MEMORANDUM

TO: Southwest Washington Regional Transportation Council Board of Directors

FROM: Matt Ransom, Executive Director MHR

DATE: July 1, 2019

SUBJECT: **Cost of Congestion Reports**

BACKGROUND

At the June 2019 RTC Board meeting, an inquiry was put forward regarding whether any work / reporting had been done regionally on the topic of the "cost of congestion".

The following lists relevant examples of reports, both recently published and of different perspectives regarding how to assess the "cost of congestion" in an urban metropolitan area.

Regional Studies

- **The Cost of Congestion to the Economy of the Portland Region** (published: December 2005)

  Web link to study: https://www.oregonmetro.gov/cost-congestion-study

Originally published in 2005, this multi-agency funded research examined the relationship between investments in transportation and the economy. Findings can be used to inform policy development for planning and investing in the regional transportation system.

- **Economic Impacts of Congestion on the Portland-metro and Oregon economy** (published: 2014)

  Web link to study: https://portlandalliance.com/assets/cta_items/pdf/2014-cost-of-congestion-FINAL.pdf

This 2014 update to the 2005 study, took a broader view of the impacts of congestion and provides findings and observations for how congestion and transportation barriers affect the entire state's economic competitiveness.

National Index (published annually)

INRIX, a private for-profit mobility data analytics provider publishes an annual Global Traffic Scorecard which identifies and ranks congestion and mobility trends across the globe. In their most recent Scorecard, INRIX reports findings and observations regarding traffic conditions within major US metropolitan areas, including the Portland/Vancouver region.

Web link to scorecard: http://inrix.com/press-releases/scorecard-2018-us/

The topic of "cost of congestion" is a hot topic among both public and private sector entities and also within academic circles. With the intent of providing a comprehensive point of view, the following academic article makes observations and findings on the cost of congestion within urban metropolitan areas.

Academic Article

- **Revisiting the relationship between traffic congestion and the economy: a longitudinal examination of U.S. metropolitan areas** (published 2018)

This academic paper reviewed economic growth and productivity among several large U.S. metropolitan areas, to assess the relative relationship between congestion and economic growth.

Web link: https://link.springer.com/article/10.1007%2Fs11116-018-9884-5

Policy Observations

The inquiry about the "cost of congestion" in urban metropolitan areas is a common pursuit. Viewed holistically, urban transportation system congestion is both an outcome and a symptom, of a comprehensive set of urban dynamics. Inherent in metro areas with strong growth trends are trade-offs between many factors, including resources and community values.

Broader public policy and investment questions remain, regardless of research findings and interpretations. An example of those types of questions and observations include:

-Does a community wish to pursue relief of congestion at any cost (ex. fiscal, economic, land, social, environmental, other) -- OR -- does a community wish to pursue their vision of what a great community should be, invest in those transportation systems that support the vision, and congestion *may be* a byproduct of the community that is being developed?

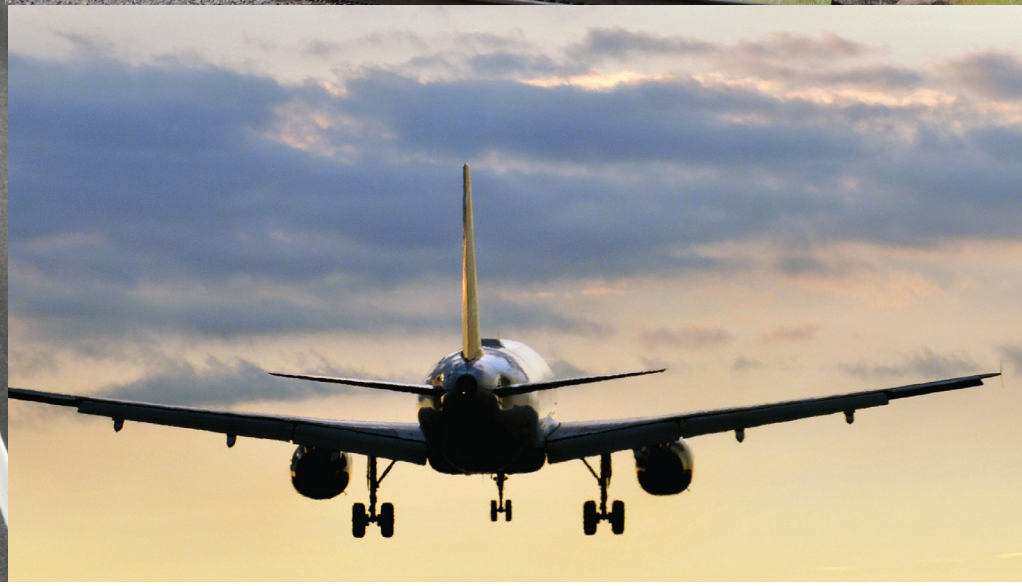
-Is congestion, within *community* defined limits, an acceptable outcome -- IF -- the community development and economic vision aligns with the transportation infrastructure strategy (auto, truck, transit, bicycle, pedestrian, marine, aviation, etc.)?

