Mexico still represents an attractive marketplace for exporting microelectronic components. The market has recovered somewhat from 2000-2002 economic slowdown which dampened the overall demand for the microelectronics sector. Renewed growth in 2003 coupled with proximity of U.S. suppliers to the Mexican market and the low transportation costs contributes to the U.S. dominant market position in Mexico.

The top five electronic components imported from the U.S. to Mexico are: integrated circuits; cathode-ray tubes; printed circuits; switches, relays and plugs; and capacitors. Under NAFTA, it is advantageous for Mexican businesses to import electronic components from U.S. suppliers. NAFTA affords virtually duty-free trade of electronic components, and improved customs procedures. In addition, geographic proximity allows short lead time and lower transportation costs.

3.4.3 Asia/Pacific: China

China with its rapidly growing export industries, combined with swelling trade deficits in the U.S., has been viewed as a serious economic competitor in recent years. As China has been forging its economy as a future economic power with its exports, its domestic marketplace has been expanding very quickly. With its accession to the WTO, China's emerging domestic market poses abundance of opportunities for foreign exporters.

China is one of the fastest growing IT markets in the world, and recently passed Australia to become the second largest market in Asia after Japan. In the past two years, China's IT industry has been growing at an annual rate of over 30 percent. Last year, China's IT market size exceeded $22 billion, according to International Data Corporation (IDC). China's market is expected to grow to be a $40 billion marketplace by 2006, according to IDC. Much of the market (over 70%) is attributed to hardware purchases while the rest of the market consists of software and IT services.

Trade of IT hardware products between the U.S. and China has tripled between 1998 and 2002. U.S. exports to China have been growing much slower than China's exports of computer and related items to the U.S., leading to a significant trade deficit in this area. The U.S. exports of IT hardware products to China amounted to nearly $580 million in 2002. China shipped over $9 billion worth of computer equipment to the U.S. in the same year. China's accession to the WTO is expected to encourage more IT exports from the U.S. to China as some tariffs levied on IT hardware products are adjusted.

Relative to other sectors and the IT software segment, the Chinese market for IT hardware is comparatively open. For various reasons, the Chinese government is willing to allow greater competition in the hardware segment—especially after China's accession to the WTO. China has signed the Information Technology Agreement (ITA) as a condition of joining the WTO. The ITA began eliminating tariffs starting in 2002, and eliminating tariffs on 2/3 of the products by January 2003. Tariffs on all remaining products are scheduled to disappear by 2005. Industry experts estimate that the U.S. saved about $500 million in tariffs in 2002 alone.

While many large U.S. companies such as IBM, Dell, HP and Compaq already have a good foothold in China, many U.S. suppliers face competition from domestic producers and regional suppliers from Taiwan, Japan and Korea. Chinese domestic competition is very fierce. Chinese PC makers hold over a half of the domestic market demand. Multinational firms such as IBM and HP had to form local joint ventures in order to penetrate and gain market access into China. Despite its accession to the WTO, local Chinese technology companies maintain close-knit relationship with large government and other official buyers. Cost is a key factor in gaining competitive advantage in China. Dell, known for its operational efficiency and scalable and inexpensive hardware, lowered prices in China, only to be countered by a 14

percent discount offered by a Chinese PC giant, Legend. Legend and other Chinese producers maintain a strong foothold in the domestic PC market in China.

Internationally, many U.S. companies must face stiff competition from regional foreign suppliers from Taiwan, Japan and Korea. Along with the U.S. firms, these foreign suppliers also face similar limitations and challenges entering China. With additional market access projected with China's entrance into the WTO, the U.S. must improve pricing structure and services to better compete in a more open marketplace.

There are also other barriers. U.S. Department of Commerce export licensing applies to technologies that may have "dual-use" for both civilian and military purposes. China, while committed to the WTO agreements, still has several trade barriers. China recently announced a new import standard, "China Compulsory Certification." PCs, portable (laptop) computers, monitors, printers, multipurpose printer/fax/copy machines, scanners, power supply units, game consoles, leaning machines, servers and others must carry the China Compulsory Certification Mark (CCC) starting May 2003. The certification process is another hindering step for U.S. exporters.

3.4.4 Asia/Pacific: Taiwan

Taiwan has been an important industry leader in technology, especially in the semiconductor sector. In recent years, the global economic downturn and slow market demand for IT products have affected most industrialized nations and electronics component marketplaces around the world. Despite the slow economy, Taiwan's market for semiconductors has seen improvements, and its market is recovering. The Taiwanese market for electronics parts and components can offer U.S. suppliers an opportune place to increase their market share.

Economic slowdown has reduced Taiwan's market for semiconductors from $16 billion in 2000 to $10 billion in 2001. While such reduction is a drastic one, the market still represents substantial business opportunities. U.S. exports of electronic components, including semiconductors, improved by 16.5 percent from 2001 to 2002 (from $3.2 to $3.7 billion). Current conditions provide U.S. suppliers with good footing especially in light of the recent withdrawal of Japanese competitors from Taiwan's DRAM market. U.S suppliers now have secured the third largest market share in Taiwan's semiconductors import market, over their Japanese counterparts. Tables 3-19 and 3-20 display data reflecting Taiwan's strength in semiconductors and data showing U.S. exports of microelectronic components to Taiwan.

Table 3-19. Taiwan's Market for Semiconductors

	2001	2002	2003	Projected Avg. Annual Growth Rate
Total Market	**10,056**	**10,100**	**11,850**	**10-15%**
Local Production	**6,510**	**7,500**	**6,900**	**15-20%**
Exports	**2,987**	**3,900**	**4,500**	**15-20%**
Import Market	**6,533**	**6,500**	**6,900**	**10-15%**
Imports from U.S.	**784**	**780**	**830**	**10-15%**

Source: U.S. Department of Commerce: Bureau of the Census; International Trade Administration (ITA).

Table 3-20. U.S. Exports of Electronic Components to Taiwan 1998-2002 (in $1000)

	1998	1999	2000	2001	2002	%Change 2001-2002
Taiwan	**2,346,588**	**2,807,356**	**4,092,048**	**3,187,444**	**3,713,279**	**16.5%**

Source: International Trade Administration (ITA).

U.S. suppliers of electronic components and parts to Taiwan face competition from Malaysia, the Philippines and Japan. In 2001, the three countries held Taiwan's import market shares of 18.4 percent, 16.6 percent and 11.8 percent respectively. Japanese firms, principal competitors of U.S. suppliers, have been losing market share in recent years. Meanwhile, U.S. producers have been enjoying increased sales in the segments of micro-components, logic ICs, DRAMs, microprocessors and analog ICs. The U.S. products are well received, and generally carry a reputation of superior technology, quality and performance in Taiwan's import market.

Currently, Taiwan uses a tariff system based on the Harmonized System, and the duty on imported products is defined on an ad valorem basis. There are no import duties for semiconductors and U.S. technical standards are generally accepted in Taiwan.

3.4.5 Eastern Europe & Russia

Economies of Eastern Europe and Russia offer tremendous business opportunities for U.S. firms supplying microelectronics products, parts and accessories. These economies have begun opening up, and liberalization process creates prospects for U.S. exporters.

The Russian market for the IT sector represents a growing and dynamic market for U.S. suppliers. The Russian market for the IT hardware segment is expected to grow at a double-digit annual growth rate. The market size increased at a 20 percent rate from 2001 to 2002. The Russian IT market size in 2002 was estimated to be $3.9 billion. The Hungarian IT sector is also a dynamic marketplace that is growing fast. It is estimated that the market size in 2002 was around $4.7 billion and the sector would experience a healthy growth rate of over 8 percent in 2003. In Slovakia, the IT market is estimated to be about $450 million at an 11 percent growth rate. For 2003 onward, the IT market growth in Slovakia is expected to range from 10 to 13 percent annually.

