Review and Outlook

- Cycle Analysis
- Looking Forward ~ 2021
- What About the Electronics & Components Supply Chain?
- The Impact of Inflationary Pressures
- Electronics & Components Market Drivers
Semiconductor Revenue Growth Cycle

- Quarter-over-Quarter growth surges to highest level in over a decade
- Pause or peak in Q-over-Q growth?
- Annual revenue cycle appears to have legs through 2022
- Annual revenue growth breaks positive in August 2020
- Strong demand and technology drivers
- Boost from shift in consumer spending? Durable?

Worldwide Semiconductor Revenue Growth - Moderate Scenario

Source – WSTS
Electronic Component Revenue Growth

Source: World Semiconductor Trade Statistics (WSTS), World Passive Trade Statistics (WPTS)
Semiconductor Growth Trends

Quarter-over-Quarter Growth

Source: WSTS

Americas Semiconductor Market Sustains Growth

- Memory follows its own path and drives more volatile Americas growth pattern
- EMEA achieves a remarkable turnaround in growth – now leads world with America in growth
- Japan sustains strong improved growth after stagnation
Strongest Recent Cycle
Most cycles last about four years
Looking Forward

~ 2022 + ~
**WSTS Spring & Fall 2021 Semiconductor Forecast**

**Observations:**

- Forecast built up category-by-category with experienced analysts from all regions
- Typical semiconductor cycle pattern
- Memory IC drives Americas dramatic jump from Spring Fcst
- Early indicators of stronger current cycle manifest in 2021 results
- Expect will also result in stronger and more durable than common expectations in long-term
- Also, WSTS data still does not really reflect recent price increases

*Source: WSTS*
North America Sentiment Survey Trends

- Overall Average drops below 100 in December outlook – First time in 18 months
- Seasonality likely playing a role in Oct to Dec index
- BUT – Economic and supply chain factors exacerbate downward acceleration
- Important to remember context – Month compared to prior Month

Source: ECIA Electronic Component Sales Trends Survey
North America Sentiment Survey Trends

- Over half still expecting overall market growth in Q1 2021 - 52%
- Less than 12% expect a market decline in any segment
- Wide range of growth expectations by market – 18% to 64%
- Industrial & Automotive continue to lead in optimism
- Shift in balance of growth expectations in Q1 2021 to “1% to 3%”

Source: ECIA Electronic Component Sales Trends Survey
North America Sentiment Survey Trends

• Positive growth expectations range still skews on the high end between 47% and 72% of survey respondents
• Less than 6% report growth expectations “Above 5%” in all but 2 categories – Capacitors & Discretes
• Strongest growth outlook in Electro-Mechanical and Semiconductors
• Percent of respondents expecting overall market growth = 62%

Source: ECIA Electronic Component Sales Trends Survey
Quarterly DTAM Estimates

Total Americas Electronic Component DTAM Revenue

- Revenue (Billions of Dollars)
- Growth (%)

Q1 2019: 5.1
Q2 2019: 5.8
Q3 2019: 5.6
Q4 2019: 5.4
Q1 2020: 5.2
Q2 2020: 5.4
Q3 2020: 5.6
Q4 2020: 5.8
Q1 2021*: 6.0
Q2 2021*: 6.5

Source: ECIA
Americas Quarterly DTAM and TAM Growth Comparison

Source: ECIA / WSTS

What About the Electronics & Components Supply Chain?
Supply Chain Disruptors

- CLIMATE
- POLITICS
- SHIPPING
- PANDEMIC
- TRADE WARS
- RAW MATERIALS
- LABOR SCARCITY
- GROWING DEMAND

Worldwide Semiconductor Unit Shipments

Increase From:  
- Discretes: 12.0%  
- Analog ICs: 19.9%  
- Logic ICs: 31.7%  

Previous Peak:  
- Discretes: 38.5%  
- Analog ICs: 45.7%  
- Logic ICs: 54.1%  

Source: WSTS


Electronic Components Industry Association
Americas Semiconductor Unit Shipments

Source: WSTS

Increase From:
- Discretes: 39.7%
- Monolithic ICs: 21.1%

Recovery Start:
- 94.1%
- 45.5%

Source: WSTS

Overall Trend to Less Pressure

- Except November
- On average 45% see increasing / Smattering of categories with ~4% reported decreases
- Manufacturer perspective much more positive than Distributor & Mfr Reps view

Index Calculation Formula = (%Decreasing * 0) + (%Stable * 100) + (%increasing * 200)

Source: ECIA
Critical Inventory Levels Still in Every Category

Source: ECIA
North America Lead Times – Record Shattering

Source: ECIA
North America Lead Times – Record Shattering

Average Lead Time In Weeks
Semiconductor Devices

Source: ECIA

North America Lead Times – Record Shattering

Average Lead Time In Weeks
Passive Components

Source: ECIA

Lead Time Status – A Hint of Slight Improvement

Current Lead Time

- Capacitors
- Connectors
- Electro-Mechanical
- Inductors
- Resistors
- Semiconductors
- Memory
- MPU
- MCU
- Analog/Linear IC
- Discretes

Source: ECIA

# Lehigh University Supply Chain Risk Index – Q3 2021

<table>
<thead>
<tr>
<th>Risk Type</th>
<th>3rd Quarter Risk Index</th>
<th>2nd Quarter Risk Index</th>
<th>Trend</th>
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Source: Lehigh Univ, CSCMP

*Connect. Influence. Optimize.*
Pressure At Every Stage

Overwhelming Demand
Total Intermodal Container Traffic | Top Five US Ports

- Georgia
- Houston
- New York/New Jersey
- Long Beach
- Los Angeles

Sea Shipment
Air Shipment
Railroad
Trucking
Ports
Storage


International air travel 89% down, domestic falling, though cargo strong

Cargo tonne km (CTK) and passenger km (RPK), Jan 2020 = 100

Source: IATA Economics using data from IATA Monthly Statistics. Data is adjusted for seasonality.
Demand for shipping cargo capacity remains elevated

**Boxed Up**
Monthly container volumes imported into major U.S. ports

**Imported TEUs (20-foot equivalent units)**

Note: August 2021 is projected and September-December 2021 are forecasts. Source: Global Port Tracker, prepared by Hackett Associates for the National Retail Federation.