-Should a community decide what *community* values and limits they aspire to optimize, and in invest public and private resources in transportation systems that promote those outcomes?

Answering these key questions may aid policy makers in defining the community's answer to the "cost of congestion".

Attachments

PHOTOS COURTESY OF PORT OF PORTLAND



2014

ECONOMIC IMPACTS OF CONGESTION

on the Portland-metro and Oregon economy

About this report

In 2005, the Portland Business Alliance, Port of Portland, Oregon Department of Transportation, METRO, and several other public and private sector partners completed a groundbreaking study titled, "The Cost of Congestion to the Economy of the Portland Region." The study provided key information about the importance of investing in our transportation system, particularly roads and highways, as a critical part of our economy.

The study concluded that geography and past investments have made Portland-metro a sea and air gateway as well as a regional rail and highway hub. As a result, the region's economic competitiveness is heavily dependent on an efficient and reliable transportation system. The 2005 study found that even with planned improvements, our transportation system would not keep pace with projected increases in freight and general traffic. Failing to adequately invest in our transportation system would result in a potential loss to the regional economy of $844 million annually by the year 2025 – that's $782 per household per year – and 6,500 permanent jobs.

When completed in 2005, the study gained national recognition. As recently as July 2014, the White House issued a report titled, "An Economic Analysis of Transportation Infrastructure Investment," which referenced the study's findings and the impact of congestion to businesses.

As we have learned through other research, our region and state are uniquely trade dependent. Between 2004 and 2011, Oregon's trade-related employment grew 7.5 times faster than total employment. In addition, about 90 percent of Oregon exporters are small- to medium-sized businesses. Today, it remains critical to our economy and our quality of life that we adequately invest in improvements that ensure an efficient and reliable transportation system.

This 2014 study provides a better understanding of how congestion and transportation barriers affect the entire state's economic competitiveness.

It identifies the current economic foundation of the region and the state. It also shows our reliance on the state's transportation system to move goods, ensure access to labor and increase productivity, all of which impact revenues accruing to the state for vital public services. The study then compares two scenarios – a congested future based on no additional transportation revenues and an improved future that includes new financial resources. The result quantifies the benefit to the economy and to jobs due to increased investment.

Like the previous study, business interviews were conducted to gain better insight into how businesses are coping with transportation and congestion challenges. Travel models made available from four metropolitan planning organizations around the state, including Portland, mid-Willamette Valley, Bend and Corvallis, were used to show the results.

The study seeks to answer the following questions:

- What are the impacts of highway congestion on the economic performance of Oregon and major metropolitan areas of the state?
- How has congestion affected business transportation decisions and operations in the state?
- How have the effects of congestion changed since the 2005 Cost of Congestion study?
- What are the effects of transportation investment on the state's economy?

> "Congestion can affect a region's economy by reducing its competitiveness resulting in significant impacts on employment and economic output."

This study was produced by the Economic Development Research Group, Inc., in partnership with the Portland Business Alliance, Associated Oregon Industries, Greater Portland Inc., METRO, Oregon Business Association, Oregon Business Council, Oregon Department of Transportation and Port of Portland.