In Russia, the total number of computers was over 11 million in 2001, which was an increase of over 6 percent from 2000. There is significant room for growth in this market. Only about 15 percent of Russia's computer segment demand is met by imports. The rest of the demand is met by locally assembled, manufactured products. While Russian manufacturers provide low-cost assembled PCs, other system components including printers, peripherals, servers and networking hardware are mostly imported.

Russia's IT imports market is very receptive to U.S. suppliers and their products. Larger companies such as IBM, HP/Compaq, Microsoft, Sun Microsystems and others have strong presence in the Russian market already. Major groups in Russia that are end-users of IT products, microelectronics parts and components are multinational companies, government agencies and Russian companies. Market access to Russia is fairly straightforward according to many analysts. U.S. exporters generally report few problems.

In Slovakia, the IT market was estimated to be around $450 million with an 11 percent annual growth rate in 2002. It is expected that the market will increase in size at an annual rate ranging from 10 to 13 percent in coming years. Much like other Eastern European bloc economies, recent liberalization processes in Slovakia have provided export opportunities for many American microelectronics suppliers. Robust

demand for technology in both consumer and corporate sectors has been fueling a rapid increase in the IT market. The number of Internet users in Slovakia more than tripled between 1997 and 2001.

Competing in Slovakia is not without challenge. European competitors such as Germany, France, UK, Sweden and Finland have a clear advantage in geographical and cultural proximity with Slovak markets. Besides the market competition, U.S. microelectronics suppliers face few problems. Market access to Slovakia is fairly straightforward. Import/export documentation is similar to that of EU countries. Most high-tech western technology can flow into Central and Eastern Europe without U.S. export licenses.

In Hungary, the domestic computer hardware equipment market is estimated to be over $450 million. If network equipment and telecommunication hardware were counted, the market potential may exceed one billion. The segment has been growing at a very high annual growth rate ranging from 7 to 8 percent in recent years. An estimated 2 million PCs are used in Hungary, and about 1.6 million people are using the Internet. With increasing demand for technology and computers, Hungary represents an emergent and energetic market for U.S. microelectronics suppliers.

PC sales in Hungary have had significant increases from 2001 to 2002. The overall PC market expanded by 10 percent and demand for laptops grew by over 30 percent during the same period. Larger multinational corporations such as IBM, HP/Compaq, Microsoft, Sun Microsystems and others have a strong presence in Hungary. Many U.S. companies have a solid foothold in Hungary, and represent a majority in several different market sub-segments (i.e. markets for servers, consumer PCs, printers and other peripherals, and components). The Hungarian government has identified the IT sector as a priority economic sector, and is actively supporting business and individual access to IT. Such initiatives include direct spending of over $100 million in 2001; and over $150 million in 2002. Principal opportunities in Hungary for exporting U.S. microelectronics include individual consumers of IT products (computers, peripherals), Hungarian businesses (servers, peripherals, laptops and components) and Hungarian manufacturers (components). Market access to Hungary is favorable. Although Hungary has not signed the 1996 Singapore Treaty that stipulates duty rates on import of IT products, there are no import duties on computers, storage units, printers and other equipment from the U.S.

Summary

- For Appalachian exporters of automotive parts, NAFTA economies (Canada and Mexico) present the largest export market. Established Western European markets (Germany and Sweden), Asia/Pacific (Korea), and Latin American markets (Argentina) also offer good prospects for future growth.

- For Appalachian wooden household and upholstered furniture manufacturers, NAFTA markets (Canada & Mexico), Germany, Korea, Saudi Arabia, and the United Arab Emirates represent leading export markets.

- Canada, Mexico, China, Poland, Argentina, Brazil and Thailand are leading markets for Appalachian exports of food processing and packaging machinery.

- China and Eastern European markets open many dynamic growth opportunities for exporting microelectronic components for Appalachian manufacturers. Asian economies such as Taiwan also offer opportunities for growth in future demand for U.S.-made microelectronics.

CHAPTER 4: TRANSPORTATION AND LOGISTICS ANALYSIS

The purpose of Chapter 4 is to identify routes and modes used to bring products produced in Appalachia to United States ports for export, and thereby note strengths and weaknesses of the ARC transportation network (see http://www.arc.gov/index.do?nodeId=62 for an overview of the Appalachian transportation system). As a starting pointing, we focus on export of six groups of commodities produced in Appalachia:

- Auto parts
- Electronic components
- Wood furniture
- Upholstered furniture
- Food processing machinery
- Packaging machinery

Developing the route and mode analysis requires the following steps:

1. Quantifying exports by value and volume from the ARC in the above target industries. These data are presented in aggregate, by ARC county and state.[61]
2. Identifying ports of lading of exports of these counties from ARC, pairing counties of origin with destination ports.
3. Making inferences from the data developed in Step 2 to analyze modal splits and routing from Appalachia to major ports used for exporting the target commodities. These data are supported and enriched by interviews with ARC-based shippers of these commodities and representatives from the logistics industry

4.1 Export Shipments from the Appalachian Region

By far, the value of auto parts is the largest exported product group from ARC among the six industries that this study addresses, followed by electronic components (see Table 4-1). Together these two commodities account for more than 95 percent of the value of exports of the six product groupings, while wood furniture, upholstered furniture, food processing machinery and packaging machinery in aggregate account for 4.6 percent of the total. As a five-year average, these six commodity groups exported from ARC account for 3.3 percent of the value of the $169.5 billion of exports from Appalachian states (statewide totals for all commodities).

Table 4-1. Exports from Appalachian Counties by Value

	$ Millions 1998-2002	Percent of Total (rounded)
Auto Parts	$3,634	65.4%
Electronic Components	$1,673	30.1%
Wood Furniture	$ 114	2.1%
Upholstered Furniture	$ 61	1.1%
Food Processing Machinery	$ 60	1.1%
Packaging Machinery	$ 15	0.3%
Totals	**$5,557**	**100%**

Sources: ITA, MISER, U.S. DOC through IMPLAN, JFA

[61] The aggregation of ARC counties within a state's borders.

Considering just the six targeted commodities, 43 percent of the value of exports from these industries shipped from ARC states originates in Appalachian counties (see Table 4-2). This ranges from almost 50 percent of the value of auto parts and upholstered furniture to 21 percent of the value of food processing machinery that are exported overall from the 13 states.

Table 4-2. Exports from Appalachian States and Counties. Appalachian counties are responsible for more than 40 percent of exports of targeted commodities generated by constituent states.

	Exports from ARC States ($millions)	Exports from ARC Counties ($millions)	Percent Exported from ARC States that Originate in ARC Region
Auto Parts	$ 7,510	$ 3,634	48.4%
Electronic Components	$ 4,662	$ 1,673	35.9%
Wood Furniture	$ 352	$ 114	32.4%
Upholstered Furniture	$ 129	$ 61	47.4%
Food Processing Machinery	$ 284	$ 60	21.1%
Packaging Machinery	$ 54	$ 15	27.9%
Totals	**$ 12,991**	**$ 5,557**	**42.8%**

Sources: ITA, MISER, U.S. DOC through IMPLAN. Calculations by EDR Group and JFA.

