Oregon State Rail Plan

Oregon's Economy

draft

report

prepared for

Oregon Department of Transportation

prepared by

Cambridge Systematics, Inc.

March 31, 2014

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1.0 Impacts of Rail Transportation

1.1 INTRODUCTION

This section provides a context for the use of rail in Oregon, showing the growth factors, demographic and economic, that will influence the future use of the rail system in Oregon. Included in the section are detailed analyses of trends in the overall Oregon economy, population, international trade, and industry growth, emphasizing industries that are intensive users of the rail system and particularly important to the state's economy.

Oregon's ability to compete, both nationally and globally, goes beyond its diverse base of natural resources, recognized quality of life, and world-leading technologies, but also demands an efficient transportation system that can deliver products reliably and on time. As a crossroads and a gateway for the fast-growing U.S. Pacific Coast and western region, the efficiency and capacity of the rail system in Oregon is fundamental to the state's agriculture, manufacturing, timber and wood products, and logistics and distribution industries. The ability of freight rail network in Oregon and services to accommodate growth and adapt to change, will help position Oregon to continue prospering into the future. In order to plan for future rail demands and needs, it is first important to gauge how Oregon will grow – what will drive the growth; what will be the magnitude of this growth. This section of the study discusses the factors that drive the demand for rail in Oregon. It includes analyses of key trends regarding population, employment, output (gross domestic product), international trade, and industry.

The chapter begins with an overview of the macroeconomic trends that influence the demand for freight transportation in Oregon. This is followed by a detailed look at five industries that are crucial to the Oregon economy and are users of the state's freight rail system, including:

1. Timber, wood products, and paper;
2. Agriculture and food;
3. Manufacturing;
4. Logistics and distribution; and
5. Energy and mining.

1.2 MACROECONOMIC TRENDS

The growth of rail freight volumes in Oregon will be influenced by the interplay of a variety of factors that will have a bearing on transportation demand. These

factors include overall population and employment growth, and the evolution of the state's leading industries. Industries, ranging from agriculture to manufacturing have specific freight rail needs, and their growth will affect rail demand. On the supply side (i.e., the provision of rail infrastructure and quality rail services), the strength of the rail transportation system in Oregon and its ability to provide efficient rail service will affect, positively or negatively, the overall competitiveness of the state's industries and its economy.

The relationship between rail activity and the Oregon economy is both long-term and many-sided. Oregon's historical economic growth ties directly to rail used for the transport of grain and timber. Today, this legacy remains and the state's industries continue to rely on rail to reach domestic and worldwide markets and to receive the inbound intermediate goods required for production. In addition to rail's importance to Oregon's industries, an efficient rail system can help to lower the cost of consumer goods to Oregon's residents. Rail infrastructure improvements that reduce costs by: 1) reducing travel times; 2) adding capacity; or by 3) increasing the reliability of on-time shipments, translate directly into benefits for the Oregon economy.

With a Pacific Coast location amidst several of the fastest growing regions of the United States and Canada, the rail network in Oregon and services will need to respond not only to the intrinsic growth conditions of the state, but also to the transportation and economic needs of Western North America.

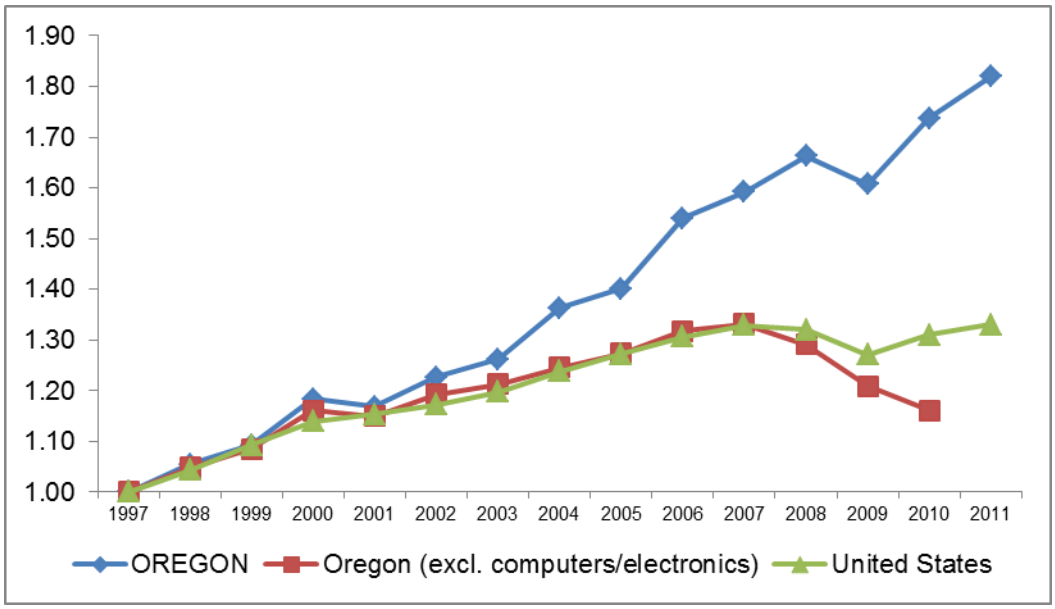
Gross State Product

Oregon's rail transportation system helps to support the state's $195 billion economy. Oregon's economy as measured by gross domestic product (GDP, the value of goods and services produced by a state, region, or country and a universal measure of economic size and activity), grew by 54 percent between 2000 and 2011 (adjusted for inflation), three times as quickly as the 17 percent increase in U.S.[1] GDP recorded over the same period (see Figure 1.1). Since 2000, Oregon has surpassed South Carolina, Alabama, and Kentucky in economic size and now ranks as the 25th largest economy in the United States. The increase in Oregon's economic size is almost entirely due to robust growth in the computers and electronics industry and its cluster of activity in the Portland region. Without this industry, Oregon would have underperformed the United States.

[1] The figures in this report are for the year ending 2011. In June 2013, the Bureau of Economic Analysis released estimates for state GDP for 2012. In 2012, Oregon's real GDP grew 3.9% which ranks 3rd strongest in the country behind North Dakota (13.4%) and Texas (4.8%) and ahead of the U.S. overall (2.5%). Source: http://oregoneconomicanalysis.wordpress.com/2013/06/06/oregon-gdp-2012/

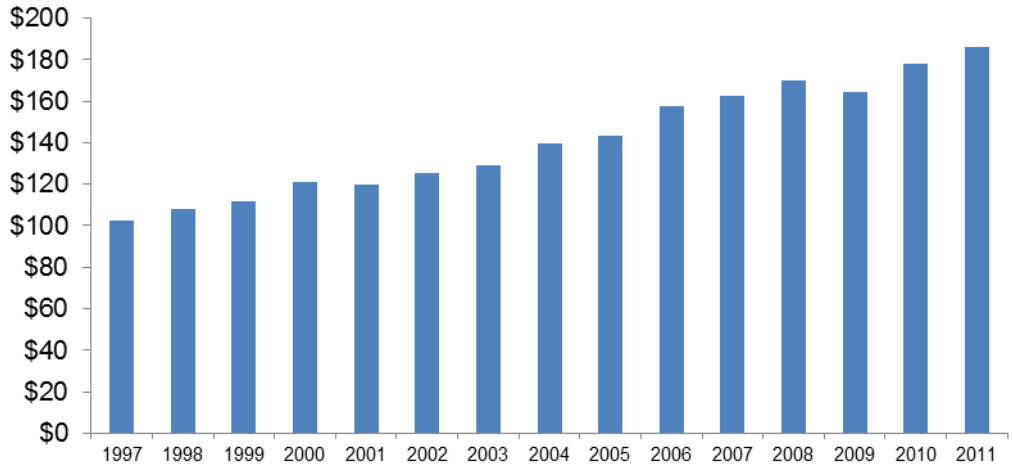
Unlike the state's employment levels, Oregon's GDP, by 2010, had completely recovered from the 2009 recession, reaching a new record (see Figure 1.2). This disparity can be explained by very strong rises in productivity (see Figure 1.3) compensating for slower growth in jobs. Oregon's productivity (GDP per job) rose to $48,100 in 2011, the 9th highest in the country, up from $35,400 in 2000 (34th highest in the U.S.). As in the past, continued economic growth in Oregon will rely on the efficient movement of goods to keep costs down, customers supplied, and to maintain competitiveness within the U.S. and world markets. However, while the rail network in Oregon has played a key role in the state's historical economic growth by transporting timber, wood products, and metals, the state's future is steering more towards high technology electronics manufacturing, an industry that relies much more heavily on air and trucking.

Figure 1.1 GDP Growth Index (1997=1.00), Oregon Compared to the United States, 1997-2011



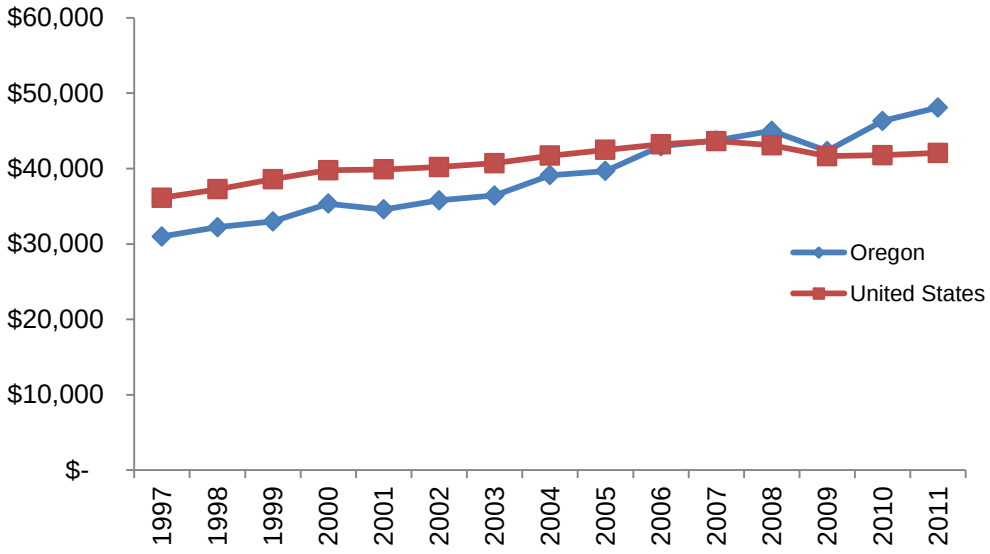
Source: Bureau of Economic Analysis

Figure 1.2 Growth in Oregon GDP, 1997-2011 (in 2005 dollars)



Source: Bureau of Economic Analysis

Figure 1.3 Growth in Productivity (Real Per Capita GDP), 1997-2011



Source: Bureau of Economic Analysis, in 2005 dollars

With the state's location at the intersection between three growing economic regions, the Pacific Coast, the Rocky Mountains, and the Canadian west, overall U.S. and Canadian growth also has a direct bearing on the needs and performance of the rail transportation system in Oregon. The recovery and growth of the U.S. economy in future years will translate to more goods being shipped through and processed by rail freight facilities in Oregon. For these reasons, the ability of the rail infrastructure in Oregon to respond to these shifts

in demand will also affect much of western North America's overall competitiveness as well as the State's.

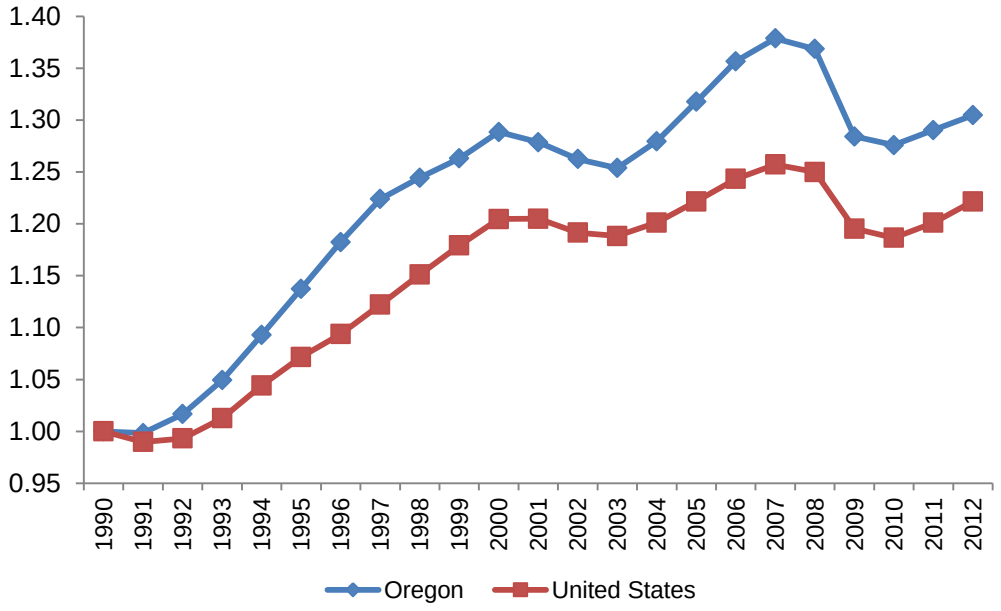
The pace of Oregon's economic growth, as measured by GDP, will be a key determinant of overall freight demand in future decades. High GDP growth linked to the increased production of goods and services will put great demand on Oregon's freight infrastructure to support the expansion of manufacturing, construction, and distribution activities. Even high GDP growth, however, may put only limited pressure on the rail system in Oregon, or pressure only on small portions of the rail system where there is regional activity. While rail plays a key role in timber, wood products, mining, agriculture, and other bulk movements, these industries have shown little or no recent growth in Oregon. Rail plays a much smaller role in the shipment of the high-value manufactured goods that are leading Oregon's economic growth. Sustained population and jobs growth, both positively affected by a more robust economic expansion, will stimulate goods movements related to consumer goods and construction, both users of rail. Slower than anticipated GDP growth, should that occur, will lessen pressures on Oregon's freight transportation system but would spur interest in strategic investments to help stimulate economic growth.

Employment

From a jobs perspective, the Oregon economy employed more than 1.6 million people in 2012. Until recently, Oregon's job gains have far exceeded the nation's. Between 1990 and 2007, total employment in Oregon increased by 38 percent, compared to a U.S. growth rate of 26 percent, as the state added nearly 500,000 new jobs (net). Despite this long record of fast gains, however, the impact of the recent recession on Oregon's jobs was worse than the nation's (see Figure 1.4). Oregon lost about 8 percent of its total jobs during the recession compared to about 6 percent for the United States. The jobs loss in Oregon was worse than all but six states. Oregon's job losses during the recession were widespread with particularly strong declines in construction, transportation, retail trade, and tourism.

As of 2012, Oregon had recovered about 36,000 of the 129,000 jobs lost between 2008 and 2010. Oregon's jobs recovery, thus far, has been moderate, and the state ranked 33rd in employment growth (in percentage terms) between 2010 and 2012. While the recent recession and today's slower growth may relieve some pressure points on freight rail networks in Oregon (and other transportation facilities), existing problems will likely resurface and new issues arise as jobs growth and the economy begin to recover more robustly.

Figure 1.4 Employment Growth Index, Oregon Compared to the United States, 1990-2012 (1990=1.00)



Source: Bureau of Labor Statistics, U.S. Department of Labor

Looking into the future, Oregon is expected to recover to its 2007 job levels (the pre-recession peak) at some point in 2015 according to Oregon's Office of Economic Analysis (OEA). With continued growth, total employment in Oregon is expected to reach 1.9 million in 2021. This forecast represents moderate growth for Oregon (a post 2012 annual growth rate of 1.7 percent), compared to an average annual rate of 1.9 percent posted over the 1990-2007 period prior to the recession. Oregon's expanding economy and recovering job numbers will translate to higher demand for a full range of goods – all possessing some form of transportation requirement, including many that are met by rail. The OEA shows that the Oregon jobs recovery will be broad-based, led by services but with substantial growth in key rail freight industries, including manufacturing, construction, and logistics. Economic growth combined with continued increases in population will also stimulate freight movements, including those by rail, of consumer goods.

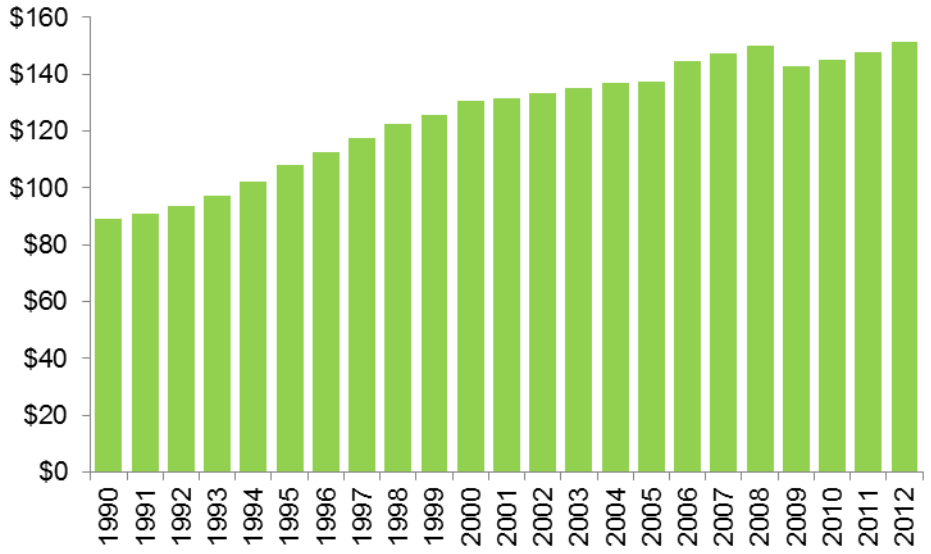
Income

While the expansion of gross state product and employment are valid measures of overall economic growth, people ultimately need higher-income levels to justify increased consumption (manifested through construction, retail sales, restaurant, and leisure spending). Per capita personal income reached $38,786 in 2012, ranking Oregon 33rd out of 50 states. Per capita personal income growth in Oregon has been slower than most U.S. states. Between 2000 and 2012, per capita

personal income increased 35 percent, ranking Oregon 43rd in the country in terms of growth rate.