*Connect. Influence. Optimize.*
Supply Chain Challenges Abound

One example – Shenzhen Port a Major Bottleneck
California Ports Overwhelmed – Florida Alternative

TOTAL VESSELS: 1,886

Vessel Types
- PASSENGER: 10%
- CARGO: 36%
- TANKERS: 8%
- HIGH SPEED CRAFTS: 1%
- TUGS, PILOTS ETC: 24%
- YACHTS: 9%
- FISHING: 7%
- UNSPECIFIED: 1%

Destinations
- LOS ANGELES: 23%
- LONG BEACH: 21%
- SAN DIEGO: 11%
- SAN FRANCISCO: 6.2%
- OAKLAND: 3.9%
- ENSENADA: 1.8%
- SAN DIEGO ANCH: 1.8%
- HUENEME: 1.6%
- COOS BAY: 1.3%
- OTHERS: 28%

Efforts to Solve the Crisis

• Biden administration announcement with LA/Long Beach Ports & Retailers
  • Billion-dollar government investment in port technology a long-term solution?

• Need to solve trucking flow – more than a driver shortage
  • Bring in the military?

• Solutions need to begin with domestic movement of cargo – truckers/rail
  • Preferably industry and not government driven

• Small businesses hardest hit once again

• Shift back to domestic production? Short term? Long term?

• Nightmare scenario

The Impact of Inflationary Pressures
“With pervasive resource shortages, input price pressures continued to be widespread,” the Fed said. “Even at greatly increased prices, many businesses reported having trouble sourcing key inputs. Some Districts reported that businesses are finding it easier to pass along more cost increases through higher prices. Several Districts indicated that businesses anticipate significant hikes in their selling prices in the months ahead.”

The Fed also noted that demand for labor remains strong but “all Districts noted extensive labor shortages that were constraining employment and, in many cases, impeding business activity.”

In a hint that the economy could be threatened with stagflation—a period of accelerating price hikes and low growth—the Fed also noted that the economy had “downshifted” in late July and August.
Inflation Hits Highest Rate in 30 Years

Source – Bureau of Labor Statistics (BLS)
Twelve Month U.S. CPI Percent Change as of October 2021

Source – Bureau of Labor Statistics (BLS)
Raw Material Pricing Trends – IHS Markit Index

• Index saw 2 weeks of decline following 3 weeks of strong increase
• Prices dropped for only one out of ten subcomponents
• Prices still at highest levels in index
• Potential for increases with overall inflation pressure
Worldwide Annualized Semiconductor Revenue

Growth Swings

- Jun '16 to Nov '18
  - 29 Months
  - +$146B; +45%

- Nov '18 to Nov '19
  - 12 Months
  - -$60B; -13%

- Nov '19 to Apr '21
  - 17 Months
  - +$57B; +14%

- Volatility = Risk
- Risk = Required ROI
Semiconductor Revenues in Constant Dollar Value

Worldwide Semiconductor Revenue

Source – WSTS and Bureau of Labor Statistics (BLS)
The Impact on Semiconductor Revenues

Source – WSTS and Bureau of Labor Statistics (BLS)
Electronics & Components

Market Drivers
Best Industries Getting Better, Worst Getting Worse

Average economic profit by industry, $ billion (n = 2,562)

- Semiconductors
- Pharmaceuticals
- Personal products
- Software
- Technology hardware
- Media
- Telecommunication
- Healthcare equipment
- Consumer durables/apparel
- Consumer services
- Food/beverage/tobacco
- Retailing
- Professional services
- Food retailing
- Automobiles
- Materials

Total change
Top 6 industries
+275

Transportation
Capital goods
Insurance
Banks
Diversified financial
Utilities
Energy

Bottom 6 industries
-373

Largest nonfinancial companies by revenue in 2018 with data for 2003–18 available.
Source: Corporate Performance Analytics by McKinsey

McKinsey & Company


Electronic Components Industry Association
COVID19 has accelerated the fourth industrial revolution, expanding the digitization of human interaction, e-commerce, on-line education and remote work.

“+25 million terabytes of data are being created every day and 90% of all data in history has been generated in the last two years, 80% of that is unstructured, and <2% is being analyzed.”

Lip-Bu Tan, CEO Cadence
Americas Technology Sales Growth Driver Average Ratings 2021

- Electric Vehicles (EV / HEV)
- 5G
- Internet of Things (IoT)
- Green/Renewable Energy
- Smart Grid / Smart Meters
- Energy-Efficient Lighting
- Autonomous Vehicles
- Artificial Intelligence (AI)
- Virtual/Augmented Reality (VR/AR)
- Active Matrix Micro LED TVs
- Foldable Displays

Average Rating (Range 0 to 10)
Thank you!

Dale Ford – Chief Analyst
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