4.2 Routing and Modes from Appalachia to Ports of Lading

Unfortunately, there is not a single data source to trace routing of commodities from points of origin to points of lading. The largest three issues confronted are:

1. Export data are available from state to port, but not from county to port.
2. Publicly accessible modal data are not available in industry specific detail or by sub-state geography.
3. Databases that were used use different industry and commodity classification systems, requiring translations between industry codes and commodity codes, and among varying industry and commodity codes. This project at different junctures used databases in NAICS, SIC, BEA sectoring, Harmonized Commodity Codes, SITC and, STCC.[62]

This analysis, therefore, involves a series of sources. Data accumulated per county by Minnesota Implan Group, Inc. (IMPLAN) from federal data sources (most notably the U.S. Department of Commerce) is the basis for county-specific economic activity and the rate of exports among the six commodities. The Massachusetts Institute of Social and Economic Research (MISER) and the International Trade Administration of the U.S. Department of Commerce (ITA) were the sources for exports by commodity and value from state to country of destination and domestic ports of lading.[63] The Freight Analysis Framework (U.S. Department of Transportation) and the Commodity Flow Survey (U.S. Department of Transportation and U.S. Department of Commerce) provide insights on the modal splits from point of origin to points of lading. Finally, we contacted manufacturers, common carriers and logistics firms to mine their insights regarding transporting goods for export.

[62] NAICS – North American Industry Classification System; SIC – Standard Industrial Classification; BEA – Bureau of Economic Analysis of the U.S. Department of Commerce; SITC -Standard International Trade Classification**;** STCC - Standard Transportation Commodity Code.

[63] Annual values of exports per commodity from 1998 through 2002 were averaged. In this way, annual fluctuations are not a factor.

4.2.1 Exports by State

Data gleaned from IMPLAN, ITA and MISER are the basis for estimating the original state and county of lading of exports by value generated from the ARC region for each of the six targeted commodities. Data available from 1998 through 2002 was averaged to account for year to year fluctuations.

Overall, the annual value of the six target commodity groups exported from Appalachian counties is over $5 billion per year. Counties in West Virginia, Tennessee and Alabama account for roughly 50 percent of the total (see Table 4-3). Note that counties in these three states are the leaders in the export of auto parts, by far the largest of the six commodity groupings, and West Virginia is also a prominent exporter of electronic components, which is the region's second largest industry of the six as shown in Table 4-1, above.

Table 4-3. Exports from ARC Counties. The aggregated export value of the six target commodities show the disproportionate strength of West Virginia, Tennessee and Alabama due to these states' strengths in auto parts and electronics. Appalachian counties are aggregated by state.

State (Totals of ARC Counties)	Average Value of Exports, 1998-2002	Percent of Total ARC Exports
West Virginia Total	$ 988,838,386	19.2%
Tennessee Total	$ 853,066,380	16.6%
Alabama Total	$ 715,891,138	13.9%
Pennsylvania Total	$ 404,569,700	7.9%
Georgia Total	$ 381,575,320	7.4%
Ohio Total	$ 301,621,607	5.9%
Maryland Total	$ 274,323,608	5.3%
South Carolina Total	$ 257,808,513	5.0%
North Carolina Total	$ 254,895,432	5.0%
Virginia Total	$ 200,359,053	3.9%
Mississippi Total	$ 200,005,821	3.9%
New York Total	$ 178,367,325	3.5%
Kentucky Total	$ 132,493,424	2.6%
Total	**$ 5,143,815,708**	**100.0%**

Note: Totals have been rounded
Sources: ITA, MISER, U.S. DOC through IMPLAN. Calculations by EDR Group and JFA.

In examining the value of exports from Appalachia aggregated by state for each of the six target industries, only in auto parts, by far the largest industry among the six, do as many as six of ARC's 13 constituent states generate significant values of exports (Tennessee, Alabama, West Virginia, Ohio, Maryland and Georgia). Together these six states account for 79 percent of auto parts exported from the region (see Table 4-4). Examining value as well as percentage is important because exports of the auto parts industry are nearly two-thirds of the six industries. Thus 5.5 percent of auto parts exports from the Region is worth roughly $200 million, while 5.5 percent shares of upholstered furniture and food processing machinery exports are worth about $3 million and less than $1 million in packaging machinery. Overall, the states identified as the leading exporters per target industry in Table 4-4 account for $4.2 billion annually, or 77 percent of all exports of these six commodity groups from Appalachia. Of the $4.2 billion, Appalachian counties in the eight states that are prominent exporters of auto parts and electronic components account for almost $4.1 billion, which is almost 74 percent of the total value of exports from Appalachia in these six industries.

Table 4-4. States Generating Major Proportion of Exports in Targeted Commodities

Commodity Group	State of Origin (Totals of ARC Counties)	Percent of all Exports from ARC	Average Value of Exports 1998-2002
Auto Parts	Tennessee	22.0%	$ 800,112,160
	Alabama	20.0%	$ 726,714,042
	West Virginia	15.1%	$ 550,122,530
	Ohio	8.3%	$ 300,132,899
	Maryland	7.6%	$ 277,241,407
	Georgia	5.5%	$ 200,573,076
	Subtotal Auto Parts	**78.6%**	**$2,854,896,115**
Electronic Components	West Virginia	30.7%	$ 514,311,720
	Pennsylvania	19.7%	$ 330,103,131
	Georgia	12.7%	$ 211,814,781
	Mississippi	10.6%	$ 176,679,628
	Subtotal Electronic Components	**73.7%**	**$1,232,909,260**
Wood Furniture	North Carolina	40.6%	$46,461,756
	New York	26.1%	$29,861,739
	Subtotal Wood Furniture	**66.8%**	**$76,323,495**
Upholstered Furniture	Tennessee	24.4%	$14,871,673
	Alabama	21.3%	$13,002,790
	Pennsylvania	20.3%	$ 12,373,721
	North Carolina	16.2%	$ 9,912,413
	Subtotal Upholstered Furniture	**82.1%**	**$50,160,597**
Food Processing Machinery	Pennsylvania	27.9%	$16,834,722
	Georgia	20.1%	$12,101,464
	South Carolina	14.1%	$ 8,525,894
	Ohio	12.1%	$ 7,265,702
	Subtotal Food Processing Machinery	**74.2%**	**$44,727,781**
Packaging Machinery	South Carolina	64.8%	$ 9,692,613
	Georgia	16.0%	$ 2,393,219
	Subtotal Packaging Machinery	**80.8%**	**$12,085,832**
Total all Commodity Groups		**76.9%**	**$ 4,271,103,080**

Note: The five-year average of auto parts exports from Appalachian counties in South Carolina total roughly $150 million, per year. However, average exports in 2001 and 2002 are $200 million, which is most likely the influence of the BMW plant in the state. Note: Totals have been rounded.
Sources: ITA, MISER, U.S. DOC through IMPLAN. Calculations by EDR Group and JFA.

4.2.2 Major Counties

The foregoing analysis provides a framework to identify the leading counties in ARC that export the six targeted commodities and to pinpoint origins for cargo shipments.

The top value exporting counties from ARC are:

- Auto Parts – Cabell, WV
- Electronics – Logan, WV
- Food Processing Machinery – Hall, GA
- Packaging Machinery – Greenville, SC
- Upholstered Furniture – Hamblen, TN
- Wood Furniture – Chautauqua, NY

A more detailed accounting of leading exporting counties per commodity from Appalachia and the five-year average value of exports per county are listed below in Table 4-5. As expected, the leading counties that export each of the six targeted commodities generally fall into the leading states presented above in Table 4-4, given that the totals presented above are the sums of ARC counties with state borders. Exceptions are:

- Greenville, South Carolina is the fourth leading exporter of electronic components.
- Pennsylvania counties in ARC make Pennsylvania the second leading state in the region for export of electronic components. However, no single county is among the leading six counties that export in this commodity group. Instead, Pennsylvania produces goods for export among nine counties, which total over $173 million in value.
- Pulaski, Virginia is the fifth leading exporter of food processing machinery (although this is a very small industry in comparison to auto parts and electronics).
- Holmes, Ohio and Lowndes, Mississippi are respectively Appalachia's fourth and fifth largest export counties of wood furniture, although these two states do not account for significant exports overall. (This is also a relatively small industry and values of exports are heavily concentrated in the top two counties in the ARC region.)