In real terms, total income levels in Oregon have historically grown at a moderate pace (see Figure 1.5). Between 2000 and 2012, Oregon's total income increased by about $21 billion. Higher total income, in combination with the expected rise in the state's population, will contribute to higher consumer demand (for products ranging from groceries and automobiles to the lumber and concrete required in the construction of homes) in Oregon in coming decades, increasing the need for efficient goods movement by rail and other transport modes as well.

Figure 1.5 Total Personal Income Continues to Rise in Oregon, Hitting a Record High in 2012
Total Personal Income Adjusted to 2012 Dollars



Source: Bureau of Economic Analysis, in 2012 dollars

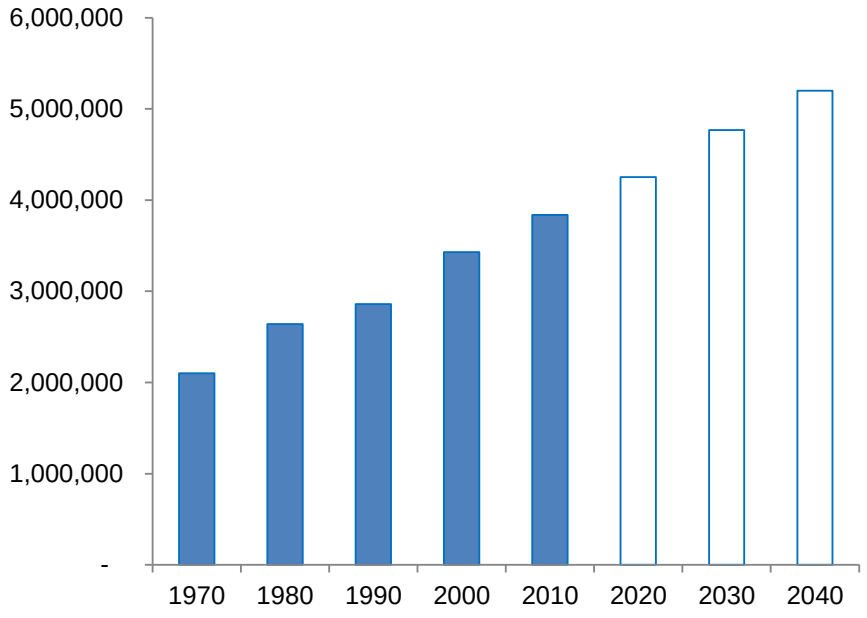
Population

For several decades, Oregon has ranked among the faster states in percent population growth. Growth has recently slowed, however, but Oregon is continuing to add people, even during the recession, at a higher rate than the U.S. average. With neighboring Washington and nearby British Columbia, Oregon and the Pacific Northwest tend to grow more quickly than either the U.S. or Canada overall. The pace of the state's population growth puts pressure on all aspects of Oregon's infrastructure: its water systems, schools, healthcare facilities, etc. In particular, the rail transportation system in Oregon must accommodate the needs of an increasing number of residents, retirees, and workers, and do so reliably, safely, and efficiently. Higher population growth will also lead to increased highway congestion and more demand for passenger

rail services. For these reasons, future plans regarding Oregon's freight infrastructure and services needs to incorporate and respond to a set of what are likely to be relatively high-population growth conditions.

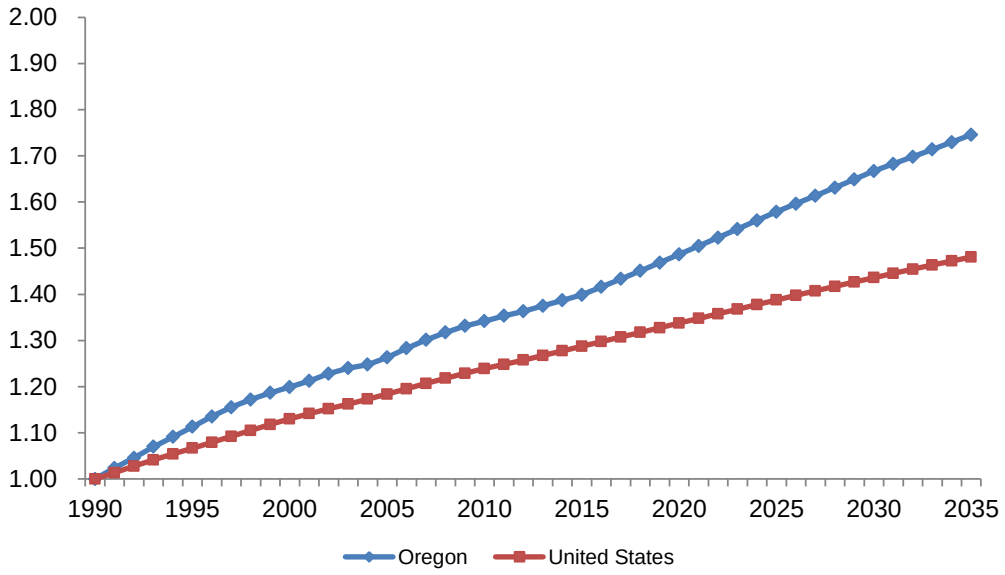
Oregon's population grew by 11.9 percent between 2000 and 2010, adding over 400,000 people, and nearly doubled between 1970 and 2010 (see Figure 1.6). Oregon was the 18th fastest growing state in the country between 2000 and 2010 and strong growth is forecast to continue into future decades. The pace of population growth slowed somewhat, however, during the recession as domestic migration (a chief draw for Oregon) slowed. Between 2010 and 2012, Oregon grew by 1.6 percent, barely faster than the national rate (1.5 percent), ranking the state 20th. Oregon's population reached 3.9 million in 2012 and is now the 27th most populous state in the country. According to the Office of Economic Analysis's population projections, Oregon is expected to add about 1.3 million people during the next 30 years and will reach 5.2 million by 2040 (this growth is roughly equivalent to adding the current populations of Multnomah and Washington counties to the state over the next three decades). The rate of Oregon's population growth has been and is forecast to continue to be comparatively higher than the United States average (Figure 1.7). Long-term population growth in Oregon helps to maintain and expand the state's labor pool, a primary factor of production upon which the state's businesses generate economic activity and compete.

Figure 1.6 Oregon Population Growth, 1970-2040



Source: U.S. Census Bureau and Oregon Office of Economic Analysis (December 2012 draft forecast)

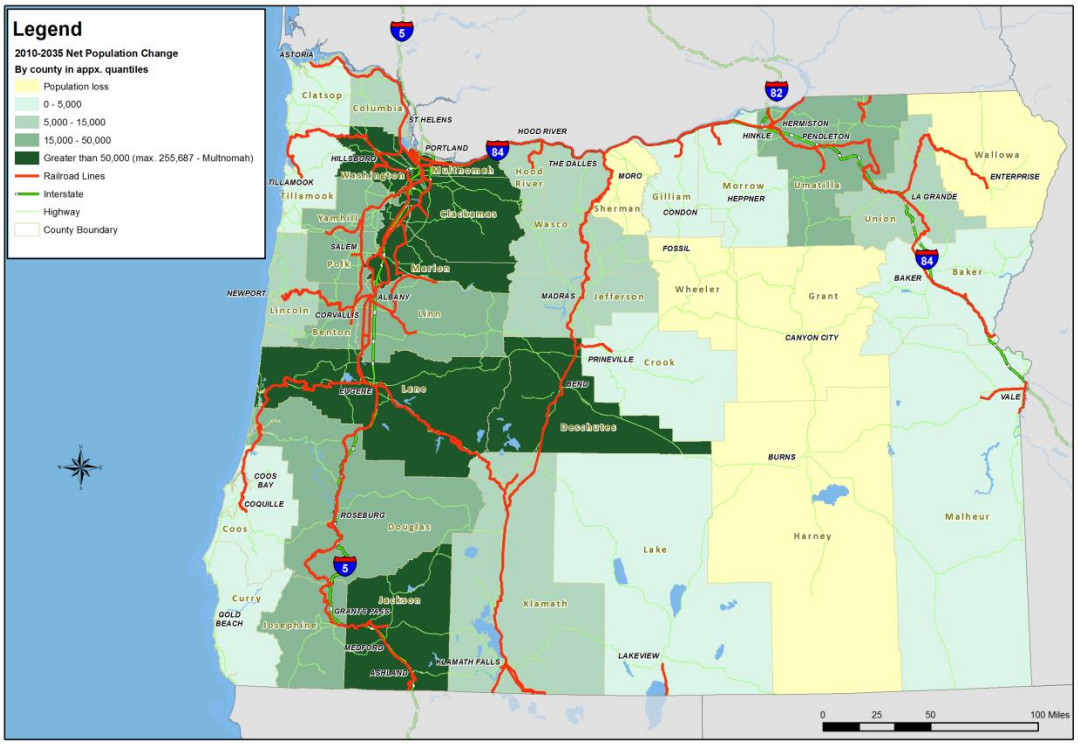
Figure 1.7 Oregon's Population Growth Compared to the United States, 1970-2035
Population Growth Index, 1970=1.00



Source: U.S. Census Bureau and Oregon Office of Economic Analysis (December 2012 DRAFT forecast)

Geographically, Oregon's population growth through 2035 will be concentrated in the state's western counties, particularly those located along the I-5 Corridor (see Figure 1.8). Four counties within the Greater Portland area, Multnomah, Washington, Yamhill, and Clackamas, will account over half of Oregon's population growth through 2035. In percentage terms, the fastest growing counties in Oregon are expected to be Polk, Washington, Deschutes, and Yamhill. Each of these counties is forecast to grow by just below 50 percent over the next 25 years. This will lead to continued growth in travel demand on already congested interstate and state highway corridors in the Willamette Valley with limited resources available to build new highway capacity.

Figure 1.8 Net Population Growth by County, 2010-2035



Source: Oregon Department of Administrative Services, Office of Economic Analysis

1.3 INTERNATIONAL TRADE AND GATEWAY ACTIVITY

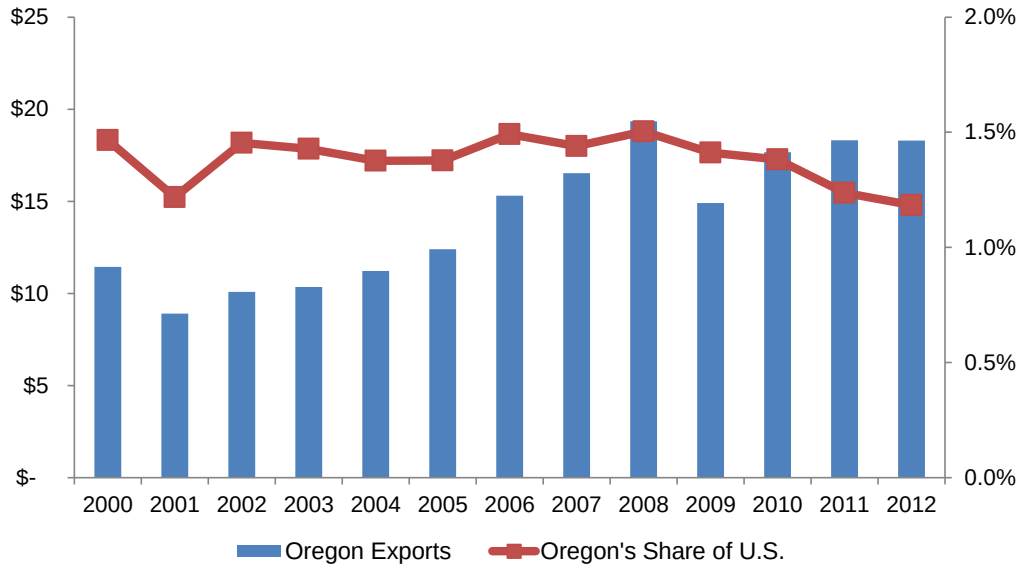
A portion of freight rail industry activities in Oregon relate to transporting international, U.S., and Oregon-manufactured and agricultural products to and from gateways for export/import, notably to/from the Port of Portland. Oregon's businesses rely on rail infrastructure in the state as well as its airports and roadways to help them reach international markets and participate in the increasingly global economy. Oregon is a key node within a global production, international trade, and transportation network that has been redefining how business is conducted and how goods are produced. The trend towards cross-border production, services, and transportation is expected to continue into the future.

A clear linkage between globalization and the transportation network in Oregon, including rail, can be measured in terms of increases in international trade. In Oregon, this can be illustrated by analyzing the importance of exports to the state's businesses (value of Oregon-origin exports), as well as by the volumes of exports and imports ("merchandise trade") handled by the state's principal international ports (the Ports of Portland, Coos Bay, and Astoria).

Exports from Oregon to other countries had been on a steady growth trend until the 2009 recession, and hit a record high in 2008 (see Figure 1.9). The total value

of Oregon-produced exports went up sharply in the 2000s, growing from about $8.9 billion in 2001 to $19.4 billion in 2008. Computers and electronics exports to Asia led the state's growth. The 2009 recession, however, affected global trade, and the value of trade both nationally and in Oregon fell sharply in 2009. Oregon's exports recovered rapidly in 2010 but have since plateaued. Oregon accounted for 1.2 percent of all U.S. exports, based on value, in 2012. The state's share of U.S. exports has eroded since 2008 as the state's exports did not continue to expand, unlike the nation's, after the initial 2010 recovery.

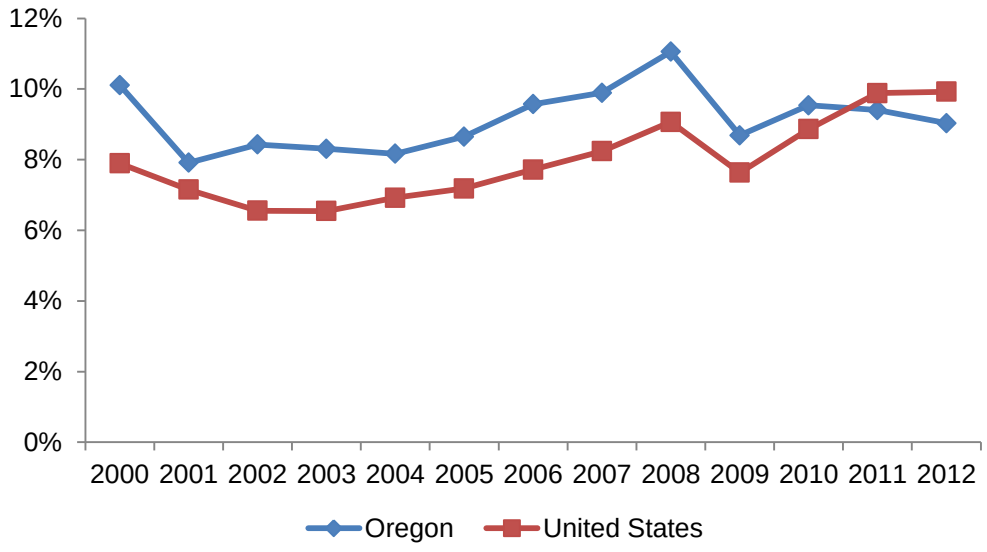
Figure 1.9 Value of Oregon-Origin Exports and the State's Share of Total U.S. Exports, 2000-2012



Source: WISERTrade

The value of Oregon's exports is equal to about 9 percent of the Oregon gross state product, slightly lower than the 10 percent average for the United States (see Figure 1.10). Longer term, international trade is anticipated to account for a growing share of the U.S. economy, a trend that will likely be replicated in Oregon. As a major timber, manufacturing, and agricultural state, Oregon will be impacted by this trend. The effects of increased trade on rail will depend on the composition of the state's imports and exports. Increases in agricultural and timber trade as well as auto imports will impact rail while the expansion of the state's high-technology related trade will have a significantly greater effect on air and trucking.