Introduction

Oregon's transportation system is the backbone of the state's economy. A well-maintained, resilient, and efficient network of highways, rail, air and waterborne transportation is essential. It supports the businesses that provide the jobs and revenues needed to underpin the resource-based, traditional manufacturing and advanced biotech and computer/electronics technologies that characterize the state's economy.

Oregon's ability to retain its quality of life in an increasingly global economy rests to a great degree on our ability to provide well-paying jobs in the diverse array of industries that trade with the rest of the U.S. and the rest of the world. To maintain its advantage as an attractive location for businesses of all types, including those in the industrial sectors that offer middle-income jobs, Oregon must support, retain and attract workers and businesses best suited to the emerging demands of the domestic and international marketplace.

One of the key business requirements needed to grow and succeed in a highly competitive marketplace is the ability to maintain consistently high levels of productivity. This requires that the costs to move materials needed to produce goods in every sector of the economy, and the costs to move finished products to their final markets, must remain competitive. Transportation congestion increases the cost of business operations and reduces productivity. Chronic delay linked to congestion can affect the economy by reducing competitiveness resulting in significant impacts on employment and economic output. Oregon, as a West Coast logistical hub, is particularly vulnerable to the impacts of increasing congestion.

Additional investment is needed to maintain Oregon's connections with global and domestic markets and to remain competitive with other states that are planning large investments in their transportation infrastructure. This report finds that:

- Oregon's competitiveness is largely dependent on efficient transportation. More than **346,400 jobs** are transportation related, or transportation dependent, meaning that system deficiencies threaten the state's economic vitality.
- Businesses report that traffic congestion and travel delays cost money, forcing changes in business operations and location decisions.
- Additional investments would generate **8,300 jobs**, **$1.1 billion in benefits**, and a **$2.40 return** for every $1 of investment, by 2040.

BY THE NUMBERS:

$300 billion.
Value of all goods moved in Oregon on all modes of transportation in 2012.

346,400.
Number of transportation-related and transportation-dependent jobs in Oregon in 2013.

36.9 million.
Total annual hours of travel time saved in Oregon if additional transportation investments are made. This equals 27 hours per household.

8,300.
Oregon jobs generated as a result of additional transportation investments by 2040.

$928 million.
Additional Oregon annual economic output/sales generated by businesses due to an improved transportation system by 2040.

$1.1 billion.
Annual income and non-monetary benefits of additional transportation investments to Oregon, or $788 per household, by year 2040.

$2.40.
The potential return for every $1 invested in the state's transportation system.

What the data show

Role of transportation in Oregon's economy

The state's economy and job base are transportation dependent, especially on its highways, for the connections they provide to domestic and international markets.

Oregon's geographic location makes it a key component of U.S. West Coast logistics, serving as a major hub for domestic and international freight. The state provides key international air and maritime gateways, as well as an important junction of critical transcontinental highways. Oregon is served by 23 port districts, including nine with inter-modal freight terminals; 23 railroads, including high-capacity transcontinental mainlines of both western Class 1 railroads; and 97 public-use airports, including seven with commercial airline service. Portland-metro in particular ranks fifth among western metropolitan regions in international shipments. However, all of these modes depend on efficient and reliable highway access for freight shipments and business deliveries, as well as passenger travel for business. This is because trucks are the workhorse of the system, linking businesses throughout the state to the global marketplace and providing the "last mile" connection to inter-modal facilities, business operations and end users, as shown in **Figure 1.**