4.2.3 Identifying Routes

We identified major routes for carrying commodities to export through the following methods.

1. Identify level of exports by state and county in ARC for each of the six targeted industries (sources U.S. Department of Commerce data through IMPLAN, MISER, International Trade Administration, calculations by Jack Faucet Associates (JFA) and EDR Group).
2. Identify major exporting states and counties in each of the six targeted industries (sources: U.S. Department of Commerce data through IMPLAN, MISER, International Trade Administration, calculations by JFA and EDR Group).
3. Identify states of lading in each of the six targeted industries originating in ARC (sources: U.S. Department of Commerce data through IMPLAN, MISER, International Trade Administration, calculations by JFA and EDR Group).
4. Identify gateway ports for exports in each of the six targeted commodities (sources: step 3 above, additional calculations by EDR Group).
5. Identify routes between major producing states/counties in ARC and primary ports of lading.

Table 4-5. Average Value of Exports 1998-2002. West Virginia hosts the counties that export the highest value of auto parts and electronics from the ARC region.

Commodity Group	County	State	Average Value of Exports 1998-2002 (millions)
Auto Parts	Cabell	WV	$ 394
	Limestone	AL	$ 283
	Washington	MD	$ 270
	Clermont	OH	$ 156
	Putnam	TN	$ 122
	Tuscaloosa	AL	$ 122
	Blount	TN	$ 120
Electronics	Logan	WV	$ 182
	Gwinnet	GA	$ 153
	Oktibbeha	MS	$ 131
	Greenville	SC	$ 74
	Wood	WV	$ 71
	Mercer	WV	$ 56
	Luzerne	PA	$ 35
Food Processing Machinery	Hall	GA	$ 8
	Clearfield	PA	$ 8
	Highland	OH	$ 6
	Spartenburg	SC	$ 4
	Pulaski	VA	$ 3
	Allegheny	PA	$ 3
Packaging Machinery	Greenville	SC	$ 7
	Spartenburg	GA	$ 3
	Gwinnett	SC	$ 2
Upholstered Furniture	Hamblen	TN	$ 5
	Rhea	TN	$ 4
	Alexander	NC	$ 4
	Lycoming	PA	$ 3
	McKean	PA	$ 2
	Caldwell	NC	$ 2
	Claiborne	TN	$ 2
	Marion	AL	$ 2
Wood Furniture	Chautauqua	NY	$ 22
	Caldwell	NC	$ 16
	Burke	NC	$ 4
	Homes	OH	$ 2
	Lowndes	MS	$ 2
	McDowell	NC	$ 2

Sources: ITA, MISER, U.S. DOC through IMPLAN. Calculations by EDR Group and JFA.

States of Lading

We identified states of lading (where a product leaves the U.S.) that account for more than 73 percent of the value of exports for the six target industries from Appalachian counties over the five year timeframe of 1998-2002. By individual commodity group, the percentage of exports shipped to these states for international export range from 68 to 76 percent of ARC exports (see Table 4-6).

- The most significant states of lading for ARC commodities are Michigan, New York and Florida. These are major states of lading for each of the commodity groups (except that Michigan is not a major state of lading for packaging machinery).
- Other key states of lading are South Carolina, Maryland and Texas for food processing machinery and South Carolina and Texas for packaging equipment.
- Note that with the exception of Maryland and South Carolina, the targeted commodities are being shipped outside of states with Appalachian counties for export.

Table 4-6. Significant States of Lading. Led by exports of auto parts, the most significant states of lading for ARC commodities are Michigan, New York and Florida.

Commodity Group	State of Lading	Percent of all Exports from ARC	Average Value of Exports 1998-2002
Auto Parts	Michigan	36.1%	$ 1,313,172,274
	NY	32.4%	$ 1,176,913,391
	Florida	7.5%	$ 271,064,338
Subtotal Auto Parts		**76.0%**	**$ 2,761,150,003**
Food Processing Machinery	Michigan	13.4%	$ 8,085,731
	New York	16.9%	$ 10,165,953
	Texas	16.1%	$ 9,689,612
	South Carolina	8.4%	$ 5,058,858
	Florida	8.2%	$ 4,932,236
	Maryland	7.5%	$ 4,498,103
Subtotal Food Processing Machinery		**70.4%**	**$ 42,430,493**
Packaging Machinery	Florida	11.6%	$ 1,736,169
	NY	19.2%	$ 2,872,162
	South Carolina	17.4%	$ 2,607,247
	Texas	20.1%	$ 3,012,852
Subtotal Packaging Machinery		**68.3%**	**$ 10,228,430**
Electronic Components	Florida	12.6%	$ 209,974,369
	Michigan	22.0%	$ 367,915,248
	NY	33.3%	$ 557,645,076
Subtotal Electronic Components		**67.9%**	**$ 1,135,534,692**
Upholstered Furniture	Florida	15.4%	$ 9,381,064
	Michigan	28.2%	$ 17,210,832
	NY	26.6%	$ 16,264,175
Subtotal Upholstered Furniture		**70.2%**	**$ 42,856,070**
Wood Furniture	Florida	21.2%	$ 24,248,372
	Michigan	14.6%	$ 16,668,612
	NY	35.4%	$ 40,448,251
Subtotal Wood Furniture		**71.2%**	**$ 81,365,236**
Total all Commodity Groups		**73.3%**	**$ 4,073,564,926**

Sources: ITA, MISER, U.S. DOC through IMPLAN. Calculations by EDR Group and JFA. Note: Totals have been rounded.

4.2.4 Major Ports

Ports of lading were identified in the following method.

- MISER provides port specific data from exports originating in ARC states by commodities. (Data for point of origin are available on a state basis).
- Leading ports within the states of lading per industry were identified from the MISER data.
- Judgments were exercised when considering the geography of ARC and the location of key ports. For example, though Detroit and Port Huron are major ports in Michigan, it is likely that shippers of products originating in ARC and exported through Michigan will not bypass Detroit and truck goods 60 miles further north to Port Huron.

Literally, hundreds of ports nationally are identified as gateways for the six targeted commodities. Narrowing the ports to those in key states of lading, and several others that are prominent nationally and are in or tangential to Appalachia, we have identified the probable main ports of lading for ARC produced exports of the six target commodities (see Table 4-7).

Table 4-7. Main Ports of Lading for Appalachian Exports. Key ports of lading for exports in target industries from Appalachia are Detroit and New York, including JFK Airport.

