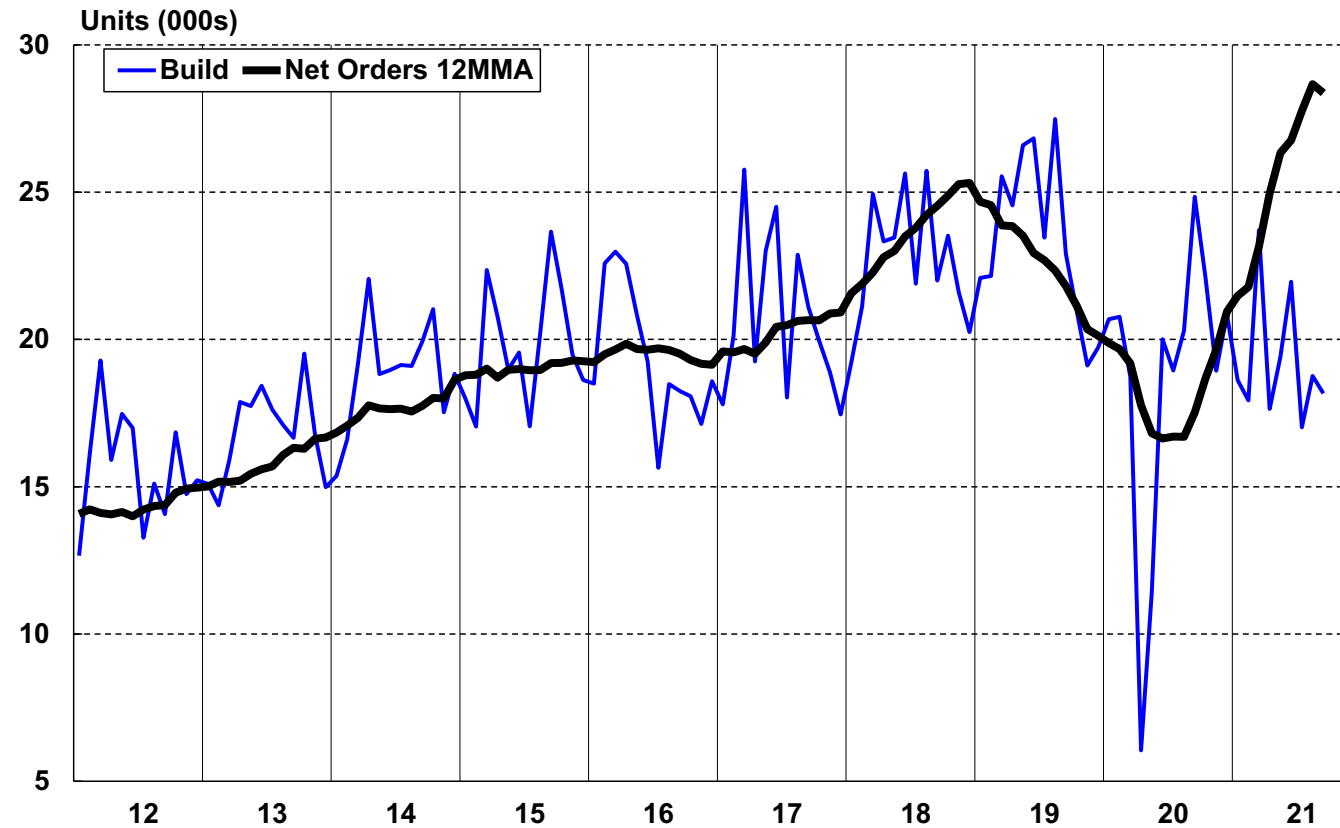
Source: ACT Research Co., LLC: Copyright 2021



