Motor Freight Transportation
U.S. Mode Shares, 1993

Modal Profile
Percent Hauled Based on Value

- Truck: 72.60%
- Rail: 4.00%
- Water: 3.90%
- Intermodal: 10.40%
- Air Freight: 2.40%
- Pipeline: 2.80%
- Other: 3.90%


Modal Profile
Percent Hauled Based on Volume

- Truck: 52.60%
- Rail: 12.70%
- Water: 17.20%
- Intermodal: 1.70%
- Air Freight: 0.02%
- Pipeline: 10.80%
- Other: 5.00%

## U.S. Mode Comparison, 1993

<table>
<thead>
<tr>
<th>TRANSPORT MODE</th>
<th>% of U.S. Freight Bill</th>
<th>Shipment Value ($/lb.)</th>
<th>Avg. Length of Haul (Miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck</td>
<td>79</td>
<td>$0.35</td>
<td>416**</td>
</tr>
<tr>
<td>Rail</td>
<td>8</td>
<td>$0.08</td>
<td>794</td>
</tr>
<tr>
<td>Water</td>
<td>5</td>
<td>$0.06</td>
<td>+2,3000: maritime 1,650: domestic</td>
</tr>
<tr>
<td>Intermodal</td>
<td>*</td>
<td>$1.61#</td>
<td>***</td>
</tr>
<tr>
<td>Air Freight</td>
<td>4</td>
<td>$26.77</td>
<td>1,325</td>
</tr>
<tr>
<td>Pipeline</td>
<td>2</td>
<td>$0.09–$0.06</td>
<td>825: crude 375: product</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>$0.20</td>
<td>unknown</td>
</tr>
</tbody>
</table>

U.S. Trucking Industry

- Exclusively serves 70% U.S. Communities
- Employees: 9.6 million
- Truck drivers: 3 million
  - Local and Over-the-Road [OTR]
- Fuel: 29 billion gallons diesel per annum
- Miles traveled: 428 billion
  - 116 billion by Class 8 vehicles

• History
  – Regulation began 1935: Interstate Commerce Commission
  – Strong railroad lobby
  – Certificated carriers for specific routes: trafficking

• Removal of barriers to entry

• Relaxed contract carriage rules

• Results
  – Route restructuring
  – Market competition and decreased prices
  – Enabling of new services: intermodal
  – Enabling of modern lean manufacturing
U.S. Trucking Industry Growth

• Increasing in importance
• Freight transport revenue share
  – 68% in 1960
  – 81% in 1997
• Continuing growth
  – Lean supply chains; just-in-time
  – Ecommerce
  – Primary beneficiaries: Parcel, LTL, Air freight
Trucking Industry Composition

CHART 1
Class 8 Truck Ownership By Fleet Size
Total Population 1,557,300

Source: MacKay & Co.
Industry segmentation

Percentage of For-Hire Industry and Carrier Revenues

<table>
<thead>
<tr>
<th>Service Type</th>
<th>For-Hire Industry</th>
<th>Carrier Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truckload</td>
<td>42.50%</td>
<td>30.70%</td>
</tr>
<tr>
<td>Less than Truckload</td>
<td>11.90%</td>
<td>40.10%</td>
</tr>
<tr>
<td>Household Goods</td>
<td>4.60%</td>
<td>7.80%</td>
</tr>
<tr>
<td>Bulk</td>
<td>5.20%</td>
<td>4.90%</td>
</tr>
<tr>
<td>Tank</td>
<td>10.60%</td>
<td></td>
</tr>
<tr>
<td>Refrigerated</td>
<td>5.70%</td>
<td>9.50%</td>
</tr>
<tr>
<td>Other Specialized</td>
<td>6.00%</td>
<td>15.70%</td>
</tr>
</tbody>
</table>

SOURCE: ATA Trucking Information Services, Motor Carrier Annual Report, derived from reports filed with the U.S. DOT by carriers with $1 million or more in annual revenue.
Examples: ranked by 1998 revenue

• Truckload firms
  – Schneider National (3), J.B. Hunt (7), Swift (14), Werner (15)

• Less-than-truckload firms
  – Yellow (2), Roadway (4), Consolidated Freightways (5), Con-Way (8), ABF (9), Overnite (11), American Freightways (12)

• Household goods firms
  – United Van Lines (10), North American (13)
For-hire vs. private carriers

![Graph showing percentage of intercity tons transported and total truck revenues for different types of carriers](image)

**Local Private**
- Intercity Tons Transported: 27.30%
- Total Truck Revenues: 42.00%

**Local For-Hire**
- Intercity Tons Transported: 20.00%
- Total Truck Revenues: 11.40%

**Private Interstate/Intrastate**
- Intercity Tons Transported: 15.00%
- Total Truck Revenues: 20.00%

**For-Hire Interstate**
- Intercity Tons Transported: 18.00%
- Total Truck Revenues: 26.60%

**For-Hire Intrastate**
- Intercity Tons Transported: 2.00%
- Total Truck Revenues: 2.40%

**For-Hire Exempt**
- Intercity Tons Transported: 3.00%
- Total Truck Revenues: 3.40%

**Intercity Tons Transported**
- Local Private: 42.00%
- Local For-Hire: 27.30%
- Private Interstate/Intrastate: 20.00%
- For-Hire Interstate: 15.00%
- For-Hire Intrastate: 11.40%
- For-Hire Exempt: 7.60%