Figure 1: Major flows by truck to, from and within Oregon, 2040

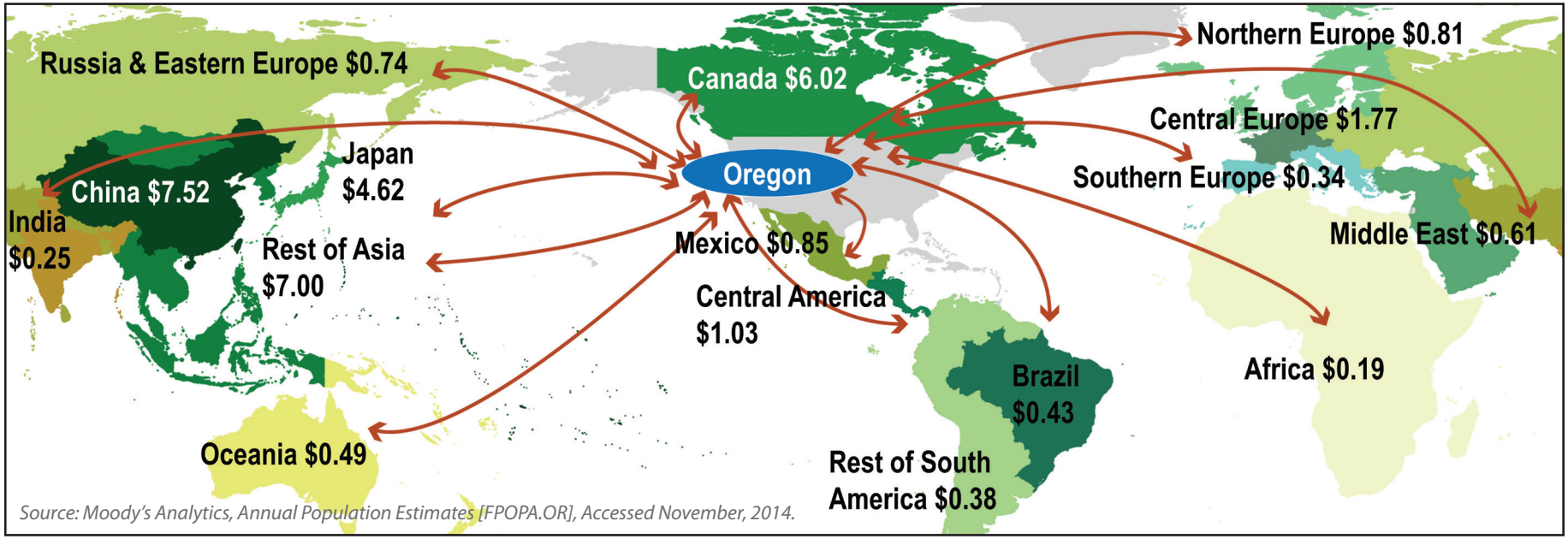
Source: U.S. Federal Highway Administration.

Traded-sector industries – those industries that provide goods and services outside of Oregon and bring money back into the state economy – are particularly reliant on an efficient transportation network. Exports from these industries are shipped through most major ports on the U.S. West Coast. These industries also are critical to statewide economic growth and job creation. In Oregon, the top traded-sector industries include wood product

INTEL CORPORATION

Intel Corp. is one of the world's largest designers and producers of essential technologies that serve as the foundation for the world's computing devices. Hillsboro, Oregon is home to the company's largest site for fabrication, testing and wafer production. Missed flight connections require Intel to reschedule shipments and are costly due to the limited usable life of dies used in production and manufacturing of chip sets.

Figure 2: Oregon import and export trade in billions of dollars by trade market

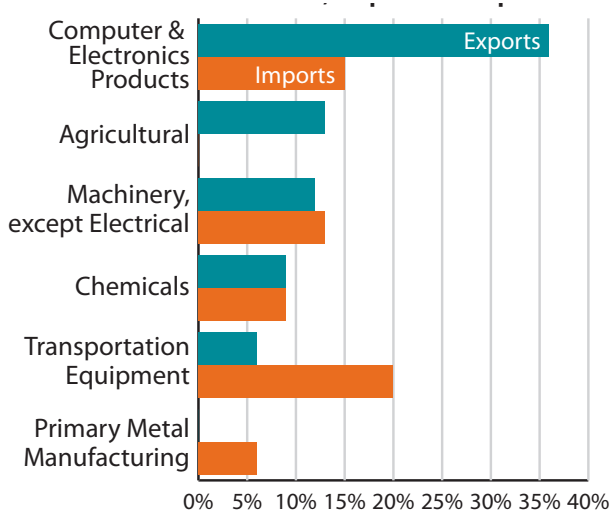


Source: Moody's Analytics, Annual Population Estimates [FPOPA.OR], Accessed November, 2014.