Builds Follow Orders ... Usually

Total Classes 5-7: N.A. Net Orders 12 Mo. Avg. & Build

January 2012 - September 2021



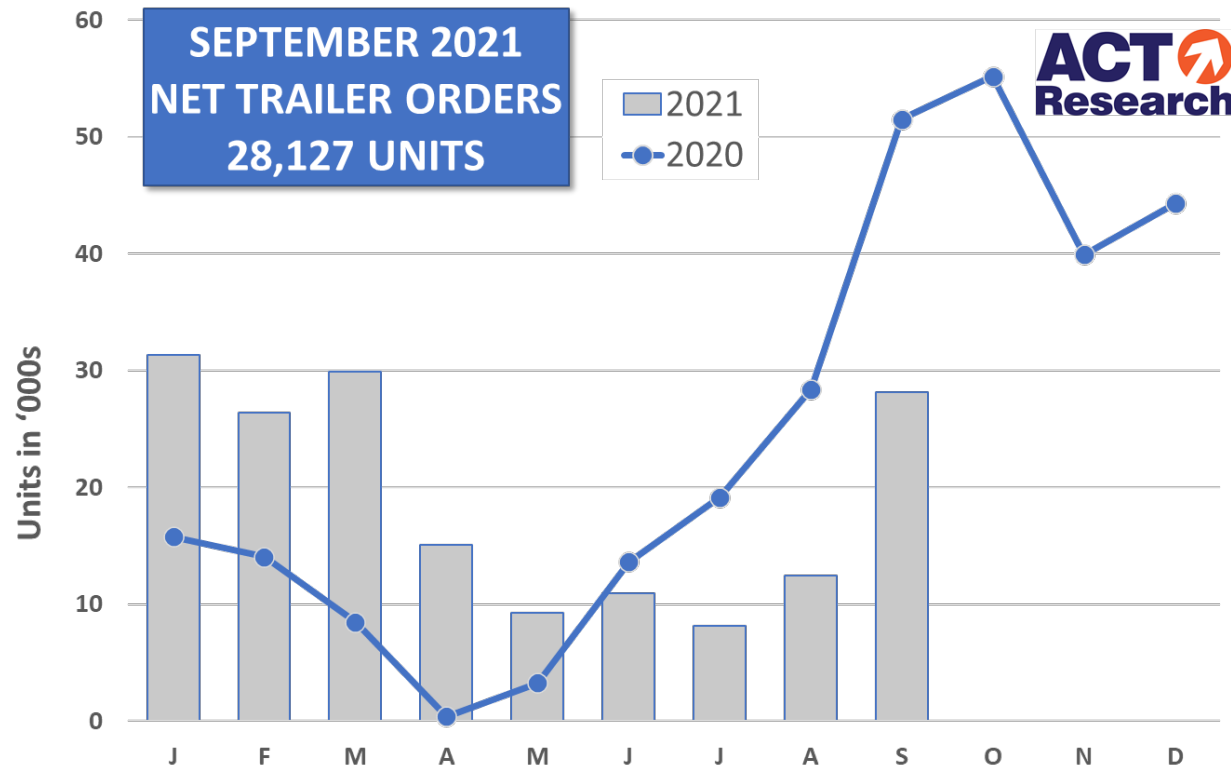
Source: ACT Research Co., LLC: Copyright 2021

Trailers

- Backlogs in place. “Everything shortage” constrains build
- Models indicate large under-build in 2021 and 2022
 - **Based on current assumptions, pent-up US demand will be around 140k units for dry van and 18k units at the end of 2022**