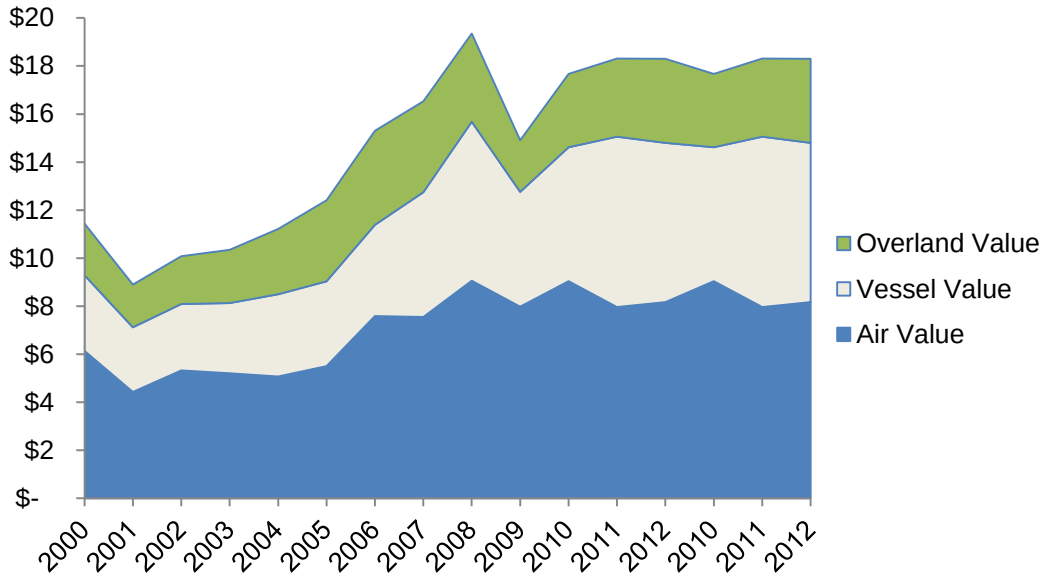
Figure 1.10 Exports as a Share of Gross Domestic Product, Oregon Compared to the United States, 2000-2012



Source: WISERTrade

Rail, truck, and air service provide Oregon-made products with access to primary U.S. trade gateways where they can then be transported to other North American or overseas markets. Based on value, air and deep sea vessels are the top modes for transporting Oregon-origin exports (see Figure 1.11) to overseas markets. Freight rail is unlikely to be used for transporting Oregon exports to airport gateways but would be a mode, along with trucks, for carrying Oregon goods, notably agriculture, wood products, and timber, to seaports and overland export gateways.

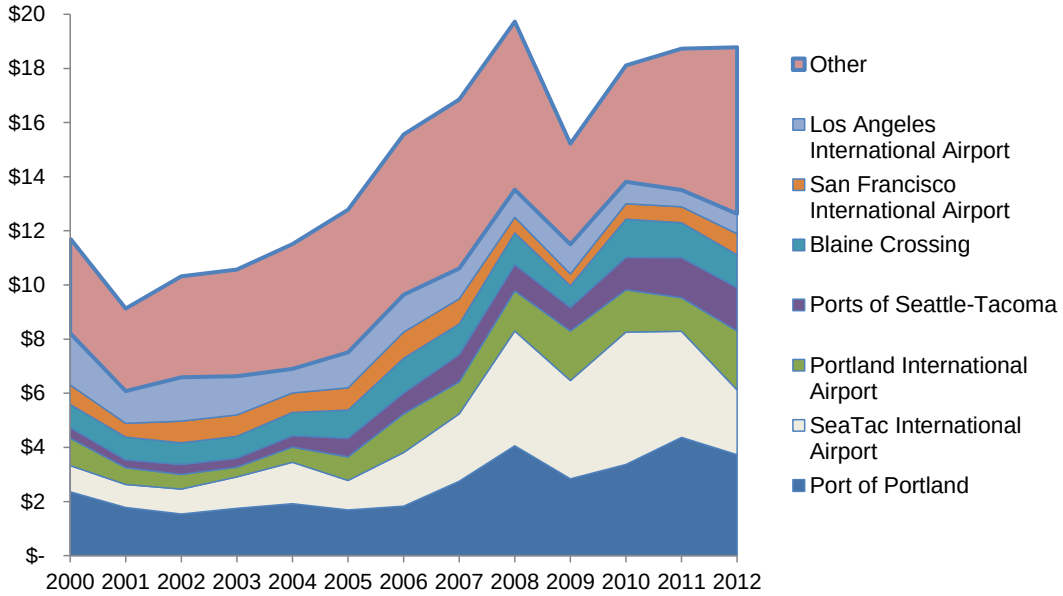
Figure 1.11 Oregon-Origin Exports by Mode, 2000-2012
In billions of dollars



Source: WISERTrade

The top gateways for Oregon-origin exports are in Oregon and Washington. Combined, the Port of Portland, SeaTac International Airport, Portland International Airport, the Ports of Seattle and Tacoma, and the Blaine border crossing are the gateways for 61 percent of Oregon-origin exports (see Figure 1.12). While airports would command Oregon's high-value computers and electronics exports, seaports transport Oregon's bulk exports of lumber and agricultural products. The latter commodities are brought primarily to Northwestern ports by a combination of rail, barge, and trucks.

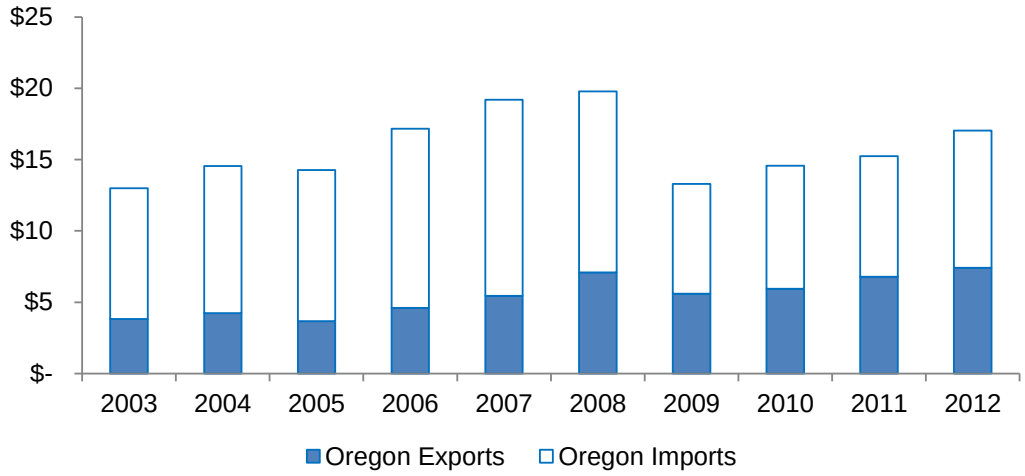
Figure 1.12 Oregon-Origin Exports by Gateway of Departure, 2000-2012
In billions of dollars



Source: WISERTrade; "origin" exports begin their export journey from an Oregon location.

The previous discussion focused on Oregon-origin exports—goods that are made or undergo a value-added activity in the state prior to being shipped overseas. As demonstrated in the figures, Oregon-origin exports can leave the United States from any gateway, not just those located in the state. Rail serves Oregon-origin exports both to reach gateways within the state (e.g., Port of Portland) as well as for transporting Oregon goods elsewhere (e.g., the ports of Seattle and Tacoma) for export. Based on weight, about 10 percent of the Oregon-origin goods exported overseas from Pacific Northwest seaports reach the ports by rail. Top Oregon commodities transported by rail to regional export gateways include feed, wood products, paper, timber, metals, and stone. Beyond the importance of rail and other modes for moving Oregon-produced goods to gateways, Oregon's own ports and airports handle large volumes of imports and exports destined for or originating in markets across the country. Oregon's gateways, the ports of Portland, Coos Bay, and Astoria and Portland International Airport, receive goods from throughout the country for export to foreign markets and process goods imported from overseas for distribution to destinations both within Oregon and nationwide. The total value of Oregon's merchandise trade (exports plus imports) exceeded $17 billion in 2012 (see Figure 1.13). Oregon's imports, based on dollar value, tend to be higher than the state's merchandise exports.

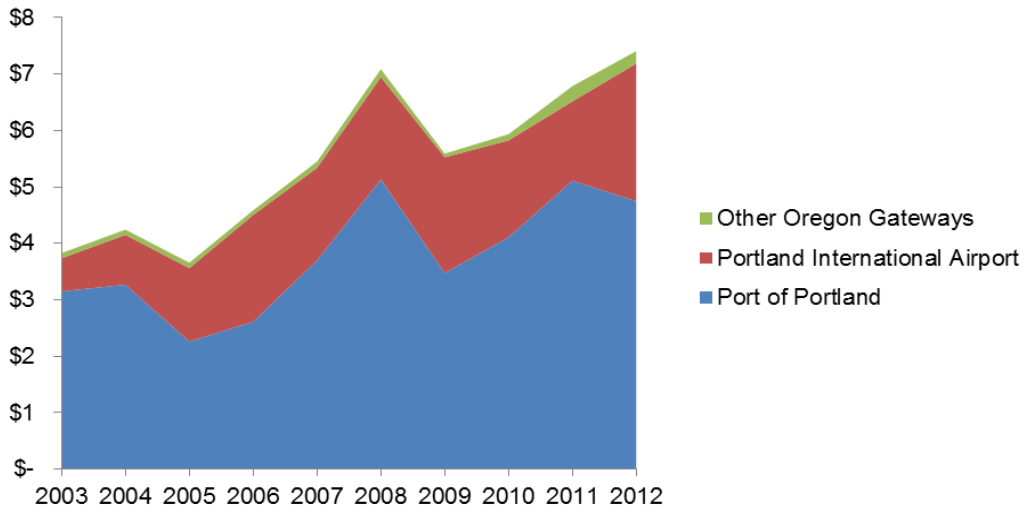
Figure 1.13 Oregon Merchandise Exports and Imports, 2003-2012
In billions of dollars



Source: WISERTrade

The Port of Portland and Portland International Airport handle the overwhelming majority of Oregon's merchandise exports (see Figure 1.14). Cereals, oil seeds, fertilizer, and iron and steel, all commodities handled by rail, are by far the leading exports from the Port of Portland based on dollar value. Electronic microprocessors account for most of Portland International Airport's exports.

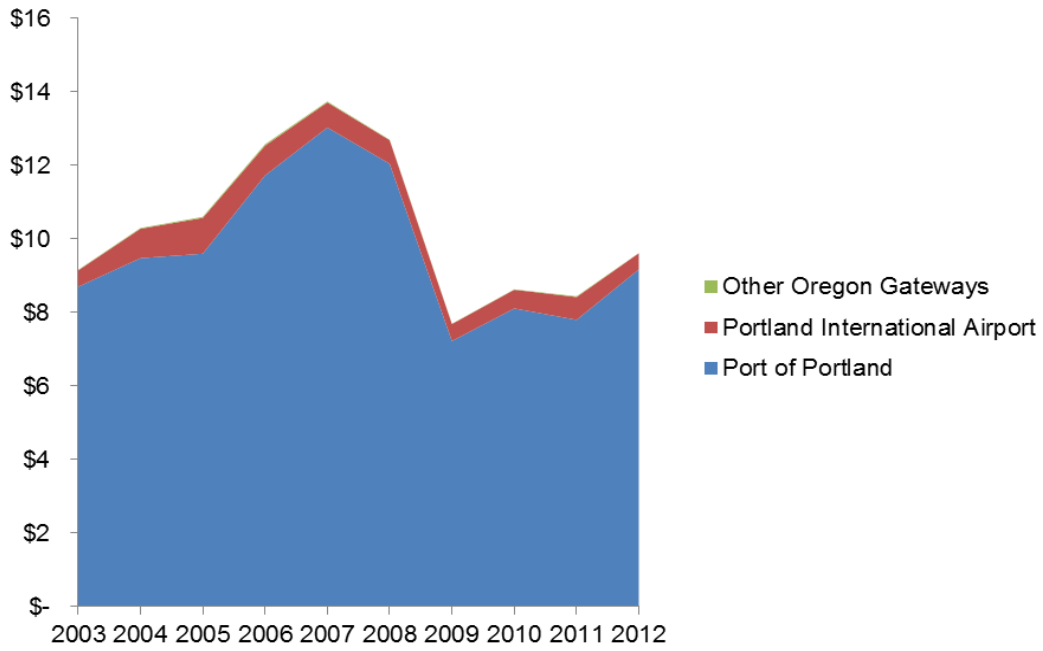
Figure 1.14 Oregon Merchandise Exports by Gateway of Departure, 2003-2012
In billions of dollars



Source: WISERTrade. "Merchandise" exports solely represent items leaving the country through an Oregon gateway, and may originate from any U.S. location.

The Port of Portland processes nearly all of Oregon's merchandise imports based on value (see Figure 1.15). Motor vehicles are by far the largest import, followed by iron and steel, and machinery. Motor vehicles and iron and steel products brought into the port are distributed nationally via rail and by truck. The decline in value since 2007 is due almost entirely to falling auto imports but apparel imports have also dropped. Iron, rubber products, optics, toys, and furniture are growth areas at the port based on value.

Figure 1.15 Oregon Merchandise Imports by Entry Gateway, 2003-2012
In billions of dollars

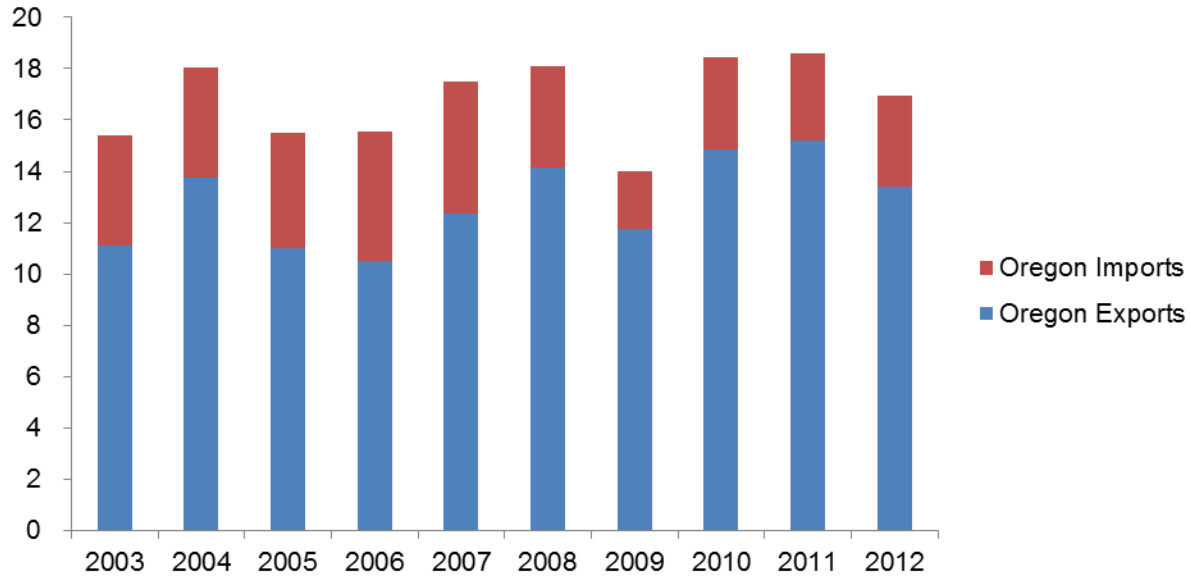


Source: WISERTrade

Oregon's trade volume, on a relative basis, is much larger as measured by weight than dollar value, particularly for merchandise exports. While the state's gateways account for less than a half a percentage of U.S. exports based on dollar value, Oregon accounts for a 2.5 percent, though declining (see Figure 1.17), share of U.S. exports based on weight. The state's gateways only have a small share of U.S. imports, however, based on weight.

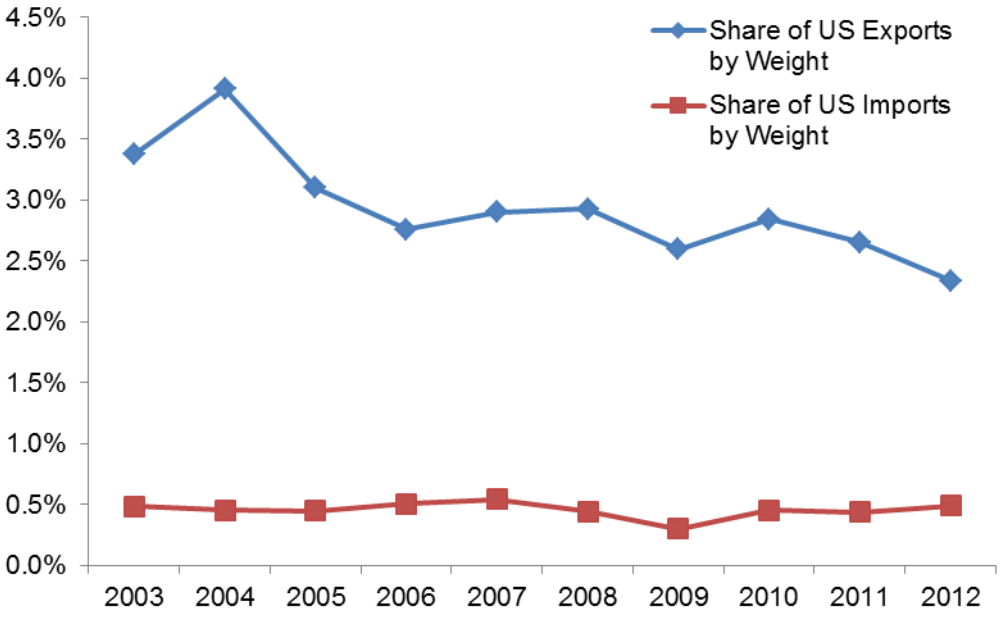
Between 2003 and 2012, Oregon's gateways generally handled between 16 and 18 billion kilograms of foreign trade on an annual basis (see Figure 1.16). About 80 percent of this trade is exports. Although volumes held relatively steady, Oregon's share of U.S. exports by weight declined.