Auto Parts	**Electronic Components**	**Food Processing Machinery**
• Detroit MI • New York, NY (including the Port of NY and JFK International Airport) • Buffalo-Niagara Falls, NY • Miami (including the Port of Miami and Miami International Airport) • Jacksonville, FL Other Norfolk, VA Baltimore, MD Laredo, TX	• JFK International Airport • Buffalo-Niagara Falls, NY • Detroit, MI • Miami, FL (including the Port of Miami and Miami International Airport) Other Charleston SC Atlanta GA Dallas-Fort Worth TX	• Detroit, MI • New York, NY (including the Port of NY and JFK International Airport) • Buffalo-Niagara Falls, NY • Champlain-Rousse Pt., NY • Baltimore, MD • Charleston SC • Laredo, TX • Detroit, MI • Miami, FL (including the Port of Miami and Miami International Airport) Other Norfolk, VA
Packaging Machinery	**Upholstered Furniture**	**Wood Furniture**
• Charleston SC • New York, NY • Buffalo-Niagara Falls, NY • Laredo, TX • Miami, FL (including the Port of Miami and Miami International Airport)	• Detroit MI • New York, NY • Buffalo-Niagara Falls, NY • Miami (Including the Port of Miami and Miami International Airport) • Jacksonville, FL	• Detroit MI • New York, NY • Buffalo-Niagara Falls, NY • Miami, FL • Jacksonville, FL Other Charleston SC Norfolk, VA

Source: MISER, calculations by EDR Group.

4.2.5 Port Pairings

Based on the research above, we identified 185 *count-to-port* pairings (see Table 4-8) and tested 79 by hypothesizing probable routes from county of production to port. These routes were buttressed with findings from interviews with regional manufacturers. The results indicate that routing is heavily oriented to interstate highways that bring products on a north-south axis from Appalachia to ports in Michigan, New York and Florida, and secondarily east-west to ports in South Carolina, Virginia and Texas.

Table 4-8. Identified County to Port Routes by Commodity Group

Commodity Group	Number of County to Port Routes
Auto Parts	55
Electronic Components	36
Food Processing Machinery	24
Packaging Machinery	19
Upholstered Furniture	25
Wood Furniture	26
Total	**185**

The Appalachian Development Highway System (ADHS) feeds into these key interstates—but is not (and is not necessarily designed to be) an alternative route (see http://www.arc.gov/index.do?nodeId=1006 for maps and data identifying the system and corridors by alphabetical designations assigned by ARC). Through interviews with manufacturers and logistics companies, we identified the interstate highways that are the backbone of shipments of the six target commodity groups to ports of lading. In Table 4-9, we present segments of the ADHS that feeds into these key interstate highways (and one U.S. highway).

Table 4-9. Key Port Connections in Appalachia.

Highway	Endpoints by State with Appalachian Counties	ADHS Corridors		Key Port Connections
		Direct	Indirect	
I—95	Georgia to New York		M	New York City, Miami and Baltimore, connects to I-26 to Charleston and I-64 to Norfolk
I-26	North Carolina to South Carolina	W	B	Charleston, Connects to I-95, Connects to I-81 for eventual connections to Buffalo/Niagara Falls and Champlain.
I-85	Alabama to Virginia	W, A1,	A, B, H	Norfolk and I-95 to New York and Florida
I-70	Ohio - Pennsylvania	C	B/B1, C, D	Connects to I-77 to Lake Erie for eventual connection to Detroit and to I-79 for eventual connection to Buffalo/Niagara Falls and Champlain
I-40	Tennessee to North Carolina	B, A	W, K	Connects to I-75 to Detroit, I-26 to Charleston, I-85 and I-95 for eventual connects to NY, Norfolk and Florida
I-81	North Carolina to New York	B, T, M S, Q, H,	L, N, O, U, P, F, G, R, I	Connects to I-90 to Buffalo/Niagara Falls, I-87 to Champlain, i-26 to Charleston (and from I-26 to I-95), I-64 to Norfolk, I80 to New York City
I-77	South Carolina to Pennsylvania	D, G, L, Q	B/B1	Connects to I70 and I-26 and I-90 for eventual connection to Detroit
Hwy 321	Tennessee to South Carolina	J		Connects to I-40, I-20 and I-85

Note: Other highways mentioned are U.S. Highways 321 and 119. Indirect connection to an Interstate Highway is defined as when an ADHS Highway connects to an Interstate through one other Interstate or ADHS highway.
Source: Telephone Interviews; EDR Group.

The ADHS system connects to key interstate highways for transporting target commodities to ports. Secondly, we tested potential origins and port destinations. Our findings show that the ADHS is particularly positioned for the transport of auto parts, semi-conductors, upholstered furniture and wood furniture (see Table 4-10). Eleven of 66 routes tested in these four sectors use the ADHS. Additional development of the ADHS would assist firms that now export packaging machinery and wood furniture, by lowering costs of shipments from plant to port.

Table 4-10. ADHS Highways Identified for Commodity Transportation

ADHS Highway	Location by State	Connections to Interstate Highways	Key Port Connections
J	Kentucky to Tennessee at the Alabama and Georgia borders	I-75, I-59	I-75 is a direct link to Detroit, connects to I-10 to Jacksonville and linkage to Miami, and I-81 for eventual links to New York. I-59 enters Texas through Alabama.
L	Intra-West Virginia	I-77, I-79	I-77 goes to Lake Erie for eventual connection to Detroit and connects to I-26 to Charleston and I-64 to Norfolk. I-79 connects to I-90 for connections to Buffalo/Niagara Falls, to Champlain via I-87 and to Detroit via I-94.
C	Intra-Ohio	I-70, I-71	See Table 4-9 or key ports associated with I-70. See above for I-77.
B-1	Intra -Ohio, immediately south of C	same as above	
O	Pennsylvania	Connects to I-80 and I-70	See Table 4-9for key ports associated with I-70. I-80 connects to New York City. And I-90 for eventual connections to Detroit, Buffalo/Niagara and Champlain. Connects indirectly to I_90 and then to Buffalo/Niagara Falls and Detroit
U	Pennsylvania to New York	Connects to I-80, connects with ADHS Highway T	See above for I-80.
T	Lake Erie at the New York - Pennsylvania border and intra-New York	I-90, I-390, I-81, I-87	See Table 4-9 for key ports associated with I-81. I-90 connects to Buffalo/Niagara \falls and to Detroit via I-94. I-87 connects to Champlain.

Source: Telephone Interviews; Mapquest; EDR Group.

Sixteen of the 23 corridors of the ADHS have not been completed. In most cases, the level of construction is far greater than the portions remaining to be finished. However, the disjunctions, though small, affect speed of transport. In some cases, noted below in Table 4-11, corridors in multiple states are complete in one state, but not a second jurisdiction. Table 4-11 lists ADHS corridors identified by telephone surveys or by routes tested as part of this study that are incomplete. Corridors in bold provide direct connections to interstate highways that serve ports or were identified in telephone interviews. Corridors not bold were identified as indirect connections to interstate highways between key points of origin of target commodities and key ports of lading for those commodities (indirect connection is defined as when an

ADHS corridor connects to a key Interstate that goes to a key port through one other Interstate or ADHS highway).

Table 4-11. Incomplete ADHS Links to the Interstate Highway System for Access to Ports

Corridor	State(s) and Location of Gaps
A	**TN, GA***
A1	**GA**
B	**NC**
B1	**OH**
C	**OH**
D	**WV, OH***
G	**WV, KY**
H	**WV**
J	**KY, TN**
M	**PA**
O	**PA**
S	**TN**
U	**PA****
K	TN, NC
N	PA
R	KY***

Note: Corridors G and J are multi-state roadways; the table lists point of gap.
* Gap is at state border
** Gap is at corridor T at NY border
******* Gap is near confluence of corridors G, B and Q
Source: *An Assessment of Intermodal Transportation Plans, Systems, and Activities in the Appalachian Region*, p.2; sources cited in Tables 4-8 and 4-9.

4.3 Transportation by Highway and Other Modes

The Commodity Flow Survey (CFS) and the Freight Analysis Framework (FAF) provide indications of how product moves from point of origin to a United States port prior to international export. Both sources provide data disaggregated to the state level. The most recent CFS is based on 1997 data and is available in three digit detail.[64] FAF is based on 1998 data and is in two digit detail.