Dry Van Orderbook Cautiously Opened in Sept

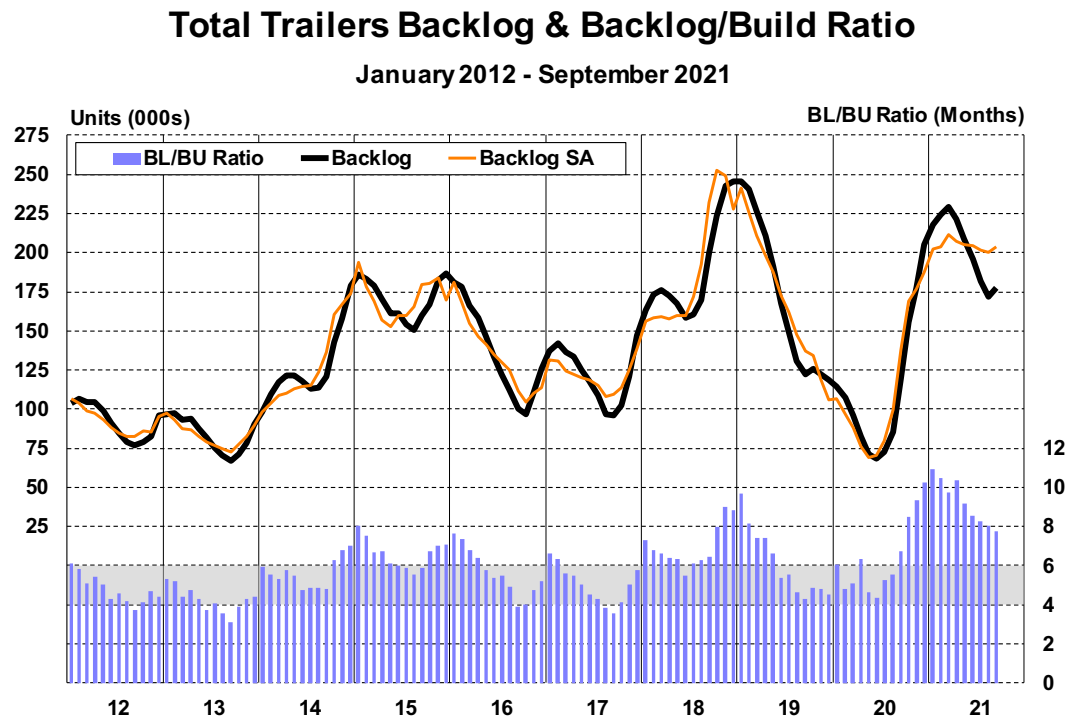


Source: ACT Research Co., LLC Copyright 2021

- Balance length of backlog and production ramp-up
- Don't overpromise & underdeliver
- Challenge to set pricing
- Still several OEMs on the sidelines
- Manage the pace for filling the remainder of 2022 production slots



Where Could Backlog/Build Go...