Figure 1.16 Oregon Merchandise Exports and Imports by Weight, 2003-2012
In billions of kilograms



Source: WISERTrade

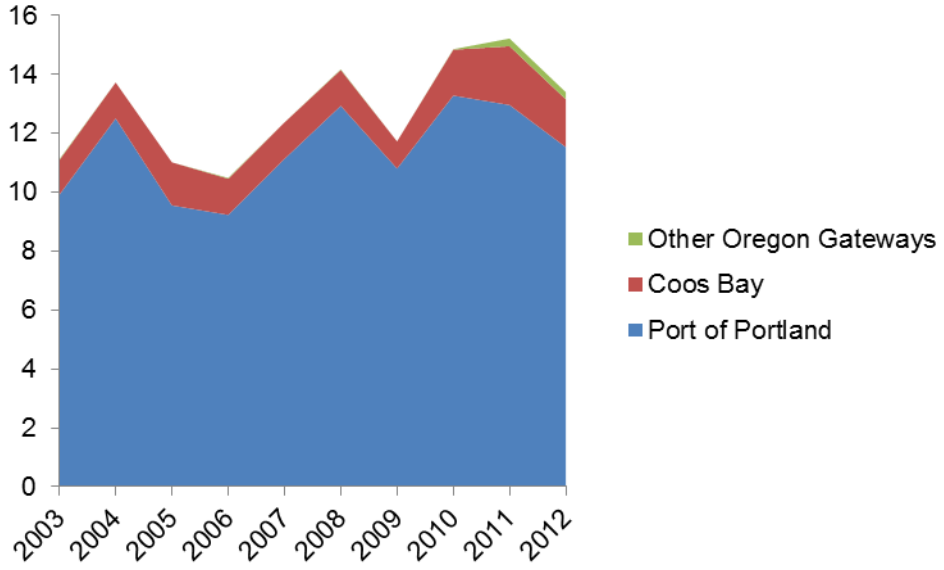
Figure 1.17 Oregon's Share of U.S. Merchandise Exports and Imports Based on Weight, 2003-2012



Source: WISERTrade

The Port of Portland handled about 11.5 billion kilograms of merchandise exports in 2012 (see Figure 1.18). The Port of Portland's leading exports by weight include chemicals (disodium carbonate), fertilizers (potassium chloride), wheat, forage (hay), and oil seeds (mostly soy). Since 2003, fertilizer and soy exports from the port have expanded, chemicals have held steady, and wheat has experienced a moderate decline. With few exceptions, exports to Asia, particularly to Japan and China, are the top destinations for the Port of Portland's export commodities. The port, however, has seen significant rises in trade in chemicals and fertilizers to South America. The smaller Port of Coos Bay has experienced generally rising export volumes since 2003 and reached 1.6 billion kilograms in 2012 after hitting 2.0 billion kilograms in 2011. Coos Bay volumes are almost entirely wood, timber, and lumber. Until 2011, Coos Bay's wood exports went almost entirely to Japan. China, however, is now emerging as a large market for Coos Bay's wood exports. The Port of Astoria's wood export volumes in both 2011 and 2012 were about one-eighth as large as Coos Bay's, with almost all destined for China.

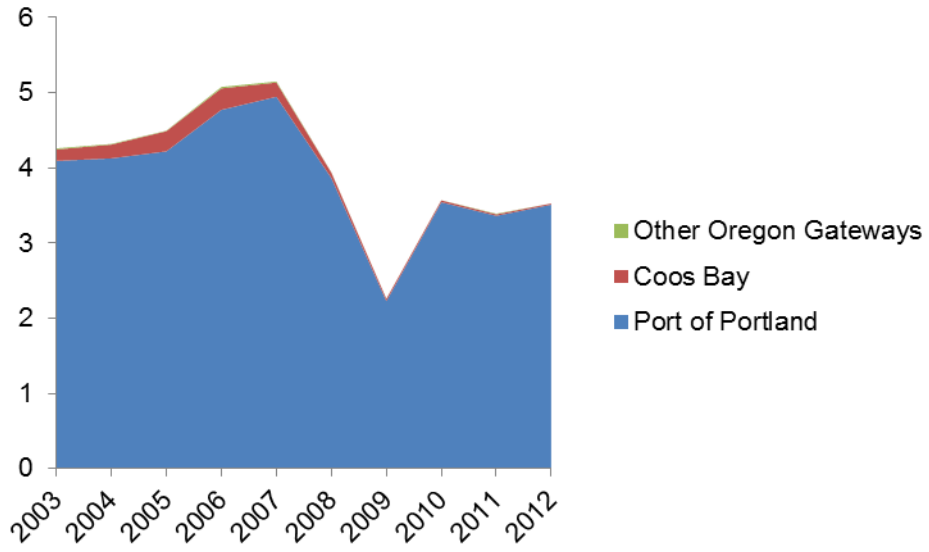
Figure 1.18 Oregon Merchandise Exports by Gateway of Departure Based on Weight, 2003-2012
In billions of kilograms



Source: WISERTrade

Oregon's import volumes by weight, nearly all handled by the Port of Portland (see Figure 1.19), are less than a quarter of the volume as the state's exports. The leading imports through ports based on weight are cement, gravel, gypsum, iron and steel, motor vehicles, fuels, and fertilizers. The main origins are Canada for gravel and stone, Mexico for gypsum, China for cement, Europe for iron and steel, Canada and Europe for fuels, and Japan and China for fertilizers.

Figure 1.19 Oregon Merchandise Imports by Entry Gateway Based on Weight, 2003-2012
In billions of kilograms

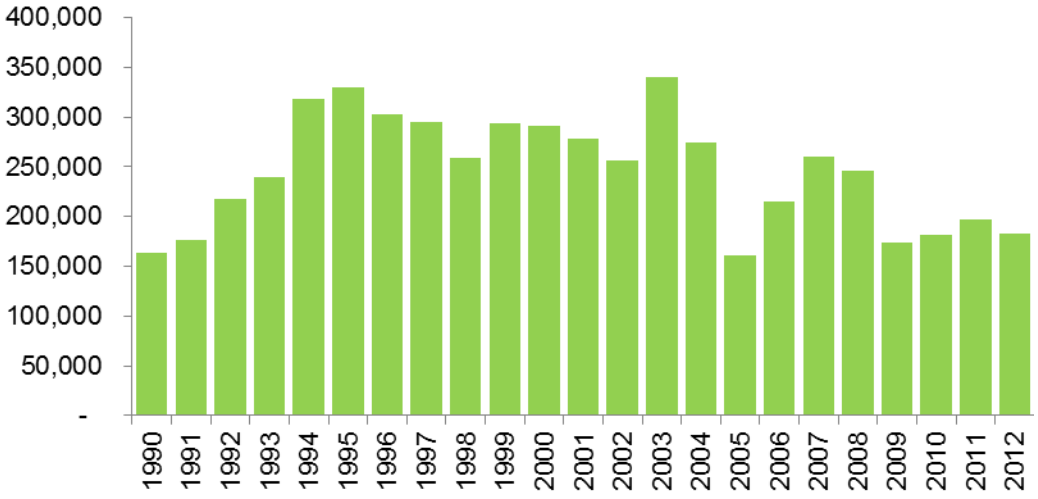


Source: WISERTrade

Rail service and infrastructure also are crucial for maintaining or improving the competitiveness of Oregon's ports. The Port of Portland handled 183,000 containers in 2012, ranking it the 25th busiest in the United States. The port processed significantly more containers in the 1990s and early 2000s (up to 350,000 annually) but now moves about half that volume on an annual basis (see Figure 1.20). Today, most ocean carriers make their first West Coast port calls at other ports rather than Portland, including Los Angeles, Long Beach, Oakland, Seattle, Tacoma, and Vancouver, British Columbia. These ports handle much greater container volumes than Portland which is continuing to lose market share. The Port of Portland has never had a substantial presence by major ocean container carriers and as a result, the loss of even a single carrier can result in a sharp decline in container traffic at the port.

On-dock or near-dock rail access is a prerequisite for container ports to compete and expand market share. The efficiency of the ship-to-rail intermodal connections (as measured by quality of service and infrastructure capacity) at the Port of Portland will be a determinant in how successfully it competes against much larger container port gateways for containerized cargoes. Rail service is a hallmark of the much larger container ports in Oakland, San Pedro Bay, Seattle, Tacoma, and Vancouver.

Figure 1.20 Port of Portland Container Volume, 1990-2011

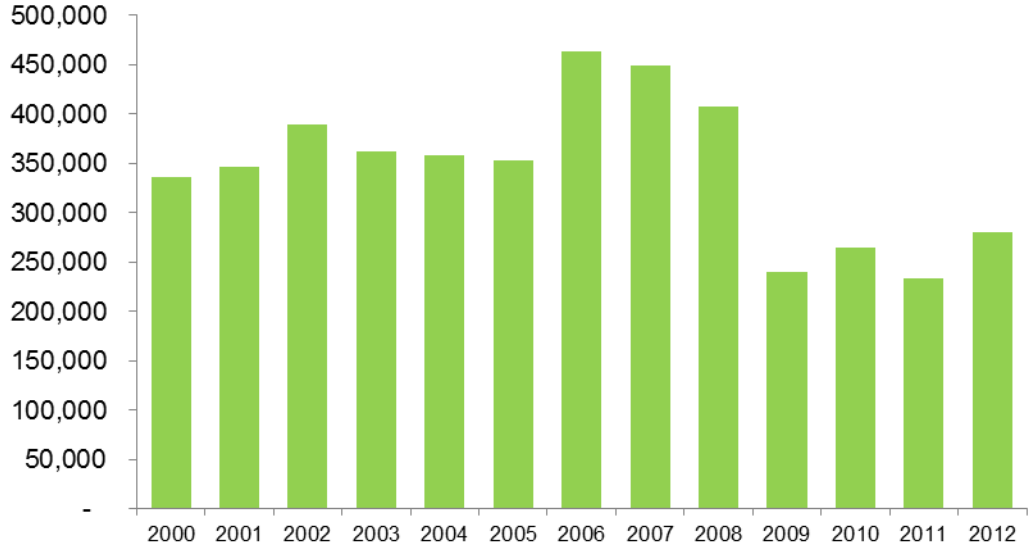


Source: American Association of Port Authorities

The Port of Portland also handles a significant volume of motor vehicles, almost entirely imported, on an annual basis. Prior to the recession, the Port of Portland imported as many as 460,000 vehicles in 2006, accounting for over 11 percent of the U.S. total. By 2012, this had declined to 280,000 units (see Figure 1.21), representing 7.8 percent of the motor vehicles entering the country through U.S. ports. Despite the decline, Portland has retained its position as the largest volume auto port on the U.S. Pacific Coast. Competing California ports, including San Diego, Hueneme, Los Angeles, and Long Beach are not far behind and Los Angeles-Long Beach, if combined, are much larger, processing a total of 465,000 vehicles in 2012. The Port of Portland exports only a very small number of motor vehicles on an annual basis. After being unloaded, processed, and sorted, vehicles are distributed nationwide from the Port of Portland by rail or truck. The efficient transfer of vehicles to rail at the Port of Portland's auto import facilities is essential to the port's success in attracting and retaining the large-scale business of such auto companies as Honda, Hyundai, and Toyota. Just across from Portland, Vancouver, Washington is a main port of entry for Subaru's entering the United States.

Competition is fierce between ports to secure contracts with large Japanese, Korean, and European automobile manufacturers. In recent years, West Coast ports including Portland have been losing market share to the Atlantic Coast ports including Philadelphia, Providence, and Brunswick, Georgia. The competitiveness of the market underscores the importance of making constant improvements to port efficiency to keep costs low.

Figure 1.21 Auto Imports Through the Port of Portland, 2000-2011



Source: American Association of Port Authorities

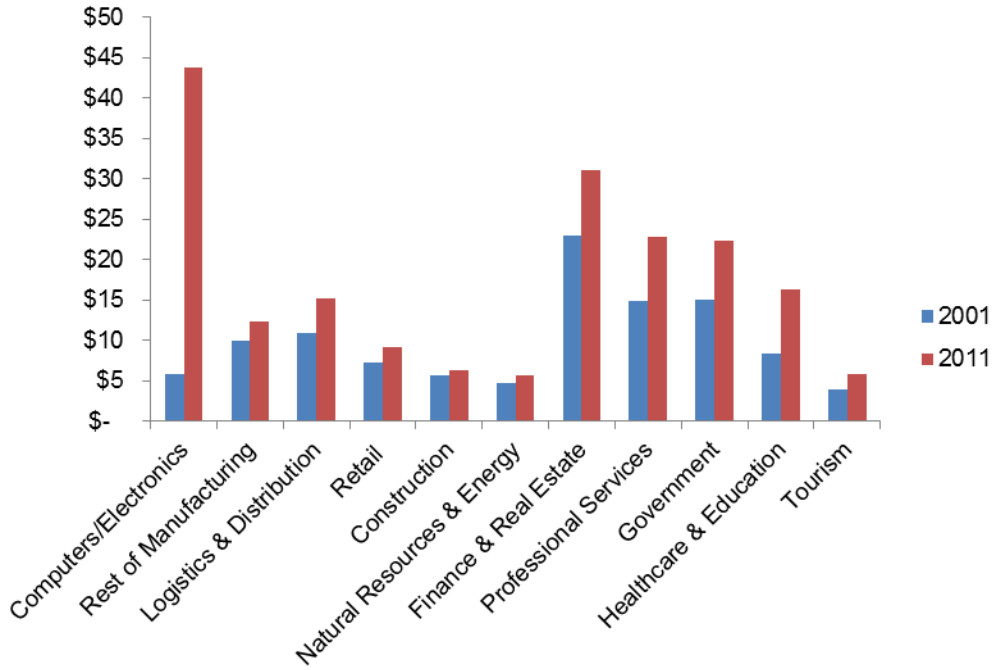
1.4 OREGON ECONOMIC STRUCTURE

A defining economic characteristic of Oregon compared to the nation and most other states is the relative size of its manufacturing sector (Figure 1.22), primarily due to the size of its computers/electronics industry. In 2011, the manufacturing sector accounted for some 29 percent of the Oregon economy compared to less than 13 percent for the nation. Figure 1.23 shows the contribution of each major industry sector to GDP for Oregon and the United States. The relative significance of Oregon's computer/electronics industry compared to the U.S. can be easily seen. In 2011, this industry accounted for over one-fifth of the Oregon economy compared to only two percent for the United States. The remaining manufacturing industries, however, make a smaller relative contribution to the Oregon economy.

Manufacturing depends on transportation to produce and deliver products reliably and in a cost-effective manner. Manufacturers keep inventories low to reduce costs and this requires a dependable, multimodal supply chain, including rail. Manufacturing and other "freight-intensive" industries (distribution, retail, construction, and natural resources) accounted for 47 percent of the Oregon economy compared to 35 percent for the United States in 2011. This indicates that Oregon's economy is relatively more dependent on freight transportation to support its economic growth and long-term competitiveness. Freight intensive industries are those that require higher levels of transportation inputs in order to produce a given unit of output. Specific industry sectors tend to be more dependent on rail than are other freight intensive industries so it is important to develop a more detailed view of the structure of Oregon's economy in order to

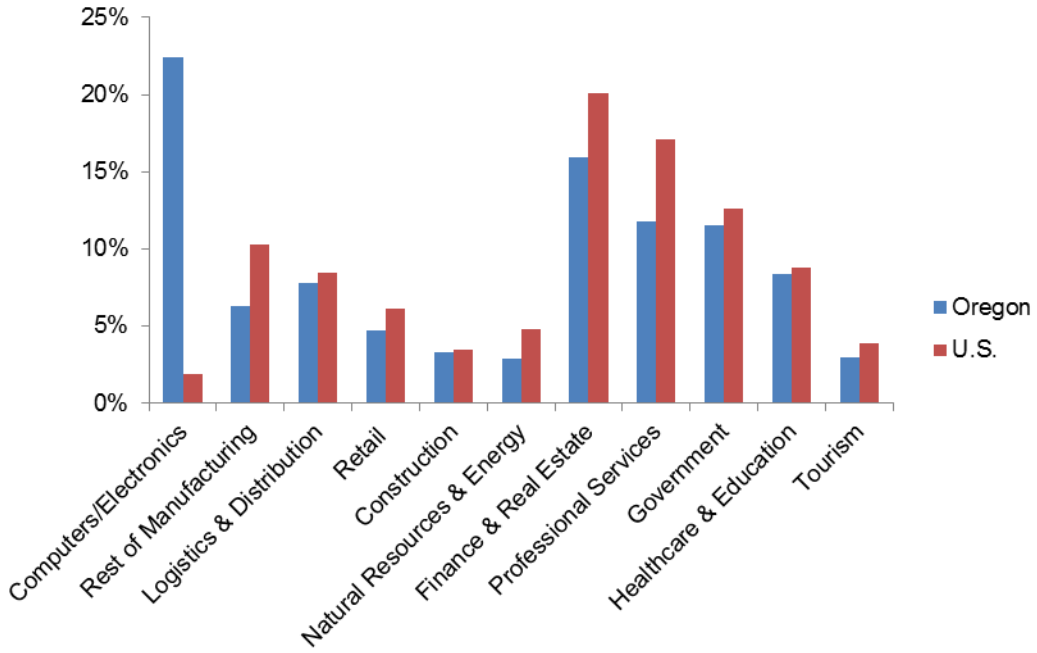
understand how different Oregon industries are likely to affect demand for rail services. For example, the growth in Oregon's computer and electronics industry is not likely to drive demand for rail services but other lower value bulk products produced in the state are major customers for rail services. Therefore it is important to understand how these rail-served industries are likely to grow or decline over the next several decades. More detailed analysis of these rail-served industries is presented later in this chapter.