manufacturing, forestry, agriculture, computer and electronics manufacturing, beverage manufacturing, and metal manufacturing. See **Figures 2 and 3.**

The statistics clearly indicate how important these traded-sector industries are to the Oregon economy. Overall, the Oregon **transportation system carried $300 billion** worth of goods in 2012, more than the entire Oregon gross domestic product (GDP) of $205 billion. About $215 billion, or 72 percent of total value, is carried by truck. When considering transportation-related and transportation-dependent jobs in the traded industries, more than **346,400 jobs are reliant on an efficient transportation network** – or nearly **20 percent of all statewide jobs**.

Figure 3: Oregon top five industries' share of international trade, imports & exports



Source: WiserTrade International Trade Industry Data, accessed October 2014. Federal Highway Administration, Freight Analysis Framework 3, 2012, Values, accessed November 2014.

CENTRAL OREGON TRUCK CO.

Central Oregon Truck Company is an over-the-road, irregular route, 48 state carrier located in Redmond, Oregon. The impacts of congestion reduce productivity delivering consumed products that can not be recovered. This cost is ultimately passed back to the consumers of all products. Since the transportation industry has heavily regulated work hours, it makes avoiding peak travel times nearly impossible for all carriers. According to Central Oregon Truck Comapny, the better the roads are maintained and the more efficient roadway travel is, the greater the payback to consumers of any and all products.

Business interviews

For this study, the businesses listed here were asked about congestion and its effects on their business. Companies involved in exports (international and domestic), transportation services and regional distribution were chosen because of their economic importance to the Portland-metro region.

Agriculture/Natural Resource

- Anderson Hay & Grain Co.
- Boise Cascade Co.
- Hampton Affiliates
- Imperial Stock Ranch
- Pacific Seafood
- Roseburg Forest Products

Advanced Manufacturing

- Genentech
- Intel Corp.

Logistics Service Providers

- Central Oregon Truck Co.
- Expeditors International of Washington, Inc.
- Oregon Transfer Co.
- Summit NW

Manufacturing/Food Production

- Chris King Precision Components
- Craft Brew Alliance
- Oregon Iron Works
- Schnitzer Steel

Retail Distribution

- Columbia Sportswear Co.
- The Kroger Company (Fred Meyer)

The transportation system's impact on business competitiveness

Congestion and travel delay due to deficiencies in the transportation system are already impacting businesses throughout the state, hurting their competitiveness.

Interviews with statewide business leaders underscore the fact that transportation is critical to business competitiveness and sustained business growth in Oregon. Due to increasing congestion, businesses report that they are drastically altering operations in order to keep a competitive edge.