Source: ACT Research Co., LLC: Copyright 2021

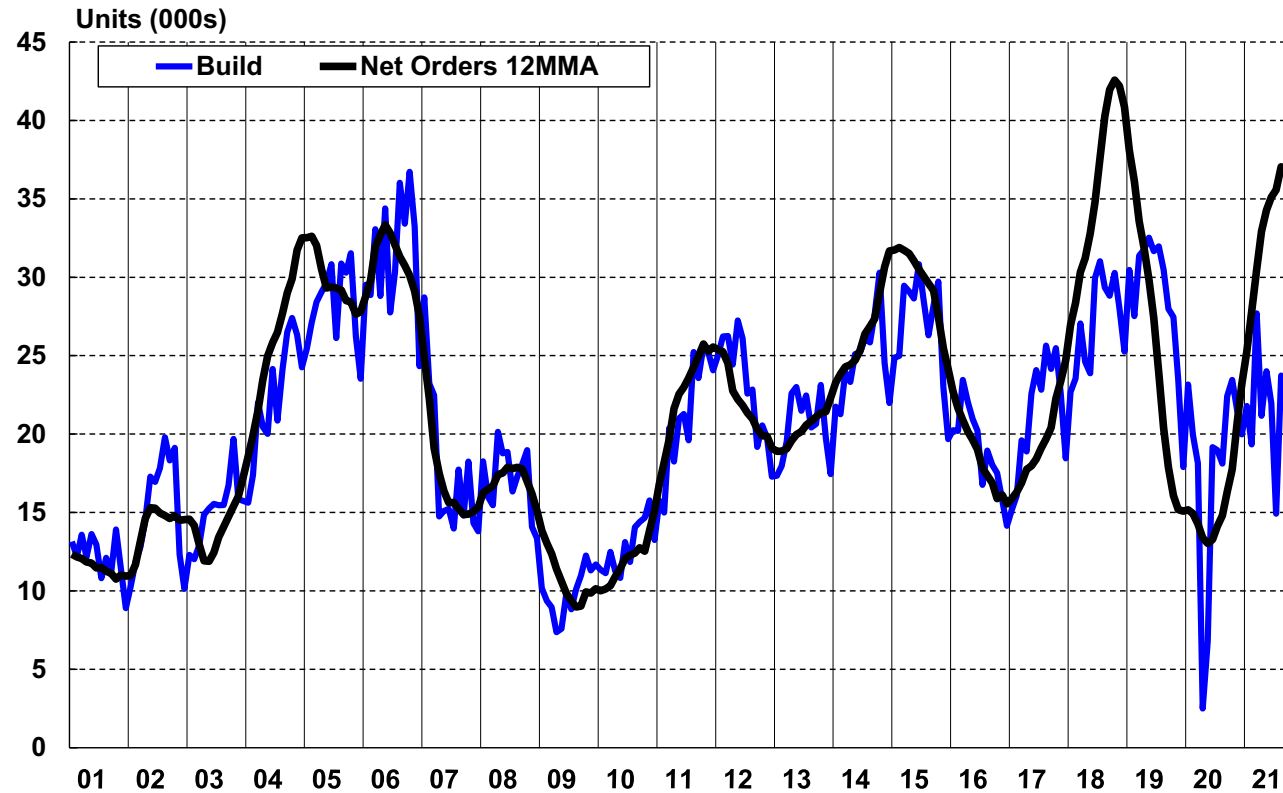
- Sep'21 BL/BU 7.7 months
- How aggressively will orderbooks be opened?
 - Through September, most OEMs still limiting access
- At this juncture in past two cycles
 - 2014'09 BL @ 121k
 - 2018'09 BL @ 199k
- Demand is there to push backlog to record levels