For analyzing mode of transport, the CFS is available in three-digit Standard Classification of Transported Goods (SCTG) Codes, while FAF is available in two-digit SCTG. The difference allows us, through the three-digit CFS, to differentiate "auto parts" commodities from other transportation equipment, which is not possible in the two-digit FAF. Moreover, CFS provides modes by both tonnage and value, which, which when contrasted, allows for more nuanced examination of modal needs. For example, in electronics industries, high-value and low weight goods are often shipped by air or courier (which in turn uses air cargo), which means that air services account for a much higher percentage of total value of electronics goods shipped than the total percentage of tons. At this time, FAF measures state and commodity-specific freight shipments by tonnage. FAF, however, is not only a year advanced from CFS, but it is considered more accurate than the Survey by federal highway officials, and provides forecasts of freight shipments to 2020. Moreover, while CFS purportedly measures all shipments within the United

[64] An updated CFS was released in December, 2003, which, unfortunately, is too late to be included in this analysis.

States, FAF includes a database that measures shipments that are U.S. bound for international export. Even at three digit detail, CFS forces a consolidation and rough approximation of several of the targeted sectors, particularly wood and upholstered furniture, and food processing and packaging machinery. At the three-digit level, the following classifications are used:

- For auto parts - Parts and accessories for motor vehicles, except motorcycles and armored vehicles
- For food processing machinery and packaging machinery - Other machinery
- For semiconductor and other electronic parts - Electronic components and parts
- For wood furniture and upholstered furniture - Furniture mattresses and mattress supports, lamps, lighting fittings

Shipments of the targeted commodities from ARC states show a similar profile to national averages. When measured by tonnage, roughly 90 percent, goods are shipped from the Region by truck. Table 4-12 compares mode shipments from ARC to national averages, and also compares mode shipments by tonnage to mode shipments by value, both from ARC and nationwide.

The modal relationships between tonnage shipped and value shipped for auto parts, "other machinery" and furniture are similar, though slightly a higher percentage of tonnage is shipped by truck (as a single mode), and shipments by value show a slightly higher reliance on air (and parcel services) and rail.

Less than half of the value of electronic components and parts are shipped by truck as a single mode. Nationally, nearly 58 percent of value in this sector is shipped by air or parcel service. In ARC states, CFS shows that 89 percent of the tonnage and 42 percent of the value is shipped by truck in this electronics sector, and a strong emphasis is seen in parcel services for value—this is similar to the national profile.

FAF at the two-digit level also shows an overwhelming use of ground transportation to ship products originating in ARC states to ports for international export. As FAF provides mode and commodity information at the two digit level, the following sectors are used:

- 25 – Furniture/fixtures for upholstered furniture and wood furniture;
- 35 – Machinery, except electrical for food processing machinery and packaging machinery. Note, this sector includes all non-electrical machinery;
- 36 – Electrical machinery, equipment and supplies. This sector includes finished consumer products as well as components;
- 37 – Transportation Equipment, including fully assembled transportation vehicles and parts for all modes.

Table 4-12. Mode Splits. Mode splits of shipments from ARC states by tonnage and value of shipment is similar to the U.S. profile.

Tonnage from ARC by percentage					$ Value from ARC by percentage				
Modes	Other machinery	Electronic compnts. & parts	Auto parts	Wood &. uphstd. furniture	Modes	Other machinery	Electronic compnts. & parts	Auto parts	Wood &. uphstd. furniture
Truck	88.3%	88.6%	85.7%	95.4%	Truck	74.8%	41.9%	87.2%	93.2%
Rail	0.1%	0.0%	6.9%	0.0%	Rail	0.1%	0.0%	2.4%	0.0%
Water	0.0%	0.0%	0.0%	0.0%	Water	0.0%	0.0%	0.0%	0.0%
Air (includes truck and air)	0.3%	0.9%	0.2%	0.0%	Air (includes truck and air)	1.5%	4.1%	0.8%	0.1%
Parcel, U.S. Postal Service or courier	3.5%	2.2%	1.7%	0.8%	Parcel, U.S. Postal Service or courier	17.6%	28.3%	5.9%	2.7%
Truck and rail	4.1%	0.0%	0.0%	0.0%	Truck and rail	1.7%	0.0%	0.2%	0.0%
Other & unknown modes	2.6%	0.3%	1.9%	0.9%	Other & unknown modes	3.4%	0.5%	2.1%	0.9%
Tonnage in USA by percentage					**$ Value in USA by percentage**				
Modes	Other machinery	Electronic compnts. & parts	Auto parts	Wood &. uphstd. furniture	Modes	Other machinery	Electronic compnts. & parts	Auto parts	Wood &. uphstd. furniture
Truck	87.2	79.9	84.2	93.9	Truck	72.6	35.6	83.6	91.2
Rail	0.7	0.3	9.7	0.8	Rail	0.5	-	3.8	0.4
Water	-	-	-	-	Water	-	-	-	-
Air (includes truck and air)	1	2.4	0.6	0.2	Air (includes truck and air)	2.7	19.2	1.7	0.6
Parcel, U.S. Postal Service or courier	4.2	8.5	1.6	2	Parcel, U.S. Postal Service or courier	18.2	38.5	6.2	4.6
Truck and rail	2	5.8	1.3	0.7	Truck and rail	0.8	0.5	1.8	0.5
Other & unknown modes	4.9	3.1	2.5	2.4	Other & unknown modes	5.1	6.1	2.8	2.7

Source: U.S. Commodity Flow Survey. Note the "ARC state" portions of this table are statewide averages among states that include ARC counties.

Roughly 94 to 98 percent of furniture, machinery, and electrical machinery, equipment and supplies are transported to ports by truck, as measured by tonnage in 1998 (see Table 4-13). Only transportation equipment uses another mode significantly, rail. Although this sector includes transport of fully assembled automobiles, rail cars and aircraft, along with parts for each industry, the auto parts sector shown above in the CFS presents a similar profile to FAF.

FAF also includes volume and mode projections to 2020, displayed in Table 4-14. The total increase of tonnage projected is more than 63 million tons from 21.6 million tons in 1998, an increase of nearly 42 million tons, nearly tripling base year totals for these four sectors.

Table 4-13. Modes of Shipment for Exports. Shipment of tonnage for selected commodities from ARC states shipped for international export is overwhelmingly by highway.

	Furniture/fixtures	Machinery except electrical	Electrical machinery/ equipment/supplies	Transportation equipment
Highway	98%	94%	95%	84%
Air	0%	1%	2%	0%
Water	0%	0%	0%	0%
Rail	2%	5%	3%	15%

Source: FAF International Commodity Flows, U.S. Department of Transportation. States refer to whole states that include Appalachian counties.

- By mode, 37.2 million of the additional tons (89%) are expected to be transported by highway and 4.2 million tons (10%) by railroad. Projections in FAF of 2020 flows originating in ARC for international shipments in these industries show a similar mode split as 1998.
- By industry, more than 21 million tons of the increased tonnage is expected to be in transportation equipment and almost 13 million of the increase is predicted for the machinery except electrical sector.
- Overall tonnage for furniture and fixtures; machinery except electrical; and electrical machinery, equipment and supplies, are expected to more than triple, while tonnage in the transportation equipment sector is forecast to grow by a factor of 2.8.