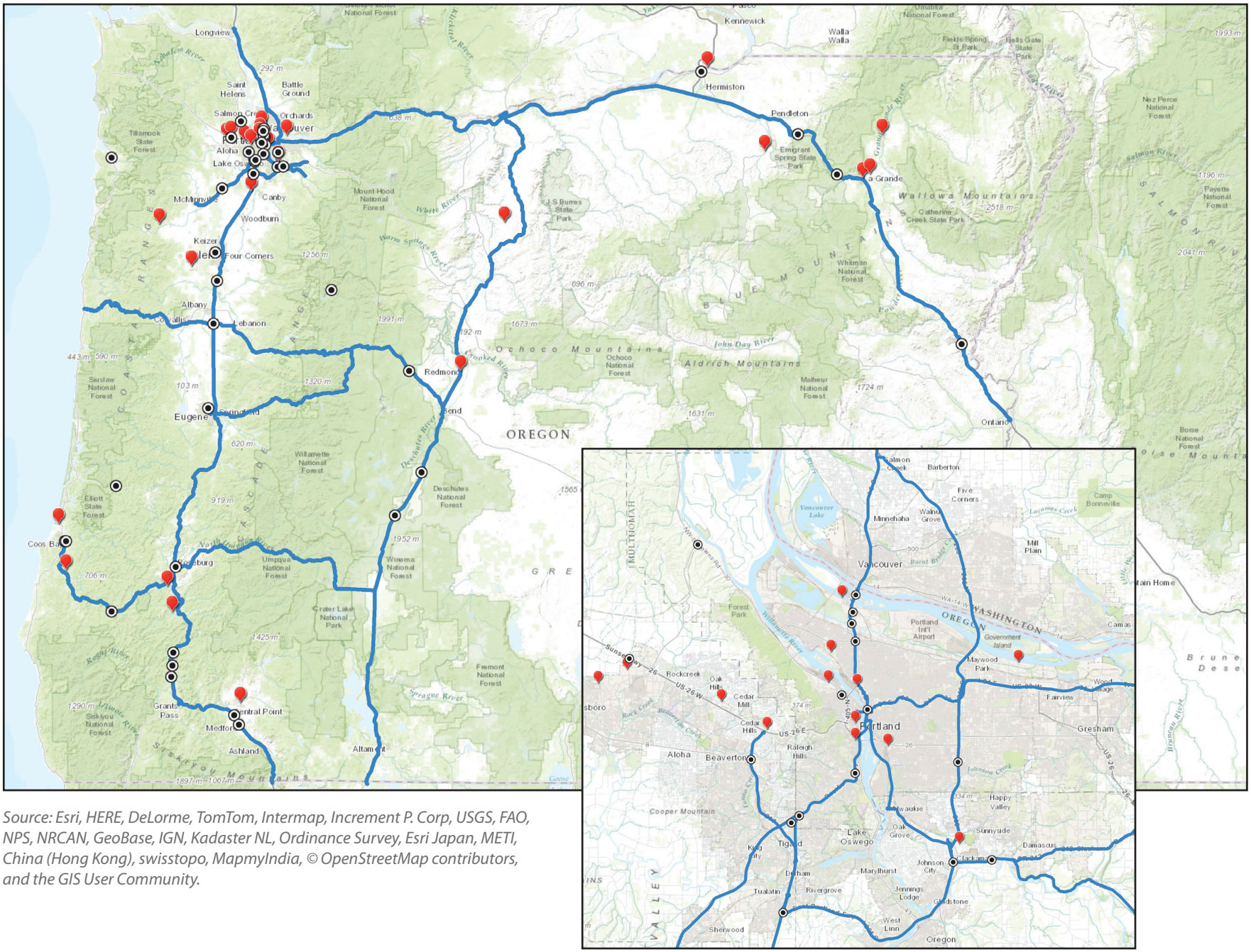
Although some businesses in the report are not located in the metro areas studied, almost all either distribute products in these areas or need to pass through them to get to ports or other operational centers. See **Figure 4.** As a result, congestion in metropolitan areas, including Portland-metro, can affect operational decisions and in some cases the costs of resource-based companies throughout the state.

Changes in business operations are nearing the limits of what a business can do to overcome transportation congestion before it becomes a severe issue. Many respondents reported that they have implemented staggered shifts, added evening and overnight operations, and are increasing operation during "off-off-peak" hours, with some delivery shifts now starting as early as 2 a.m. However, the businesses are making these operational changes in the face of regulatory limits on driver hours, worries of driver safety and limits to when they can feasibly deliver to customers. For those businesses that cannot shift to off-off-peak hours, managers report "lost turns" on truck deliveries due to congestion, meaning that a truck can take on fewer delivery routes in a day compared to the recent past when there was not as much congestion. Moreover, businesses reported that increasing congestion result in a competitive disadvantage of operating in Oregon.

New issues emerging for businesses also highlight the importance of transportation infrastructure. Businesses are focusing on exports for business growth, requiring reliable access to all U.S. West Coast international gateways and reliable service at ports and airports both inside and outside of Oregon. Demand for transportation services serving foreign markets is growing faster than the demand for domestic markets. Furthermore, businesses are optimizing costs by relying more on transportation service providers such as third-party logistics companies and for-hire transportation services, thereby minimizing direct operating risks and passing them onto another party.