Unprecedented Supply-Demand Spread

Total Class 8 N.A.: Net Orders 12 Mo. Avg. & Build

January 2001 - September 2021

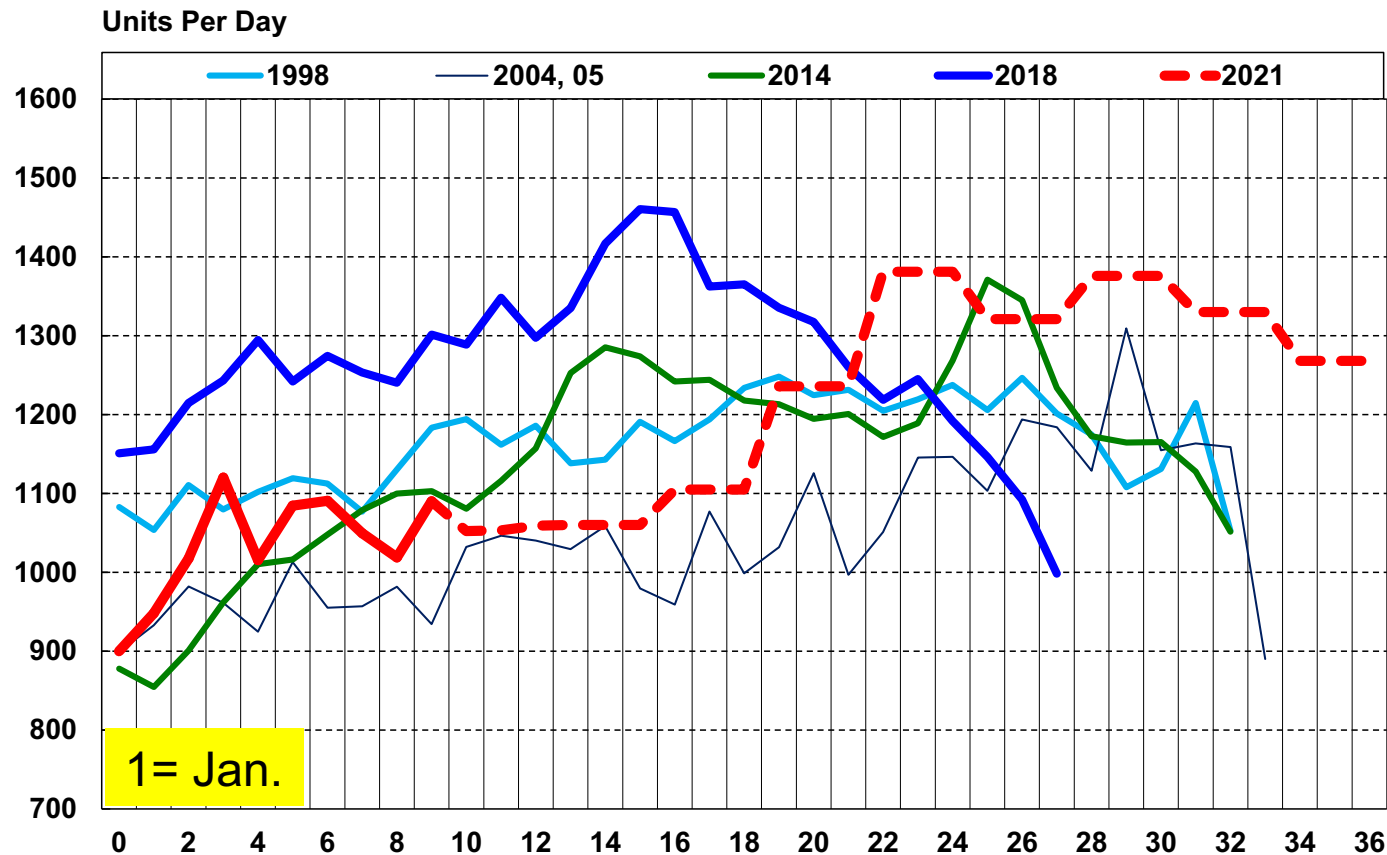


Source: ACT Research Co., LLC: Copyright 2021

Timing the Ramp, Contemplating Duration

US Trailers: Arc & Duration of Peak Demand Cycle

Build rate progression following cycle-initiating order trend shift



Source: ACT Research Co., LLC: Copyright 2021

Have we become overly cautious in our outlook?

Build Response Mos.