Table 4-14. Selected Commodities from ARC States to International Gateways by Tons

	Tons 1998	Forecast Tons 2020	Increased tons forecast, 1998-2020	Forecast Ratio of Increase 2020:1998
Furniture/fixtures	1,343,676	4,125,788	2,782,113	3.07
Machinery except electrical	5,843,814	18,496,591	12,652,776	3.17
Electrical machinery/ equipment/supplies	2,464,916	7,710,897	5,245,981	3.13
Transportation equipment	11,948,256	33,057,860	21,109,605	2.77
Total	**21,600,661**	**63,391,136**	**41,790,475**	**2.93**

Note: Totals have been rounded.
Source: FAF International Commodity Flows.

Figures 4-1 through 4-6 below illustrate the export of the six target commodity groups from Appalachian states to key ports on the base maps of FAF international commodity flows. The routing illustrated for each commodity group is based on analysis described in Sections 4.1 and 4.2 above and is derived from MISER, ITA and county-based economic data developed by federal sources and assembled by IMPLAN. The maps shown in Figures 4-1 through 4-6 represent routes of exports from the leading state of origin in Appalachia (aggregation of Appalachian counties within state borders) to the major state of lading for each of the six target commodity groups. Additional maps showing routes from other states are provided in an appendix to this chapter.[65]

[65] Sources for each figure are found in the preceding analysis and FAF. All calculations reported in the figures refer to the total value of exports for each commodity group.

Figure 4-1, Auto Parts & Upholstered Furniture. Exports of auto parts from Tennessee counties constitute 22 percent of total exports in this industry from Appalachia, and Tennessee counties also account for more than 24 percent of the exports of upholstered furniture from Appalachia. For both commodity groups, the primary ports for export from the Region are in Michigan, New York, and Florida.

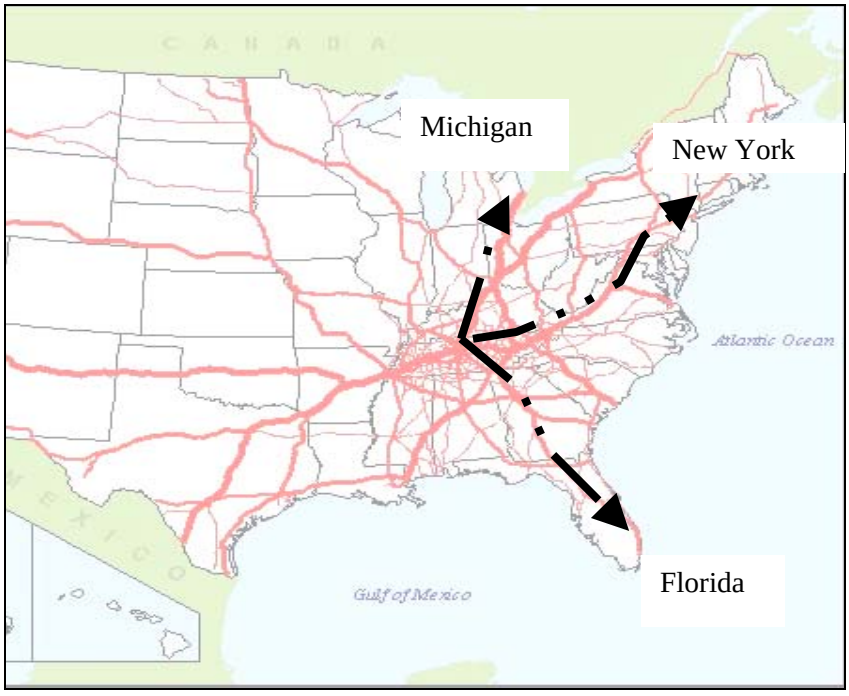


Figure 4-2, Food Processing Machinery. Pennsylvania accounts for approximately 28 percent of the value of food processing machinery exported from the Appalachian region. Key ports for exports are in Michigan New York, Maryland, South Carolina, Florida and Texas.

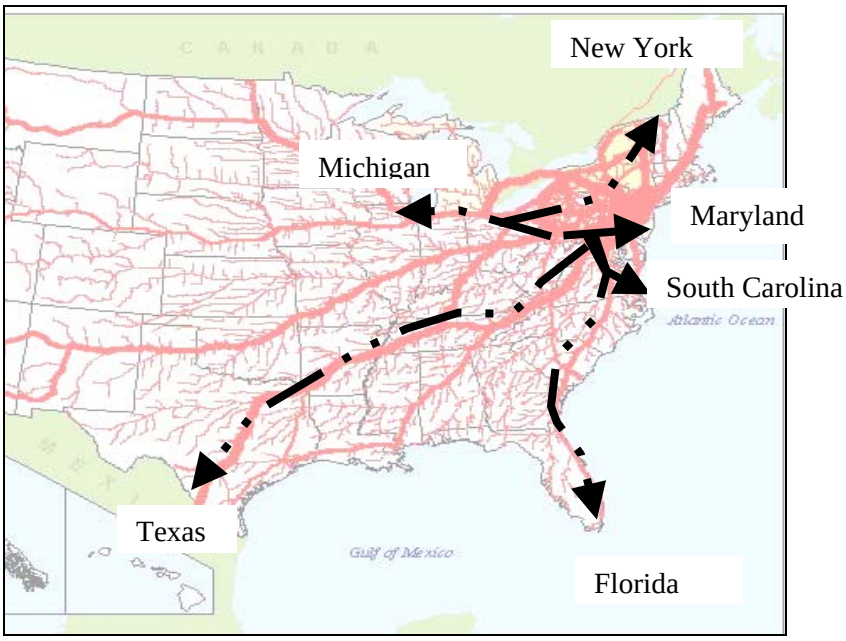


Figure 4-3, Packaging Machinery. South Carolina accounts for almost 65 percent of Appalachia's exports of packaging machinery. Major ports of lading are in New York, Florida, Texas, as well as South Carolina.

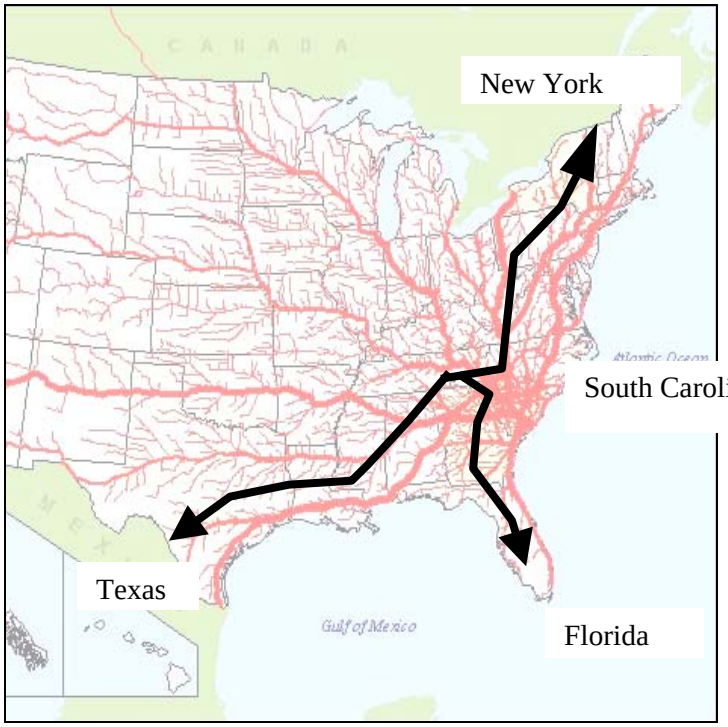


Figure 4-4, Electronic Components. Electronics represent the second largest export industry in the Appalachian region among the six targeted in this study, and almost 31 percent of the regions total value originates in West Virginia. The leading ports of lading for this commodity group are in Michigan, New York, and Florida.