Figure 1.22 Growth of the Oregon Economy by Major Sector, 2001-2011
GDP by Industry (in billions of dollars)



Source: Bureau of Economic Analysis, 2011 data for computers is an estimate

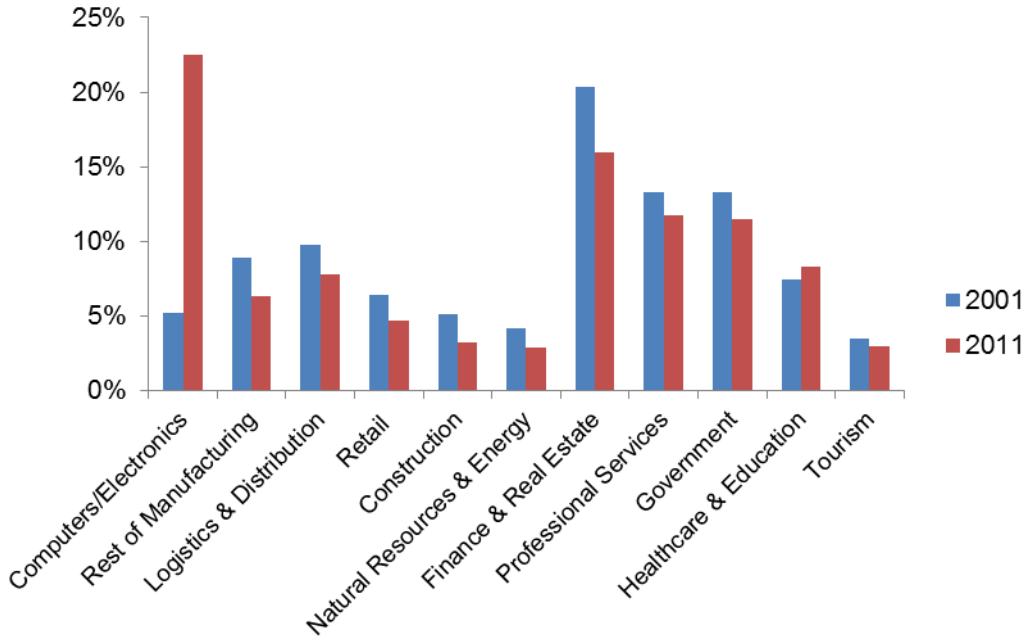
Figure 1.23 Structure of Oregon Economy Compared to U.S., 2011
Industry Share of Economy



Source: Bureau of Economic Analysis

Oregon's economy is relatively less dependent than the United States' economy on service-related industries, including finance, real estate, and professional services (professional, business, and personal). However, even as manufacturing garnered a larger share of the Oregon economy between 2001 and 2011, the services sectors continue to be the largest contributors to the state's overall economic output (see Figure 1.24). In 2011, services sectors accounted for over half of Oregon's economy. Service industries tend to move more time-sensitive goods (e.g., overnight parcel post). The trucking and air modes have historically dominated these types of shipments, but railroads have responded, in other parts of the country, by offering scheduled services and improved reliability for parcel shipments.

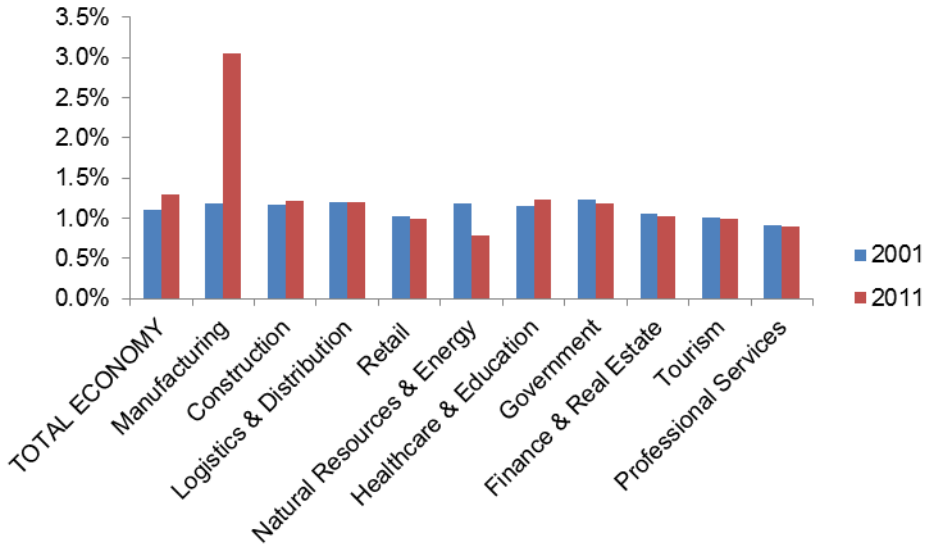
Figure 1.24 Structure of Oregon Economy, 2001 and 2011
Share of Oregon Economy by Industry



Source: Bureau of Economic Analysis

As mentioned earlier, the Oregon economy has been growing at a significantly faster pace than the nation's, largely driven by computers/electronics manufacturing. This is borne out in Figure 1.25, showing the exceptional increase in Oregon's share of U.S. manufacturing between 2001 and 2011. In most sectors, Oregon's share of U.S. output is commensurate with its share of U.S. population, about 1.2 percent. In manufacturing, however, Oregon commanded over three percent of the U.S. total in 2011, up from 1.2 percent in 2001. Oregon's share of U.S. natural resources and energy production went down, but for all other industries, aside from manufacturing, Oregon's share of U.S. production remained relatively constant. The decline in forest products contributed to Oregon's eroding share in the natural resources industry. With few oil and natural gas resources of its own (Oregon has no crude oil production and limited natural gas production), Oregon also did not participate in the nationwide energy production boom resulting from the application of new extraction technologies and higher prices.

Figure 1.25 Oregon's Share of the U.S. Economy by Major Industry Sector Oregon Share of U.S.



Source: Bureau of Economic Analysis

Performance of Oregon's Rail-intensive Industries

The following section provides more in-depth analyses of Oregon's rail-intensive industries – those that depend on rail to receive and to transport goods. These include the following:

- Timber, wood products, and paper
- Agriculture and food
- Manufacturing
- Logistics and distribution
- Energy and mining

Each of Oregon's rail-intensive industries has a distinctive supply chain pattern and is affected by competition, economic cycles, and a different set of global trade and supply chain trends. How these industries respond to these trends and make adjustments to their supply chain strategies will dictate changes in the future volume of cargo that will move through Oregon via the Class I and shortline rail system. Understanding the most important trends and their potential impacts will enable Oregon policymakers to proactively develop strategies and plans to work independently and in conjunction with the railroads to ensure rail system infrastructure, importer/exporter/freight forwarder access, and rail services within the state are optimized.

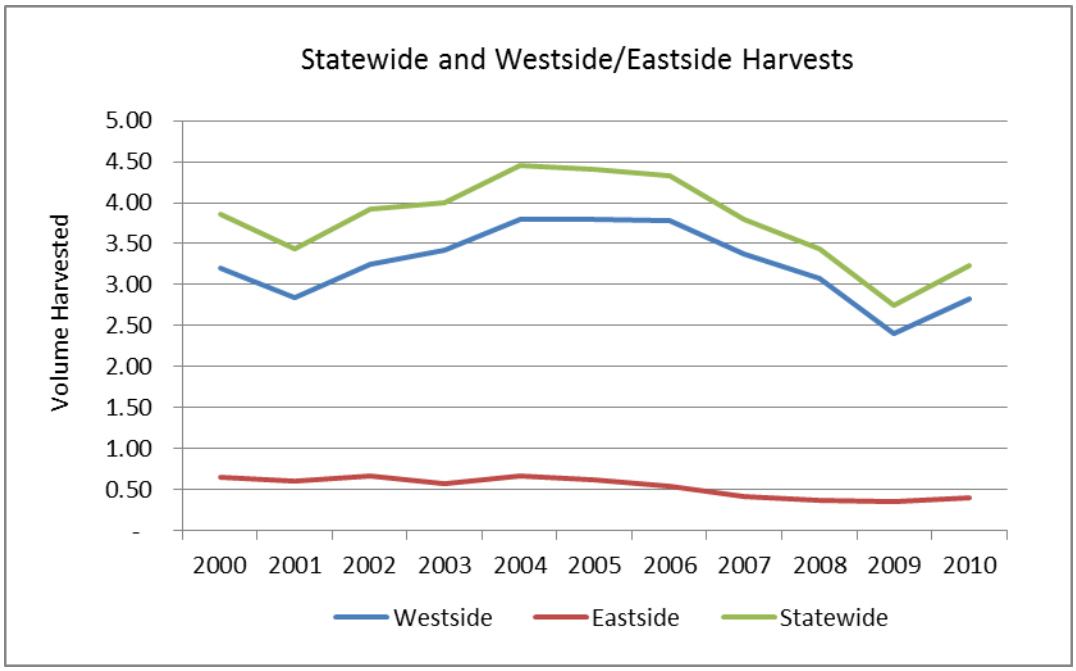
This section summarizes key trends for Oregon's rail-intensive and rail dependent industries and addresses the key challenges and opportunities they

face when moving raw materials and finished goods for international and domestic markets via rail.

Timber, Wood Products, and Paper Industry

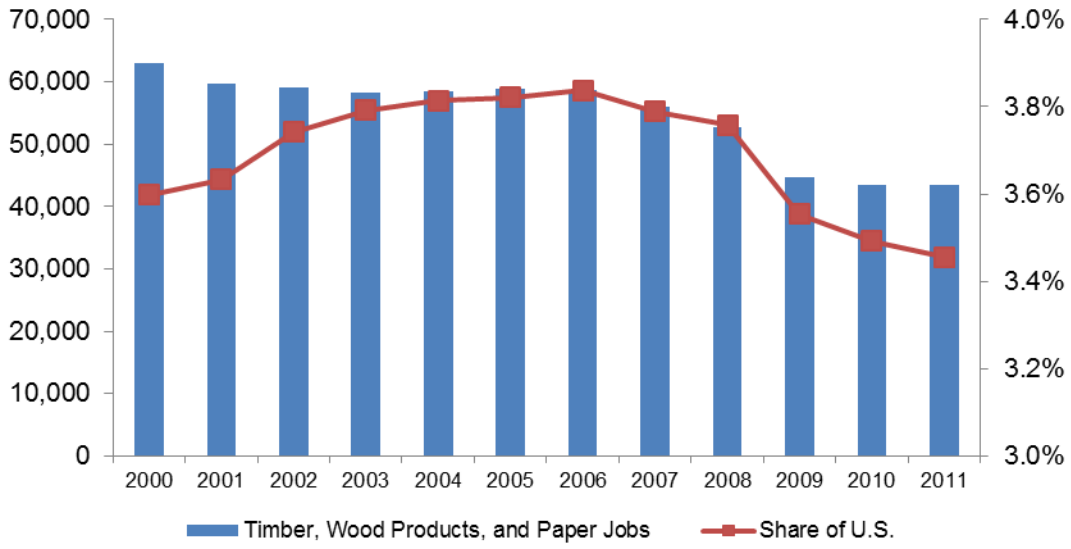
Oregon is at the center of North America's most productive forest areas, stretching from Northern California to British Columbia. Within the state, timber production is concentrated in the west (see Figure 1.26), particularly in Lane and Douglas counties. The state's timber, wood products, and paper industries are economic legacies of the state and still form an important pillar of the Oregon economy, and are particularly critical to the economy in several regions. In 2011, these industries accounted for 43,000 jobs in the State (see Figure 1.27). Oregon's timber harvest is the largest in the country, about 20 percent greater than second-ranking Washington. In 2010, Oregon accounted for over three percent of the nation's wood products (e.g., milled lumber, engineered wood, pallets, etc.) production and paper output. Among the states, Oregon's wood products shipments, valued at $1.4 billion in 2010, were the highest in the country. Oregon is a mid-ranking state in paper production, with output valued at $1.1 billion in 2010.

Figure 1.26 Oregon's Timber Harvest by Region, 2000-2010
In billions of board feet



Source: Oregon Department of Forestry

Figure 1.27 Timber, Wood Products, and Paper Jobs in Oregon and Share of the U.S. Total, 2000-2011

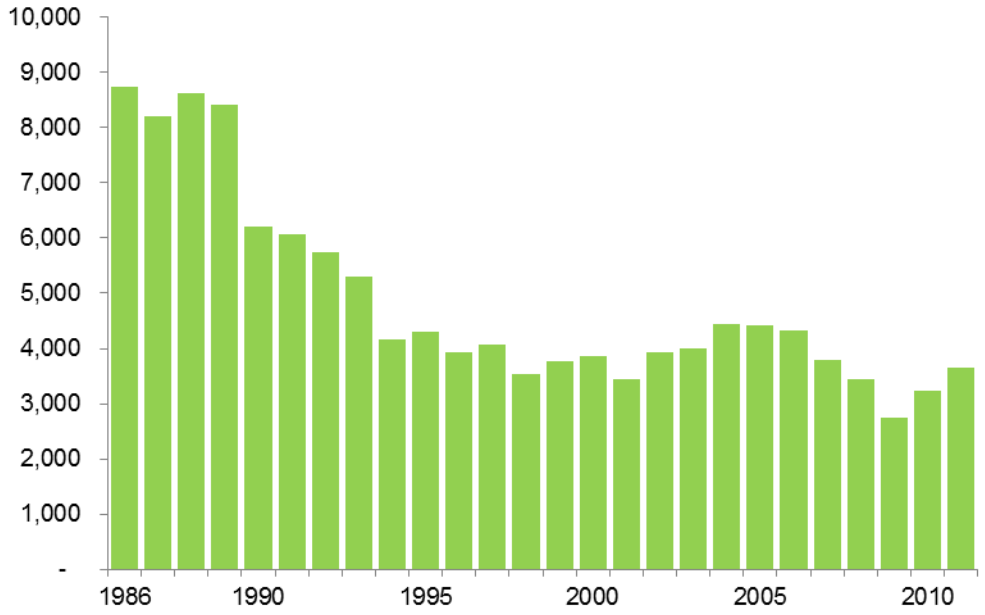


Source: U.S. Department of Commerce, Bureau of Economic Analysis

While timber, wood products, and paper remain important contributors to the Oregon economy, timber production and the number of jobs in these industries has declined. Oregon's timber production, after reaching a peak of nearly nine billion board feet annually in the late 1980s, fell to a low of 2.8 billion board feet in 2009 according to the Oregon Department of Forestry (see Figure 1.28). The reduction in logging on federal lands is a main cause of the decline in the state's timber harvest. Until the 1990s, federal lands frequently accounted for over half of the Oregon timber harvest. Today, most logging takes place on privately-owned land with federal properties accounting for less than 10 percent.

Oregon's logging companies and mills are heavily dependent on the U.S. housing markets and increasingly, on exports to China. The strong U.S. housing market in the mid-2000s stimulated increases in timber and lumber production in Oregon and Washington, but the subsequent effects of the recession were equally clear. Oregon timber production declined by over one-third between 2006 and 2009. Improvements began in 2010 as the economy began to recover and timber production increased to meet rising demand in Asia, notably China. Timber harvested from federal lands cannot be exported. However, as demand from China rises, logging on federal land has recently increased to compensate for the increased exports sourced from Oregon's privately-held timber lands.

Figure 1.28 Oregon's Timber Harvest, 1986-2010
In millions of board feet

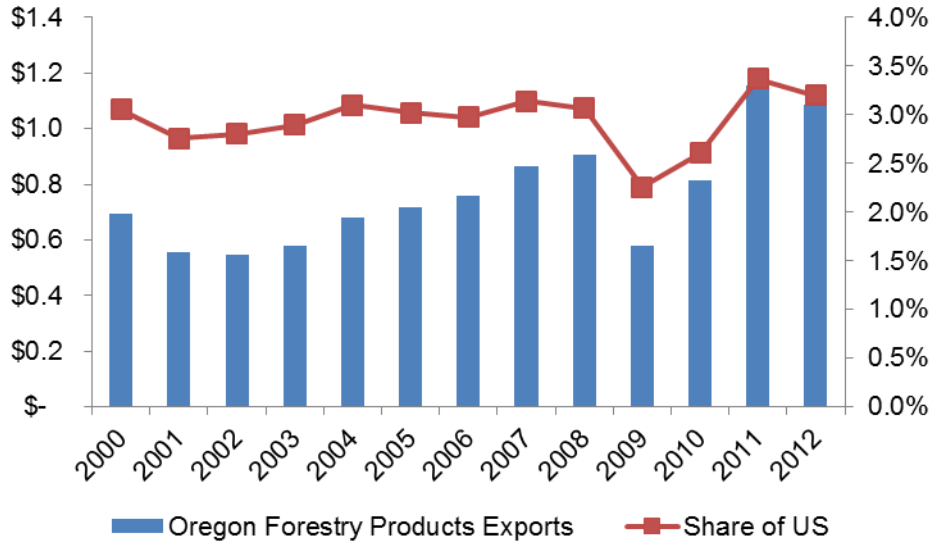


Source: Oregon Department of Forestry

Future timber production will respond to a resurgence in construction markets but that will depend on a broader U.S. economic recovery. Timber and wood products demand is primarily based on population, so long-term demand is expected to recover as population growth continues to increase, both in Oregon and throughout the country. Until domestic housing demand returns, however, export markets will be a main driver for Oregon timber harvests. The combination of improved domestic consumer confidence and rising lumber exports to Asia in particular will support increases in logging and wood product production in Oregon. This, in turn, will generate greater intermodal rail volume.