Businesses were also asked to comment on any concerns or plans they have regarding the resiliency of the transportation system to seismic events. Many businesses reported high vulnerability to a seismic event if major transportation links were disrupted, with some more localized businesses reporting an inability to sustain themselves in the event of long-term transportation system failure. Thus, in addition to the reliability of the transportation network, the resiliency of the network is also of concern to Oregon businesses.

Figure 4: Coping with congestion; key routes (blue), bottlenecks (black) and businesses interviewed (red)

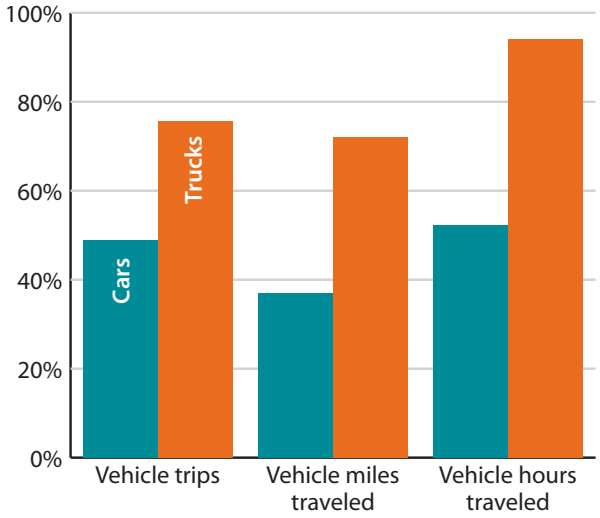


Source: Esri, HERE, DeLorme, TomTom, Intermap, Increment P. Corp, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordinance Survey, Esri Japan, METI, China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.

HAMPTON AFFILIATES

Hampton Affiliates produces dimensional lumber with six sawmills located throughout the Pacific Northwest. There are three mills in Oregon (Willamina, Tillamook and Warrenton.) They produce about 2 billion board feet of wood products per year with roughly 500 million board feet of exports. They rely extensively on for-hire firms for their outbound shipments that require about 45,000 truckloads per year. Hampton's costs have gone up dramatically in the last five years due to congestion, new driver rules and lack of drivers.

Figure 5: Portland-metro projected travel increases, 2010-2040



Source: Portland Metro

Overall impacts of congestion and travel delay on the economy

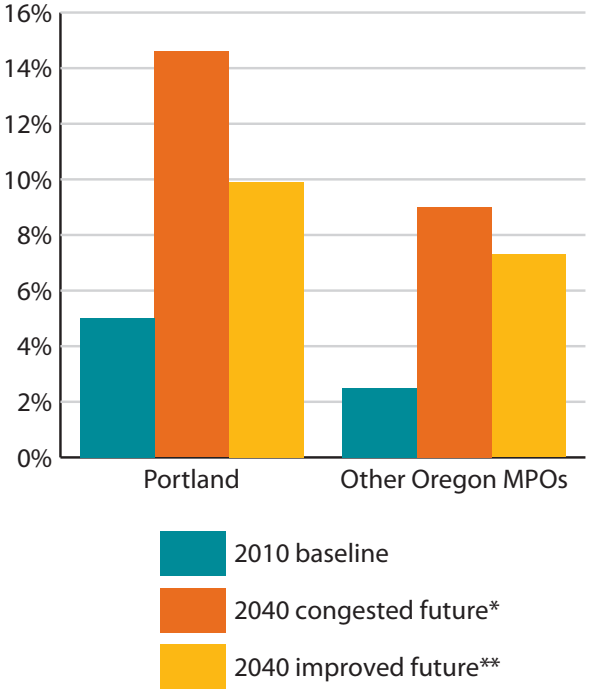
Failure to adequately invest in the transportation system results in significant losses to Oregon's economy, job base and quality of life.