'98: 8-10

'04: 10-12

'14: 10-13

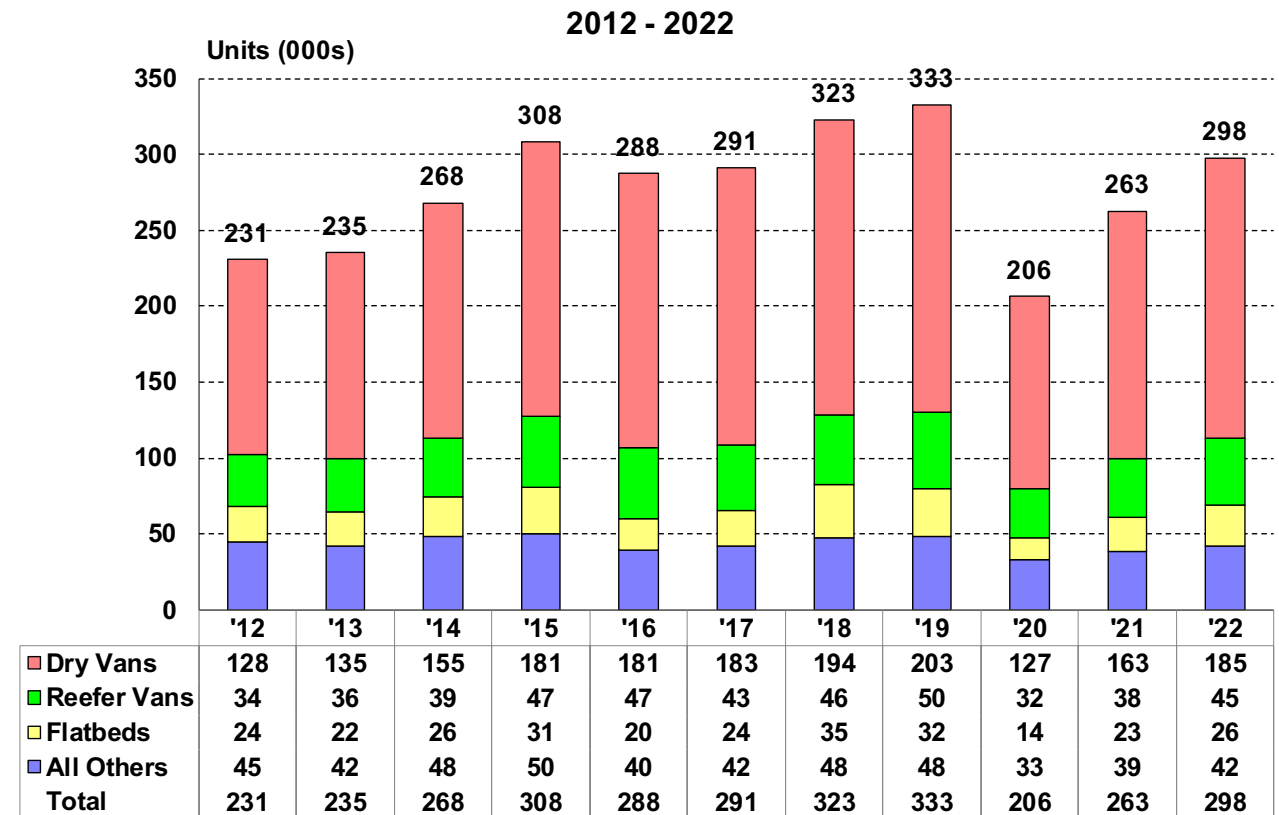
'18: 9-11

Every 100upd x yr = ~25k AR

November '21 OUTLOOK Forecast

- Expect cancel/reorder churn in Q4'21
- Red tags could supplement production through year-end
- Total '22 little changed, but pattern pushes volume to 2nd ha
- Vocational segments improving
- Supply headwinds preventing higher volumes

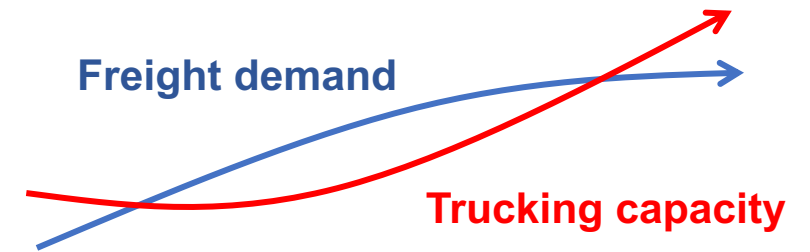
U.S. Trailer Production



Source: ACT Research Co., LLC: Copyright 2021

Short-Term Forecast Overview

- **Best freight economy in history**
 - Industrial/manufacturing cycles last 6-8 quarters – usually
 - Services to goods substitution continues for now
 - ***Strong consumer fundamentals***
 - Millennial life-stage demographics add boost
- **Capacity growth will accelerate**
 - *Rising pent-up demand for new equipment*
 - *When capacity constraints ease, **production should go vertical***
- **It is hard to stop a pendulum**
 - Supply-demand balance should be swinging into line in 2H'2022
 - **Pent-up demand expected to keep demand high in 2023**



Build Forecasts

	2018	2019	2020	2021	2022
NA Class 8 (000s)	324.5	344.6	214.3	261.1	300.0
NA Classes 5-7 (000s)	272.7	281.4	223.7	232.3	261.4
US Total Trailers (000s)	323.0	332.6	206.3	262.7	297.9



Sam's Last ACT Rodeo



Sam taking home the trophy forecasting excellence from the Blue Chip Economic Indicators and ASU.

THANK YOU

Presented by Penske Transportation Solutions