Although conditions point to a recovery for the industry in Oregon, competition from Canadian pulp and timber can dampen the U.S. market at times. The poor management of forests in Southeast Asia, however, is likely to push China to increase their sourcing for wood and paper supplies from other locations, including Oregon. A recent increase in Oregon's exports of forestry products (see Figure 1.29) since 2009, underlines this trend.

Figure 1.29 Value of Oregon-Origin Forestry Products Exports, 2000-2012, and Oregon's Share of the US Total
In billions of dollars



Source: WISERTrade; Forestry products includes raw timber, wood products, and paper.

Rail's Role in the Oregon Timber, Wood Products, and Paper Industry

Oregon is a primary source of lumber and wood products for much of the U.S. market. Rail is a key mode for shipping these products to major U.S. housing markets in the Midwest, South, and Southwest. Illinois is the destination for over one-third of the wood products carried by rail from Oregon, followed by California and Texas. From Illinois, Oregon wood products are distributed throughout the Eastern United States. Due to the relative bulkiness and heavy weights of lumber, rail is the most cost-effective mode for transporting lumber and wood products, especially for long-distance trips. The use of rail helps to manage shipping costs and thus maintain the competitiveness of these industries in Oregon.

Companies engaged in forestry also rely on specialized motor carriers to move logs from the forest to mill because of the remote locations in which timber harvesting occurs. The mills tend to be near the source of harvested trees to minimize the transport of bulky, heavy logs. Although trucks account for a greater share of short distance (i.e., less than 500 miles) trips, the majority of freight tonnage moved on Oregon shortline railroads is related to the timber and wood industry. In areas where rail access is available, rail is used when rates and service are more competitive than truck.

Companies in the timber, wood, and paper industry need the following to keep their supply chains operating in an efficient and cost-effective manner:

- Access to Class I and shortline rail service and intermodal reload facilities to transfer goods between truck and rail;
- Low-cost multimodal transportation options to receive raw materials and to ship finished products; and
- Supply chain reliability that ensures a steady flow of raw materials to optimize production schedules at mills and movement of finished goods to destinations.

The Oregon wood and timber industry is encountering issues in rail access and rail services that erode their competitiveness. Some wood and paper manufacturers are "captive" shippers served by only one mainline or shortline railroad, or experience "paper barriers" in which one railroad is artificially prevented from switching a rail car to another railroad. Both situations can result in higher than normal rail rates. Since there are no truck-rail transfer facilities in Southern Oregon, shippers have to haul their rail containers by truck to Portland transfer facilities, which adds costs. Some shippers in certain rural areas where timber harvesting and processing occurs have limited or no access to rail service, and as a result, rely on more expensive truck transportation. Some of the shortline rail infrastructure is in need of maintenance and capacity upgrades to handle existing demand. The Class I railroads have in the past decade adopted a model in which they prefer to haul longer "unit" trains and are less willing to switch small quantities of railcars at shipper facilities. These rail access and service issues are particularly acute for companies engaged in forestry and manufacturing of paper and wood products. When shippers cannot rely on, have little or no access to rail service, or experience high rail rates as the result of railroad policies, they shift cargo to trucks, a more costly transportation option. If Oregon invests in shortline rail improvements, the mode shift to truck may be reduced. The "captive shipper" and "paper barrier" issues are primarily outside of the public domain to address, but as long as some shippers continue to have access to only one railroad, they will be inclined to apportion some of their cargo to truck.

Agriculture and Food

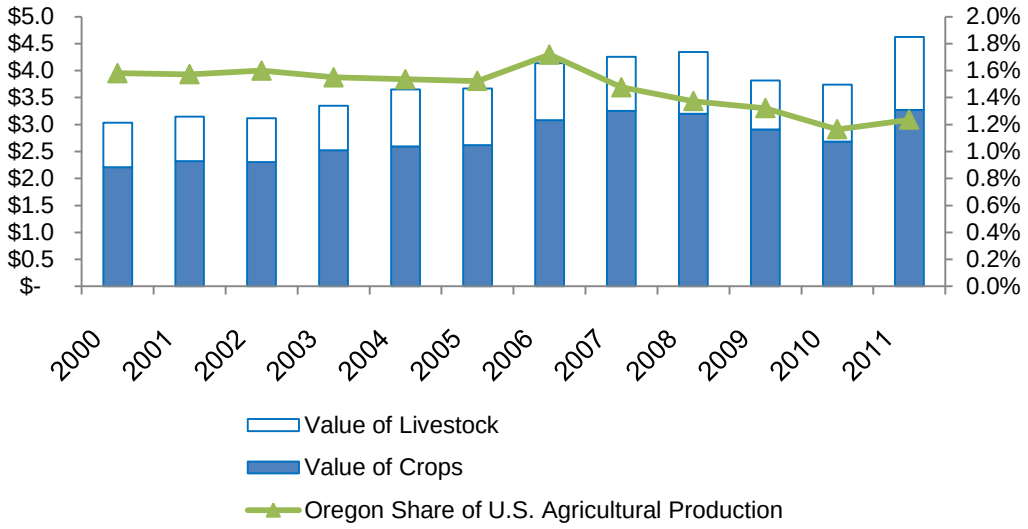
Agriculture and food are two interrelated industries. "Agriculture" represents the growing of crops (e.g., hay, wheat, berries, fruit, nursery crops, etc.) and the raising of livestock, while "food" represents the manufacture of the items commonly found on grocery store shelves (e.g., bread, juice, cheese, cookies, soda, wine, beer, etc.) other than fresh produce. Both agriculture and food use rail for inbound materials as well as to transport goods to more distant markets.

Agriculture – Oregon's agriculture industry is the 28th largest in the country, producing crops and livestock valued at $4.6 billion in 2011. While livestock sales reached some $1.3 billion in 2011, Oregon's agriculture industry, based on value, is distinguished by its crop production (e.g., wheat, hay, nursery products, apples, pears, berries, grapes, etc.). In 2011, the value of crops grown in Oregon

reached $3.3 billion, ranking the state 21st in the country. Agricultural production in Oregon is slowly rising over time (see Figure 1.30), but the state's share of total U.S. agriculture is gradually eroding as the state's growth is not keeping up with the faster pace of overall U.S. growth.

Oregon is the 14th largest producer of wheat in the United States, generally growing 60 to 70 million bushels per year. Oregon's wheat farms are concentrated in the northeastern part of the state, particularly in Umatilla County. The state accounts for 2 to 3 percent of U.S. wheat production in most years. The variance in Oregon's share of national wheat production is likely due to fluctuations in growing conditions.

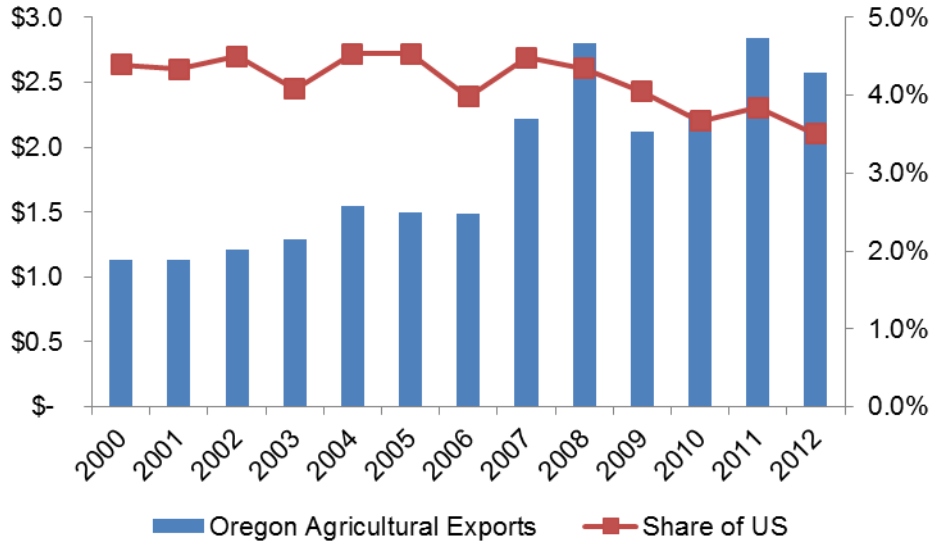
Figure 1.30 Value of Oregon Crops and Livestock Production, 2000-2011, and Oregon's Share of U.S. Total Agricultural Production
In billions of dollars



Source: U.S. Department of Agriculture

Oregon-origin agriculture exports generally account for about 4 percent of the U.S. total and have ranged between $2.0 and $2.5 billion annually for the last five years (see Figure 1.31). Asia accounts for nearly of all Oregon-origin agricultural exports and China, Japan, and South Korea are the main markets.

Figure 1.31 Value of Oregon-Origin Agricultural Exports, 2000-2012, and Oregon's Share of the US Total
In billions of dollars



Source: WISERTrade

Food and Beverage Products – The value of Oregon's food products output reached $2.1 billion in 2010, ranking 28th among the states. In real terms, Oregon's food production increased by 17 percent between 2000 and 2010 but has remained relatively constant since 2005. Food production is an important part of the Oregon economy, accounting for over four percent of the State's manufacturing output and employing about 28,000 people in 2010. Within the food industry, Oregon's particular strengths are in fruit and frozen food preparations, as well as in breweries and wineries. The state ranks 6th in fruit and vegetable preserving based on employment and ranks behind California and Washington in winery jobs. For 2011, the Oregon Wine Board reported that the state produced 2.2 million cases of wine from a grape harvest of 42,000 tons. Wine production in the state has close to doubled over the past 10 years.

Rail's Role in the Oregon Agriculture Industry

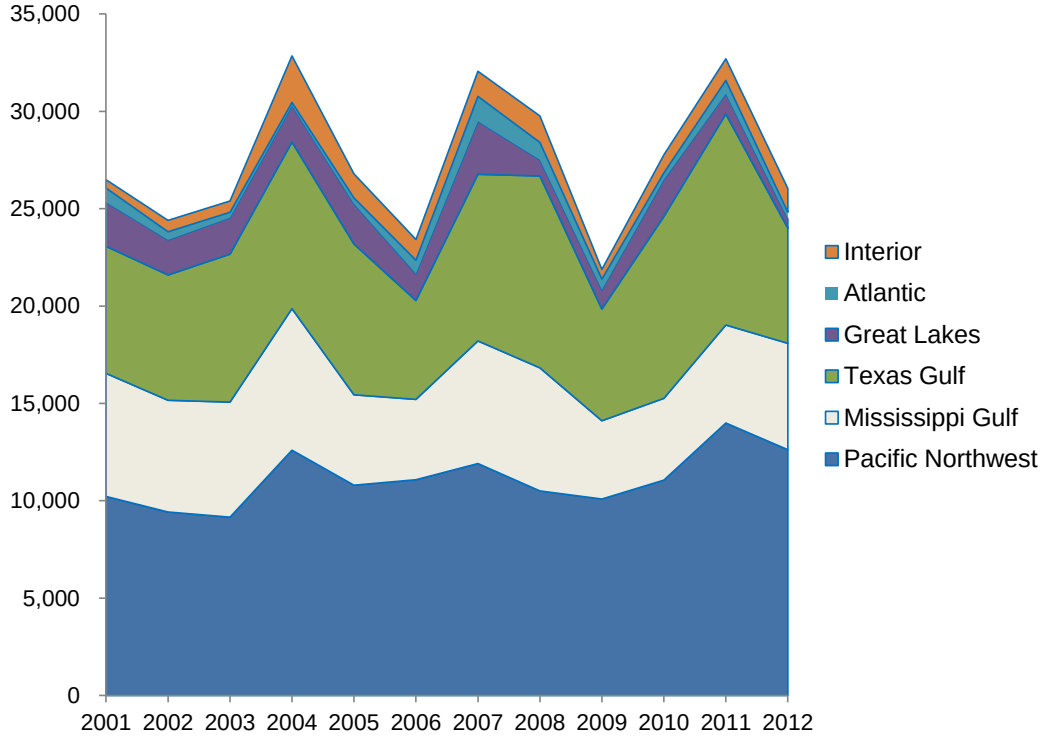
Oregon competes in world grain markets with wheat growers from Argentina, Australia, Canada, and the European Union. Pricing is market-driven and Oregon farmers must be cost-competitive to secure orders and maintain profitability. Maintaining efficiency and keeping costs low is crucial to the competitiveness and profitability of Oregon wheat growers.

Rail plays a critical role in controlling costs by providing an inexpensive option for transporting Oregon's and much of the rest of the nation's wheat to West Coast seaports, notably Portland, for export. Portland is the largest grain exporting port on the West Coast. Pacific Northwest ports, with Portland being

the largest in terms of grain shipments, typically handle over half of the nation's wheat exports (see Figure 1. 32). Wheat and other grains have historically moved from Pacific Northwest (including northeastern Oregon) and Midwestern farming areas by way of rail spurs which are connected to grain elevators. However, small volume agriculture producers are challenged with the Class I railroads' preference for "hooking-and-hauling" unit trains. Access to rail in rural areas can also be limited. Due to these practices and access issues, agricultural shippers will continue to move some or all of their shipments via truck. There may be opportunities to increase rail usage by Oregon agricultural producers by creating facilities to aggregate shipments at large grain loading sites.

Grain is often moved in bulk by barge or rail to the Port of Portland and other Columbia River ports for export via bulk vessels or container ships (after a transfer) due to more economical transportation costs to the port relative to trucks. Constant competition from foreign grain producers and variable U.S. harvest volumes result in significant annual fluctuations in the Port of Portland's grain exports.

Figure 1.32 U.S. Wheat Exports by Gateway Region, 2001-2012
In thousands of metric tons



Source: U.S. Department of Agriculture, based on weight of wheat inspected for export.

Because the eastbound leg of the Asia-to-U.S. trade-lane is the portion of the ocean movement where ocean carriers earn the bulk of their revenues, and because import containers tend to be destined to urban areas, ocean carriers are no longer willing to reposition empty regular and refrigerated containers from inland cities to locations where agricultural goods need to be loaded for export to Asia. Shippers have been challenged, particularly in the past half-decade, to obtain an adequate supply of empty ocean containers, and usually cannot afford to pay to reposition the equipment themselves because the extra transportation costs could erode their slim profit margins enough to make them uncompetitive with foreign growers. Growers of specialty grain in the Midwest that export through West Coast ports face this conundrum, and the ocean carriers' business models are not likely to change to the benefit of agriculture exporters, particularly because ocean carriers prefer to keep containers on the West Coast so they can be quickly turned back to Asia, even if empty, to capture loads back to the U.S.

Agriculture products are among the largest, most trade-oriented and most transportation-dependent sectors. Agricultural producers have a high dependency on highways and railroads. Though rail is a cost-effective means to move products to market, rail access is not available at many of the farming locations where crops are produced, forcing companies to rely on the highway network. In some instances, such as in Oregon's large nursery industry, producers would like to use rail to reduce costs but continue to rely on trucks due to the delicate nature of their products.

Companies in the agriculture sector have several distinct transportation system needs, including: consistency in transportation pricing; fast and reliable transportation, in particular, if the commodity being shipped is perishable; and access to refrigerated transport modes (rail, truck, air, and barge) for certain perishable products.

Rail's Role in the Oregon Food and Beverage Industry

The food and beverage manufacturing industry has a high dependence on highways and a more moderate dependence upon railroads, water/marine, and air freight. Firms depend on truck and rail transport to move products from the fields to processing facilities, with rail the preferred mode for non-perishable products that require long haul transport to inland processing and distribution centers. Processed food products are one of the top commodity groups by weight that move by rail in Oregon. Most Oregon food processors cater to the domestic market.

Most of the raw materials for Oregon's wine and beer production are sourced domestically or from Canada and are moved via truck, tanker truck, and rail. The grains and containers used for making and packaging beer are suitable for transport by rail. Wineries source some production and packaging materials like oak barrels and bottles from foreign suppliers. Wine and beer are sold through distributors across the U.S. and transported primarily in trucks and refrigerated

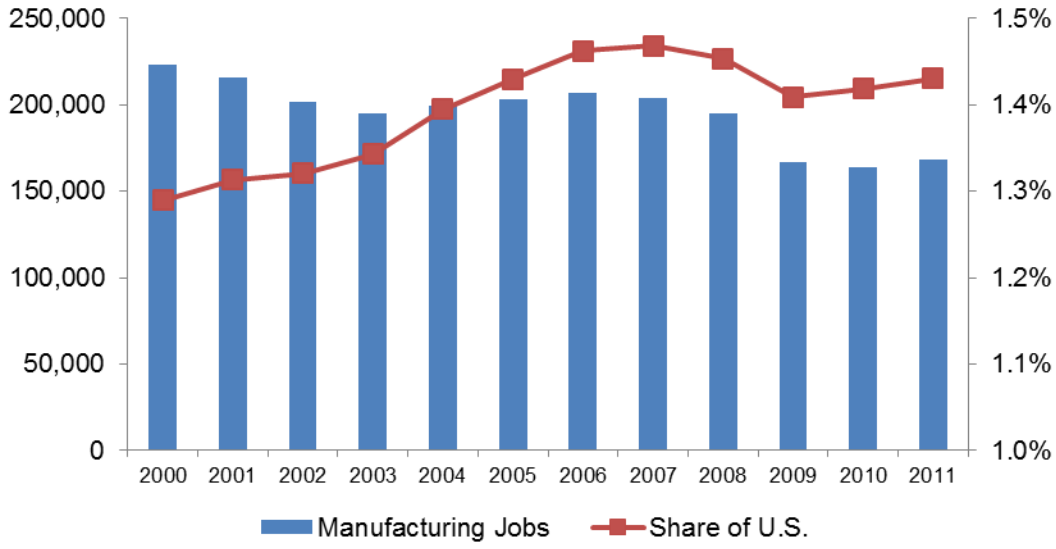
trucks, due to high value and perishability. Oregon producers are increasingly making inroads in foreign markets, and these orders are shipped in refrigerated ocean containers.