**Total Truck Revenues**
- Local Private: 20.00%
- Local For-Hire: 3.00%
- Private Interstate/Intrastate: 2.00%
- For-Hire Interstate: 1.40%
- For-Hire Intrastate: 2.00%
- For-Hire Exempt: 2.40%

**Source:** America’s Private Carriers Who Are These Guys?, National Private Truck Council and Transportation Technical Services, 1995.
### Primary Commodities

#### Percentage of Revenue and Volume

<table>
<thead>
<tr>
<th>Category</th>
<th>Revenue</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food &amp; Food Related</td>
<td>13.30%</td>
<td>9.50%</td>
</tr>
<tr>
<td>Lumber/ Wood Products</td>
<td>11.50%</td>
<td>11.50%</td>
</tr>
<tr>
<td>Petroleum/ Coal</td>
<td>10.00%</td>
<td>10.00%</td>
</tr>
<tr>
<td>Clay, Concrete, Glass, Stone</td>
<td>9.70%</td>
<td>5.60%</td>
</tr>
<tr>
<td>Mail/ Contract Traffic</td>
<td>9.40%</td>
<td>2.80%</td>
</tr>
<tr>
<td>Non-Metallic Minerals</td>
<td>8.70%</td>
<td>8.70%</td>
</tr>
<tr>
<td>Chemicals/ Allied Products</td>
<td>8.40%</td>
<td>5.60%</td>
</tr>
<tr>
<td>Farm Products</td>
<td>12.30%</td>
<td>4.50%</td>
</tr>
</tbody>
</table>

**SOURCE:** U.S. Freight Transportation Forecast, ... to 2004, DRI/ McGraw-Hill and American Trucking Associations Foundation
Dominant revenue producers

- Electronics, instruments, vehicles: $953MM, 55% share
- Base metals and machinery: $831MM, 80% share
- Wood products, textiles, leathers: $764MM, 78% share
- Furniture and other manufactured products: $601MM, 77% share
- Grains, alcohol, and tobacco: $556 MM, 93% share
- Pharmaceutical and chemical products: $546 MM, 74% share
Export trucking

- Grown in importance with NAFTA
  - Trend: Mexican manufacturing facilities
- 20% of export freight revenue
- 11% of export tons
- Primary commodities:
  - Electronics, instruments, vehicles: $49 MM
  - Base metal and machinery: $23MM

- Gateways: Laredo, El Paso, San Diego
Truckload operations

• Direct origin-to-destination service
  – No equipment changes
  – No intermediate terminals required

• General vs. specialized
  – Refrigerated vans ("reefers"), automobile transports, grain carriers

• Planning issues
  – Supply-demand balancing (backhauls, empty repositioning)
  – Driver issues (relays, home stays)
Less-than-Truckload (LTL) operations

• Small shipments
  – 250 to 12,000 lbs.
  – Cube (volume) is usually constraint on vehicle packing

• Hub-and-spoke networks
  – Consolidation and rerouting role of terminals

• Planning issues
  – Network design
  – Routing and scheduling problems
Less-than-Truckload (LTL) operations

M: Main Terminal
S: Satellite Terminal

Shippers

Consignees
Equipment types in fleets

- **Single-unit trucks:** 68%
  - Delivery vans, tank trucks, dump trucks, cement mixers

- **Tractor-semitrailer combination:** 26%
  - Often, “18-wheelers”
  - Lengths (US): 40 to 53 foot

- **Multi-trailer combinations:** 6%
  - STAA doubles: twin 28’ trailers
  - Longer combination vehicles: Rocky Mt Doubles, Turnpike Doubles, Triples
Conventional combinations

Conventional Combination Vehicles

5-Axle Tractor Semi-Trailer

6-Axle Tractor Semi-Trailer

STAA or “Western” Double
Longer combination vehicles (LCVs)
Single-unit: delivery vans
Tractor semi-trailer combinations
Tractor semi-trailer combinations
Multi-trailer combinations
Intermodalism

• Economics
  – Can be slower
  – Origin and destination drayage
  – Huge cost savings in driver pay

• Long-haul trips
  – 500-700 miles
  – Hub-to-hub trips in LTL and package express trucking

• TOFC vs. COFC
  – Equipment investment and management vs. price
TOFC

- Trailer-on-flatcar
- 28’ Highway trailers
TOFC train
Trends

• Value-added
  – Tracking and tracing, online quotes and service requests

• Dedicated contract carriage
  – Replacement for private carriage: outsourced

• Time-sensitive transportation
  – Expedited options: FAST
  – Time-definite delivery: RELIABLE

• 3PL Services
  – Warehousing, distribution management, handling