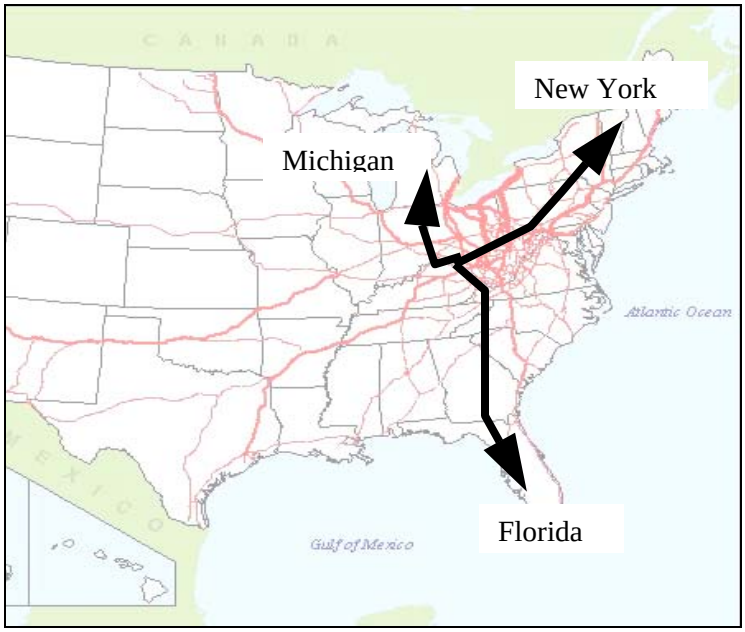
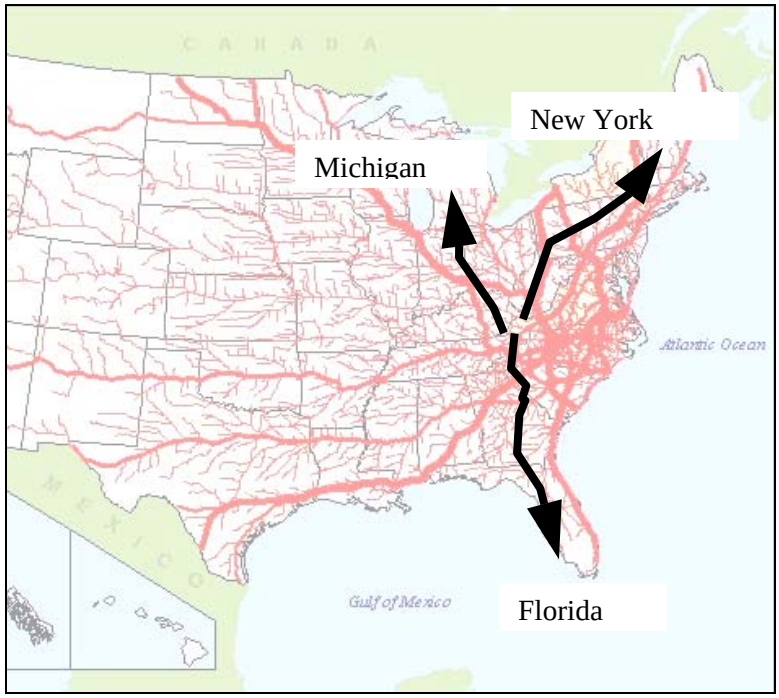


Figure 4-5, Wood Furniture. North Carolina accounts for approximately 41 percent of Appalachia's exports in wood furniture. The leading ports of lading for wood furniture produced in the Region are in New York, Florida and Michigan.



4.3.1 Highway-Rail Intermodal

Auto parts is the only commodity group among the six studied that show appreciable goods moved by rail. Alabama and Tennessee are Appalachia's leading states in this industry, accounting for more than 42 percent or $1.5 billion annually of the value of industry exports. In addition, Appalachian counties in four other states export more than $200 million, including West Virginia ($550 million), Ohio ($300 million), Maryland ($277 million) and Georgia ($201 million).

Five of the seven highway-rail intermodal flatcar transfer facilities in Appalachia are located in two cities in Alabama and two in Tennessee. An additional ten cities host intermodal facilities operated by CSX and/or Norfolk-Southern railroads, which are located outside of the Region but in states including Appalachian counties that show relative strength in exporting auto parts (see Table 4-15).

The presence or proximity of intermodal stations is important because locations at major ports of lading for Appalachian-produced auto parts have intermodal facilities (Detroit, Miami, Jacksonville, Buffalo, and the New York area (facilities are in New Jersey). Intermodal facilities are found at other ports that export significant amounts of the target commodities in Appalachia: Baltimore, Norfolk and Charleston.

At this writing, West Virginia does not host an intermodal facility and this state is the third largest in terms of the value of annual exports of auto parts produced in Appalachia. Two improvements are under consideration, however, that may support the competitive position of the state's by reducing transport costs of bulk parts shipments to ports: an intermodal facility in Pritchard (near ADHS highways B and B1, and I-64) and a Columbus-Norfolk double stack route that will provide direct rail connections through West Virginia to the Port of Norfolk.

Table 4-15. Intermodal Facilities Support for Export of Auto Parts

State	Value of Auto Parts Exports from Appalachia (Average 1998-2002)	Locations of TOFC/ COFC Facilities in Appalachia	Locations of Intermodal Facilities Operated by CSX Railroad and/ or Norfolk Southern Railroad
Alabama	$727 Million	Birmingham (2), Huntsville	--
Georgia	$201 Million	--	Atlanta (3), Austell, Savannah (2)
Maryland	$277 Million	--	Baltimore (2)
Ohio	$300 Million	--	Cincinnati, Cleveland, Columbus, Toledo
Tennessee	$800 Million	Kingsport, Knoxville	Memphis (2), Nashville
West Virginia	$550 Million	--	--

Sources: *An Assessment of Intermodal Transportation Plans, Systems and Activities in the Appalachian Region*; www.csxi.com and www.nscorp.com.

4.3.2 Air

Air transportation is significant for electronic components among the six target industries. Four states, West Virginia, Pennsylvania, Georgia and Mississippi account for almost 74 percent of the value of exports from Appalachia for this industry. Together these four states host 367 airports, of which 37 are commercial airports. Eighteen of the commercial airports are in Appalachia and ADHS highways serve as important connectors to smaller commercial airports in each of these states (see Table 4-16). Among the four major exporting states:

- West Virginia, accounting for almost 31 percent of Appalachia's electronic components exports hosts 37 public use airports, of which six are commercial.
- Pennsylvania, with a 20 percent share, is the home of Pittsburgh International Airport, the largest airport in Appalachia, and Harrisburg International Airport is located just east of the ARC portion of the Commonwealth.
- Georgia accounts for 13 percent and Hartsfield International Airport in Atlanta—the largest commercial airport in the United States is immediately adjacent to the region.
- Mississippi companies in Appalachia export 11 percent of the value of the region's electronic components and as is served by commercial airports in Columbus and Tupelo.

Table 4-16. Airport Access in Appalachia. ADHS highways play an important role in providing access to moderately sized commercial airports in states accounting for a high proportion of value in electronic components exported from Appalachia.

State	Total Airports in State	Total Commercial Airports	Commercial Airports in Appalachia	Significant Commercial Airports Adjacent to Appalachia	ADHS Highways Serving Commercial Airports
West Virginia	37	6	6		B, G, L
Pennsylvania	138	15	10	Harrisburg	M, V, O, P
Georgia	109	9		Atlanta	A/A1
Mississippi	83	7	2		V
Totals	367	37	18		

Sources: *An Assessment of Intermodal Transportation Plans, Systems and Activities in the Appalachian Region*, Federal Aviation Administration, www.AirNav.com.