Manufacturing

Manufacturing has been a mainstay of the Oregon economy for decades, transforming from the state's traditional strengths in metals, transportation equipment, wood products, and food to today's production of computers and electronics that keep Oregon at the forefront of modern production processes.

Oregon's manufacturing sector employs approximately 168,000 people (see Figure 1.33), accounting for 9.7 percent of all the state's jobs. By comparison, manufacturing accounts for only 8.5 percent of U.S. jobs. Manufacturing contributed $56 billion to the Oregon economy in 2011, accounting for 29 percent of the gross state product. By comparison, manufacturing comprised a much smaller share, 12.3 percent, of the nation's gross domestic product in 2011. Oregon has the highest concentration of manufacturing in the country based on the sector's relative contribution to gross state product. Oregon is followed by Indiana and Louisiana in manufacturing concentration.

Figure 1.33 Oregon Manufacturing Jobs, 2000-2011, and Oregon's Share of the US Total



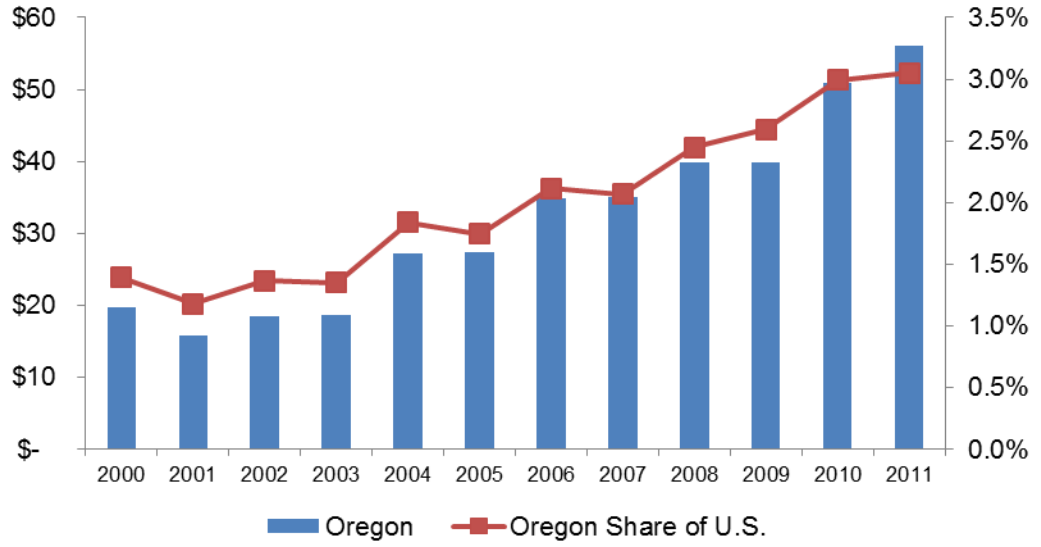
Source: U.S. Department of Commerce, Bureau of Economic Analysis

As Oregon plans for the future of the rail network, it needs to consider the substantial contribution of manufacturing to the state economy, a fact that can be obscured by years of declining jobs in the industry. While employment in the Oregon manufacturing sector has been dropping (similar to almost all other

states), manufacturing output in Oregon has been rising quickly (see Figure 1.34). Oregon's manufacturers have invested heavily in automation and sophisticated process technologies, reducing their need for labor while maintaining and increasing output. The drop in manufacturing employment also reflects the internal restructuring of manufacturing firms. To reduce costs and maintain competitiveness, and focus on core competencies, manufacturers have been outsourcing functions formerly done in-house, such as human resources, payroll, maintenance, engineering, and logistics services. This has shifted employment from manufacturing to other sectors, notably the service sector, which has seen continuing increases in employment. The number of manufacturing jobs in Oregon declined by 22 percent between 2001 and 2011, but manufacturing output, measured in the value of goods produced, more than tripled over the same period.

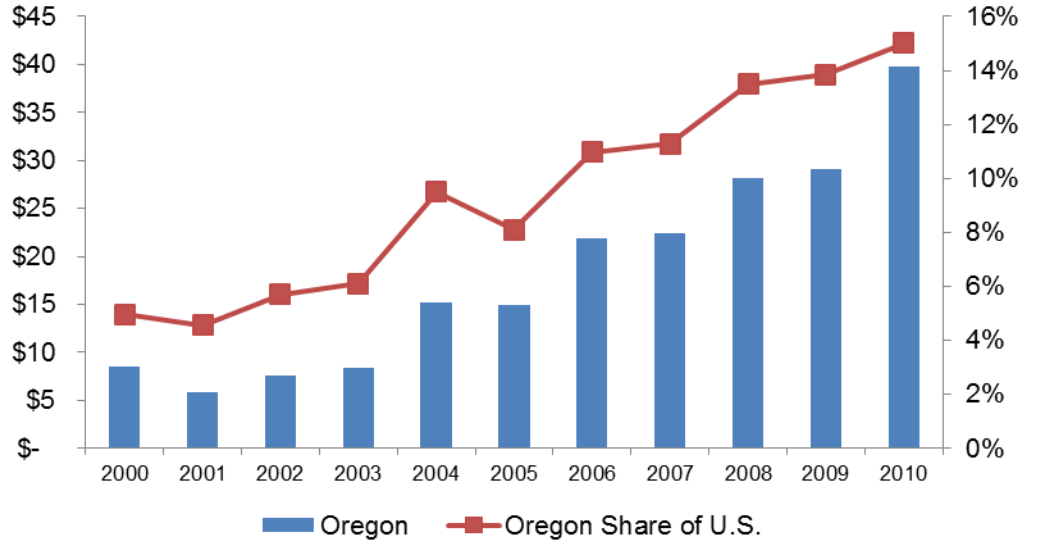
Almost entirely due to growth in Oregon's computer and electronics industry, the state's share of the nation's manufacturing output grew from 1.2 percent in 2001 to 3.0 percent in 2011 (see Figure 1.34). Oregon is recognized internationally as a center for semiconductor production and this is reflected in the recent growth of the state's computers and electronics industry. Oregon's share of U.S. production in this industry grew from five percent in 2001 to 15 percent in 2010 (see Figure 1.35). During this period of growth, the computer and electronics industry accounted for more than half of all new capital investment in manufacturing in the state (see Figure 1.36). The new investments have translated into the greatly expanded production within the industry. Massive investments by Intel in Hillsboro will support the continuation of this trend at least through the mid-part of this decade.

Figure 1.34 Oregon GDP in Manufacturing, 2000-2011, and Oregon's Share of the US Total
In billions of dollars



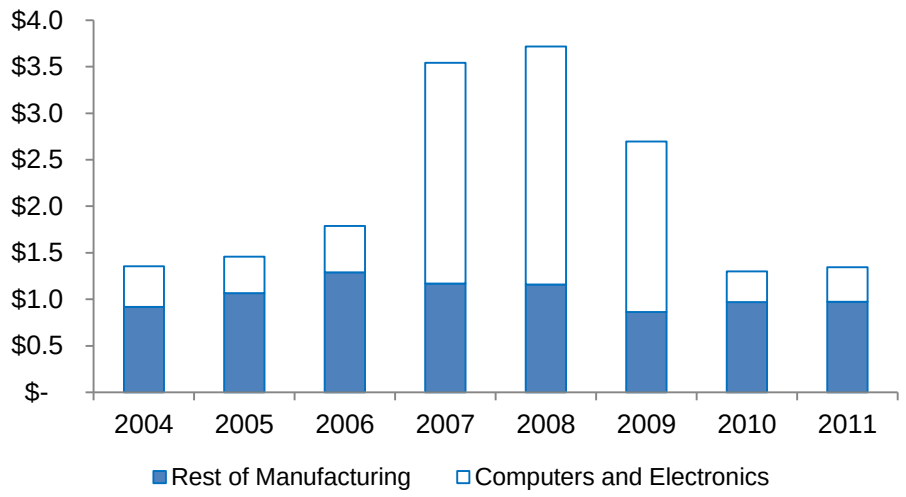
Source: U.S. Department of Commerce, Bureau of Economic Analysis

Figure 1.35 Oregon GDP in Computers and Electronics and Oregon's Share of the U.S. Total
In billions of dollars



Source: U.S. Department of Commerce, Bureau of Economic Analysis

Figure 1.36 Oregon's Growth in Computers/Electronics Production Has Been Fed by Recent Large-Scale Investments
New capital expenditures in manufacturing, in billions of dollars



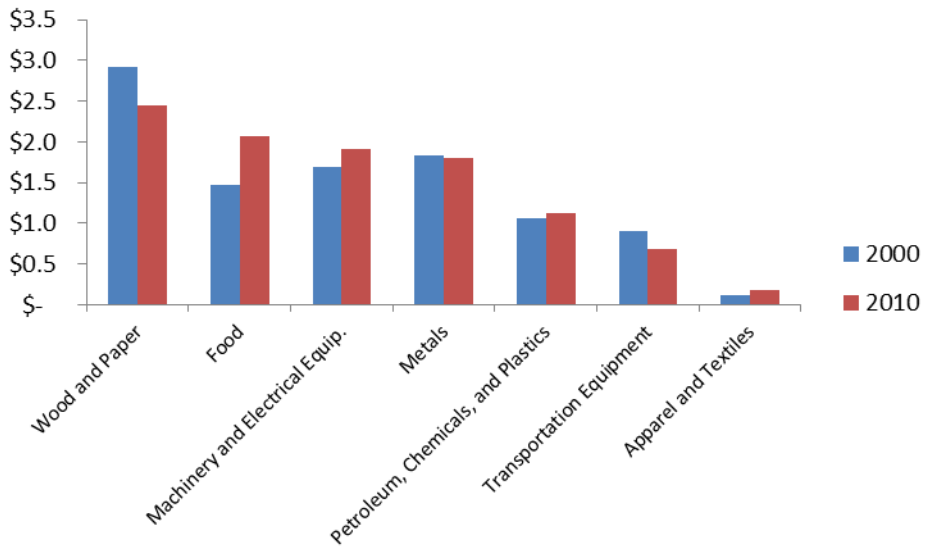
Source: U.S. Census Bureau.

Beyond computers and electronics, performance over the last decade varies significantly for Oregon's other manufacturing industries (see Figure 1.37). Wood and paper products production is the second largest manufacturing industry in Oregon after electronics and computers, but production in this industry is dropping. Food and beverages, buoyed by Oregon production of wine and fruit products is expanding. Other major manufacturing industries, including metals (primary and fabricated) and machinery have seen fairly steady output levels over the past decade.

The Pacific Northwest and Oregon are home to one of the greatest concentrations of transportation equipment manufacturers in the U.S., including Freightliner (trucks) and Gunderson (railcars) in Oregon and Boeing (aircraft) and Paccar (trucks) in Washington. Boeing also supplies its Washington assembly operations from a large plant in Gresham, Oregon. Although Oregon's transportation equipment industry saw a decline in output between 2000 and 2010, large-scale new investments by Boeing in Gresham completed in 2012, demonstrate that the industry will continue to be a key contributor to the Oregon economy into the future. The Boeing investment will allow Gresham to build and process larger structural metal parts for the new Boeing 787. Gunderson and Freightliner continue to face headwinds as they slowly recover from the recession. Suppliers that support the aerospace, truck, and railcar manufacturing industries, including primary metal producers (e.g., aluminum and steel producers), are located throughout the region. Finished transportation equipment is often driven, flown, or shipped out Oregon, but the manufacturers of transportation equipment require a reliable stream of components and parts to

produce trucks and railcars in a timely and cost-effective manner. Rail service is particularly important for inbound shipments of heavy castings and components.

Figure 1.37 Oregon GDP in Manufacturing by Industry, 2000 and 2010
In billions of dollars, excluding computers and electronics

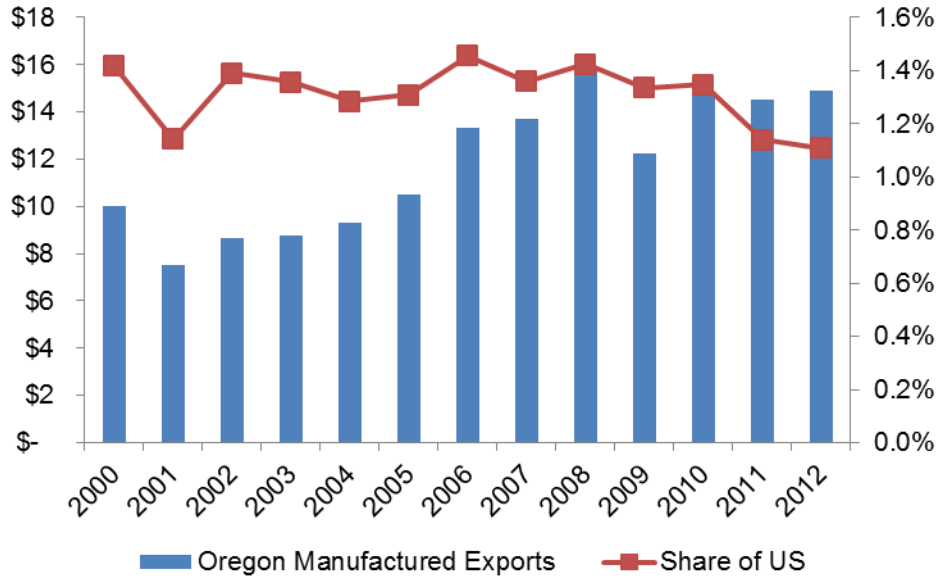


Source: U.S. Department of Commerce, Bureau of Economic Analysis

Rail is the preferred mode for shipment of bulk chemicals and, for safety reasons, shipment of hazardous chemicals. Chemicals transported by rail are a major input to other rail-dependent industries in Oregon such as the construction, farming, lumber and paper industries. Cost-effective rail service is important to Oregon's chemical industry, itself, but also has a pronounced "multiplier" effect on other Oregon industries because of the volume of chemicals moved by rail.

Exports from Oregon of manufactured goods to other countries have grown significantly since 2001 (see Figure 1.38). The total value of Oregon manufactured exports reached $14.9 billion in 2012 and is rising steadily after hitting a recessionary low in 2009. Oregon accounted for 1.1 percent of U.S. manufactured exports in 2012. Oregon's top manufactured exports are similar to the composition of the state's manufacturing sector, with computers and electronics being by far the largest export followed by machinery, chemicals, transportation equipment, and wood and paper products.

Figure 1.38 Value of Oregon-Origin Manufactured Exports, 2000-2012, and Oregon's Share of the US Total
In billions of dollars



Source: WISERTrade

Rail's Role in the Oregon Manufacturing Industry

Transportation is a key contributor to manufacturer competitiveness and these trends have several implications for the rail system in Oregon. First is the need to maintain rail as a flexible and reliable component of the state's transportation network. Oregon's manufacturing capability relies on the state's extensive transportation infrastructure, including highways, water, and air cargo services, in addition to rail. As the lowest cost mode of transport other than barges and deep sea shipping, rail can efficiently connect Oregon manufacturers with customers and suppliers while helping them to compete more effectively in a price-sensitive, competitive marketplace.

Today, manufacturers typically have long, complex domestic and foreign supply chains for moving raw materials to factories and finished goods to market. Companies in the manufacturing sector require dependable, cost-effective and well-functioning multimodal transportation to reduce the risk of business interruptions and ensure availability of necessary inputs to meet production and customer delivery schedules. Transportation costs comprise a large portion of overall costs, so fluctuating freight rates can influence mode shifts as well as influence ports used for importing and exporting goods.

More than other types of manufacturers, high technology industries, including Oregon's advanced electronics industry uses airfreight to transport components to factories and finished goods to foreign and domestic markets due to the very

high cost and time sensitivity of these items. Metals manufacturing is highly dependent upon highways and railroads. Short-haul shipments usually are handled by truck and long-distance shipments move by rail. Raw materials for metals manufacturing are transported in large volumes by rail.

The combination of an increasing energy supply and rebounding economy in the U.S. combined with higher labor costs in China are contributing to "onshoring" or "reshoring" – the movement of some manufacturers back to the U.S. and Mexico. If reshoring to the U.S. and Mexico takes hold, rail volumes could increase as raw materials and finished products move through the U.S. system. At least initially, the reshoring is strongest in durable goods manufacturing industries which comprise some Oregon strengths including metals and transportation equipment. However, these rail-served industries have not demonstrated particularly robust performance in Oregon in recent years. There may be only a few rail-served manufacturing industries in Oregon that are still likely to grow, but even these mostly at average rates. The resurgence of manufacturing in the U.S. will help stimulate some rail demand in Oregon but the extent of any increases is uncertain.

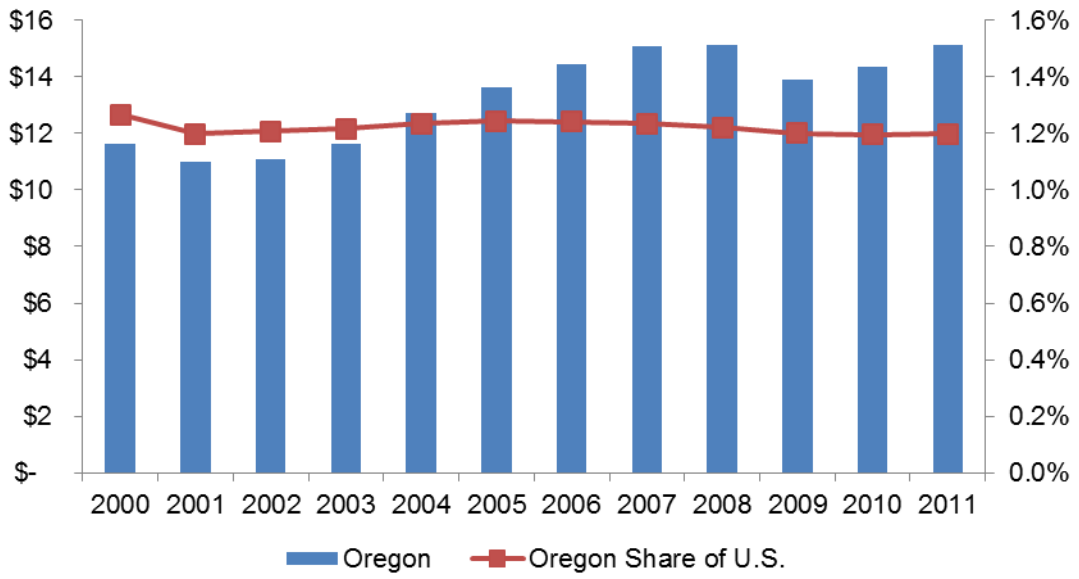
Logistics & Distribution

The trade and distribution industry is comprised of two key economic sectors – wholesale trade and transportation and warehousing. Together, these sectors employ over 124,000 people in Oregon, accounting for 7.2 percent of the State's jobs. Employment in the Oregon logistics and distribution industry has held fairly steady, not increasing significantly during the 2000s' economic expansion and only dropping moderately during the recession (see Figure 1.39). The logistics and distribution sector accounted for 8 percent of Oregon's gross state product (GSP) or about $15.1 billion in 2011. Similar to employment in the industry, output levels, though growing, have remained relatively steady in Oregon (see Figure 1.40). Additionally, Oregon's logistics and distribution sector supports the state's retail industry which accounts for about 5 percent of the economy. The global recession of 2009 negatively impacted sales of consumer goods (and hence the logistics and distribution industry which keeps retailers supplied) because many of these products are considered discretionary rather than essential. Volumes have since recovered as people have gained more confidence in the economic recovery and consumer demand has returned to more normal levels. These recent trends are reflected in Oregon's GDP trends, in particular.

Figure 1.39 Oregon Logistics and Distribution Jobs, 2000-2011, and Oregon's Share of the US Total

Source: U.S. Department of Commerce, Bureau of Economic Analysis

Figure 1.40 Oregon GDP in Logistics & Distribution and Oregon's Share of the U.S. Total
In billions of dollars



Source: U.S. Department of Commerce, Bureau of Economic Analysis

Distribution is part of Oregon's economic legacy. The area developed as the distribution center for the Pacific Northwest because of its unique geographic advantages. It has access to interior states via a navigable waterway and river-level rail and highway routes, giving Portland, in particular, a significant transportation advantage over other West Coast ports. Water access, combined with its location in the major valley of a mountainous region and proximity to the Pacific Ocean, made the northern Willamette Valley a very suitable, geographically, for a distribution hub. As the rail, water, and roadway network developed around region, the distribution industry grew, attracting distributors that today serve Oregon, Washington, Idaho, the western portions of Montana, and the northern parts of California. In recent decades the distribution and warehousing industry has expanded to accommodate a large influx of new residents into the region requiring consumer goods. As the Pacific Northwest continues to grow in population, the distribution industry in Oregon is expected to expand commensurately.

Rail's Role in the Oregon Logistics & Distribution Industry

Oregon's logistics and distribution industry exists to serve shippers of particular products that move through the region's international gateway, are manufactured in Oregon and traded in other parts of the country, or are moved from other parts of the country to Oregon to meet demands for consumer products. The health of Oregon's logistics and distribution industry will depend in part on the availability of good multimodal transportation infrastructure and the support this provides to a number of key industries that have based their national and regional distribution activities in Oregon to take advantage of this transportation infrastructure and services. The industries that drive demand for logistics and distribution services are often in wholesale and retail trade sectors.

While trucking is the leading mode to support the movement of merchandise to and from wholesalers as well as to retailers, rail is crucial for the long-hauls that bring goods into the State from distribution hubs such as Chicago, New York, and Los Angeles—the leading point of entry for consumer items entering the U.S. from Asia. Oregon's wholesalers realize cost savings by using rail and weigh that against timeliness and reliability concerns.

An example of how the logistics and distribution services industry makes use of rail as part of the supply chain strategies for wholesalers and retailers is found in the distribution of apparel, footwear, and outdoor products. Oregon is home to a sizable number of firms involved in the design, marketing, and selling of apparel, footwear, outdoor and recreational products, and other trend-setting and fast moving consumer goods that must be distributed to customers across the U.S. and the world. Most of these companies source the bulk of their finished goods from foreign suppliers, particularly from China and Asia. Products are imported via ocean containers through the Port of Portland and airfreight through Portland International Airport if the order needs to be expedited. When

the import shipments are destined to U.S. inland markets, they usually move via intermodal rail.

To achieve supply chain reliability, companies in the logistics and distribution sector require consistent transit times to ensure customer satisfaction (e.g., with major retailers) and on-time delivery of shipments, and smooth connections between transportation modes because shipments are often intermodal. Shippers are generally more concerned with receiving good, reliable service rather than inexpensive freight rates. This is important, because it may explain why these shippers would use trucking or air freight instead of intermodal rail, even if the rail services are less costly. Ensuring that the rail system can operate reliably without unexpected delays is important to ensuring that Oregon remains a good place from which to conduct distribution activities.

The warehousing industry is dispersed across Oregon to serve import, export and domestic customers, though many are concentrated in the Portland region to enable easy access to Port of Portland, Portland International Airport, the highway system and railroads. Logistics service providers offer marine, air, truck, rail, and small package services. A wide variety of activities are performed in warehouses and cargo handling facilities including storage, transloading, distribution, and value-added services such as ticketing and labeling. Transport and warehousing volumes fluctuate in step with imports and exports and domestic consumer demand.

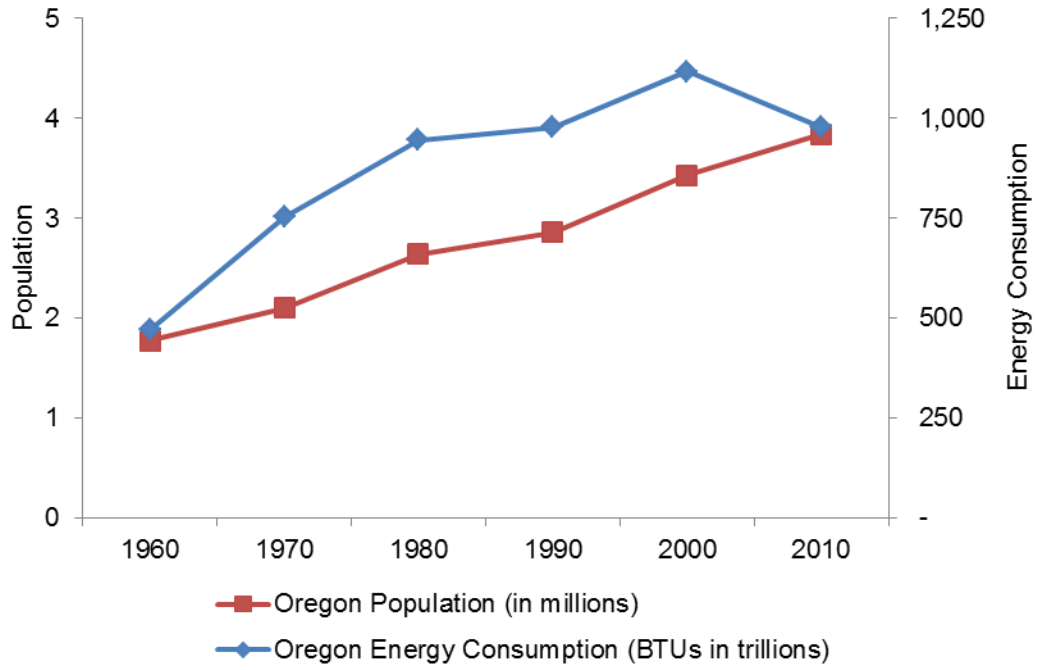
Energy and Mining

Energy and mining both contribute significantly to rail freight volumes. Due to both weight and volume, rail is the preferred mode for transporting aggregate, sand, stone, and ores as well as fuel (e.g., coal) used for generating electricity. Today, rail is transporting crude oil from new oil fields (e.g., the Bakken field in North Dakota) that do not have pipeline infrastructure in place. Rail is also used for oversized loads, including windmills, related to energy production. Oregon's mining industry is small but railroads in the state carry significant volumes of stone for use in construction projects. Recent improvements in the construction industry should yield higher volumes over Oregon's rail system. The Port of Portland also handles significant tonnages of stone.

Electricity costs are a key business climate consideration that affects the site location decisions of prospective companies and also influences the willingness of local companies to expand. By delivering electricity from hydroelectric sources, Oregon and the Pacific Northwest have maintained some of the lowest electricity prices in the United States for decades. The availability of a plentiful supply of power at low cost has also helped to attract and develop energy intensive industries, including aluminum smelting, a legacy industry that is now in decline in the region and semiconductor manufacturing, now the cornerstone of the Oregon economy.

Oregon's total energy consumption (includes fuels used for all uses) from 1960 to 2000 outgrew the state's growth in population (see Figure 1.41). Over that 40 year period, energy use surged by 137 percent while Oregon's population expanded by 93 percent, a fast but much slower rate of increase. Oregon's energy consumption, however, has changed considerably since 2000. Between 2000 and 2010, the state's population grew by 12 percent but energy consumption actually *declined* by 13 percent. Traditionally, energy consumption and population growth are linked but that relationship has broken down, at least temporarily, in Oregon. The closure of aluminum smelting facilities, huge consumers of electricity, is a main contributor to the decline. Although affected by economic cycles (Oregon energy consumption peaked in 1999 and fell in the early 2000s recession), Oregon's decline in energy consumption appears to be structural.

Figure 1.41 Energy Consumption and Population Growth in Oregon
1960 to 2010

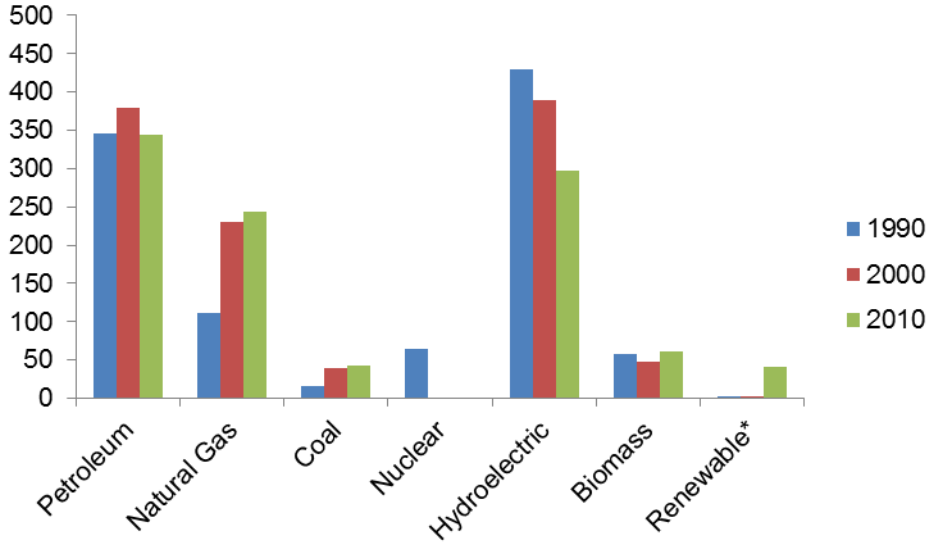


Source: Energy Information Administration

Due to the plentiful supply of hydroelectricity, Oregon is much less dependent on coal, a top commodity moved by rail, than most other states. About one-third of Oregon's energy use is from hydroelectricity. Oregon is the second ranking hydroelectric state, following Washington. The state's hydroelectric consumption, however, has declined by about one-third since peaking during the 1990s. As hydroelectricity has declined in use, it has been replaced primarily by renewables (wind, geothermal, and solar) and to a lesser extent by natural gas, biomass, and coal (see Figure 1.42). During the 2000s, the consumption of

renewable energy in Oregon increased from a trace in 2000 to 4.2 percent of the state total in 2010. By 2010, coal and renewable-based energy consumption in Oregon were equal.

Figure 1.42 Oregon Energy Consumption by Source, 1990, 2000, and 2010
In trillions of BTUs



Source: Energy Information Administration; *Renewable combines geothermal, wind, and solar energy.

Almost all of Oregon's renewable energy is currently derived from wind, but solar power is beginning to have a larger presence in Oregon. Electricity from solar consumed in Oregon tripled from 2004 to 2010 but it is still less than one-tenth the size of wind-sourced power. Due to the complementarities between solar panels and semiconductors, both manufactured from silicon wafers and sharing production processes, solar power has the potential to benefit from Oregon's strength in high tech electronics.

Oregon imports all of its coal, primarily from Wyoming's Powder River Basin. Although coal accounts for a relatively small share of Oregon energy consumption, it ranks among the leading commodities, by tonnage, carried into the state by railways, thus the link between rail freight transportation and energy production is clear. Coal consumption has remained relatively constant in Oregon for the last decade after growing significantly during the 1990s. With the discovery of much larger natural gas reserves in the United States and Oregon's push to renewable fuels, future large-scale increases in coal-use in Oregon appear doubtful. Although coal is abundant and has become cleaner burning thanks to filtering technologies and the use of lower sulfur coals sourced from the Powder River Basin, it is unlikely to be substituted for other power sources in

Oregon. In fact, the state's largest coal-fired plant in Boardman is slated for closure in 2021.

On the other hand, even as Oregon replaces coal with other fuels, the expanding Chinese market for Wyoming and Montana coal could result in substantially higher rail volumes in the future should an Oregon port, either Coos Bay or Portland, be developed into an export terminal for Asia-bound coal. Should new Pacific terminals be built for exporting coal to China, gateway locations in both Washington and British Columbia would also be under strong consideration.

Ultimately, the decisions made in the next several years concerning how to meet Oregon's energy needs will have a bearing on the utilization of the rail system in Oregon. If clean-burning natural gas and renewable energies continue growing, the use of rail to transport coal is likely to go into gradual decline. The decisions made by Oregon's energy providers to address the state's future electricity requirements need to be monitored by policy-makers as they will have an effect on how the rail freight transportation system in Oregon is used.

Rail's Role in the Energy and Mining Industry

Wind farms are continuing to be established and expanded along the Columbia Gorge in rural areas of central and eastern Oregon and Washington as a means to reduce use of carbon-based energy sources. The majority of these components are imported through the Port of Vancouver, Washington, which has heavy-lift cranes and specialized equipment to handle over-dimensional cargo. Some components travel by rail to destination, but the majority move by truck. Ensuring there is sufficient multimodal transportation infrastructure in those corridors is very important. As the number of wind farms increases, Oregon's rail volume will benefit.

The mining industry in Oregon includes facilities that mine for sand, gravel, and other construction-related materials. In terms of weight, rock/gravel is one of the primary commodities moved within and from Oregon. These products are heavy and have a low-value/ton, so transportation costs are a significant factor in the market price. Whenever possible, mining products and aggregate are transported by barge or rail, especially over longer distances. Sand gravel is moved by rail on the Oregon shortline network. Soda ash, coal, potash, and other minerals are moved almost exclusively by rail from the mining regions to power plants, manufacturing plants, or export facilities.

The commencement of production of oil in the Bakken field region of the Dakotas, Montana, and Saskatchewan brought a steady stream of rail tank cars to the Port of Tacoma during the past year. The oil is transferred from rail to barge at the Port of Tacoma and then transported to California oil refineries. Industry experts forecast that Bakken oil production will double or triple in the next couple of years. Oil demand in the Pacific Northwest can likely support multiple facilities in addition to the Port of Tacoma to handle Bakken oil for either local use or barge movement to other West Coast locations. At this point, the Port of

Portland is not used as a shipment center for Bakken oil. It is feasible that several more sites in the Pacific Northwest may be developed for Bakken oil shipments and transfers. The Class I railroads will likely push more oil through their networks in the Pacific Northwest rather than California due to the shorter distances. If a transfer facility is built at an Oregon port, then the volume of oil moving through Oregon by rail could increase dramatically.

Canadian oil from Alberta's tar sands also has the potential to increase oil volumes moving over the rail system in Oregon. Marine terminals in Vancouver, British Columbia are at capacity and the city is reluctant to expand them further to accommodate more Alberta oil. For this reason, there may be potential for Pacific Northwest facilities to export Canadian crude oil. U.S. gateways are prohibited from shipping U.S.-sourced crude oil overseas but they are permitted to export Canadian oil. This could possibly increase the rail volume in Oregon if a transfer facility is developed at an Oregon port. The expansion of transfer facilities for Alberta's oil in the Oregon would likely encounter controversy just as it has in its own country (Vancouver, British Columbia) and in other parts of the United States (the Keystone Pipeline corridor through the Central Plains) and is outside the scope of this document.