Transportation system assessments for the metropolitan regions included in this study (Portland, Salem/Mid-Willamette Valley, Bend and Corvallis) suggest that congestion is becoming an increasing problem statewide and that investments in infrastructure can strongly mitigate these conditions.

Over time, as more trips are generated in the state, traffic increases cause additional congestion and reduce reliability on the highway network for both passenger cars and trucks. See **Figure 5.** For example, in 2010, 5 percent of all travel time in Portland-metro took place in congested conditions (e.g. in slow, stop-and-go traffic). This is expected to triple to 15 percent of all trips by 2040. Put another way, by 2040, the average Portland-metro household will experience **69 hours of congestion annually**, or nearly two work weeks spent in congested conditions, if only the currently programmed improvements are made, as shown in **Figure 6.** Additional future investments would reduce this amount to 37 hours per household. In other Oregon metropolitan areas, congestion will increase to 18 hours per household by 2040 without new investments. That figure could be reduced by two-thirds, to six hours per household, with additional investments. In total, new transportation investments would **save Oregonians 36.9 million hours of travel time** or an average of **27 hours per household,** as shown in **Figure 7.**

These travel time savings from new investments translate to significant economic impacts. With additional transportation investments these savings would generate an additional **8,300 jobs**

Figure 6: Improved future transportation funding reduces percent of travel time in congestion

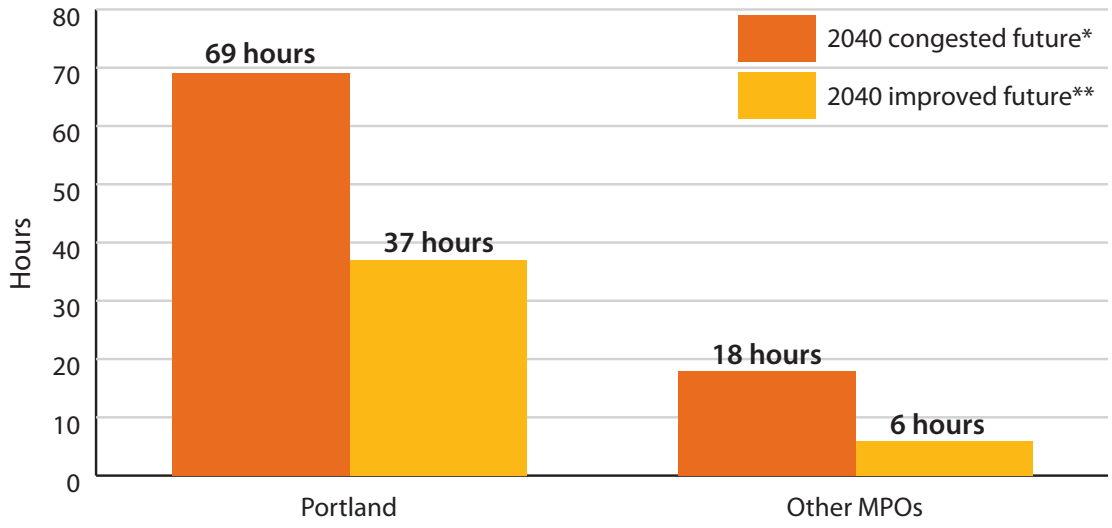


** Based on no investment beyond current funding.*

*** Based on fully funded Regional Transportation Plans.*

Source: Portland Metro and Oregon DOT Office of Planning. Travel demand model estimates provided directly, October 2014.

Figure 7: Improved future transportation funding reduces congestion, hours per household in slow, stop-and-go traffic



** Based on no investment beyond current funding.* *** Based on fully funded Regional Transportation Plans.*

Source: Calculations from EDR Group based on travel demand model estimates. Household data from Moody's Analytics, Total Households [FHHOLDA], Accessed October 2014.

GENENTECH

For Genentech, perishability is a key concern and missed air shipments require that products be stored under controlled conditions. When outbound shipments are missed, products must be held in Hillsboro, where the cost of storage, monitoring of tightly controlled conditions and re-dispatching significantly increase overall costs.

> "Due to increasing congestion, businesses report that they are drastically altering operations in order to keep a competitive edge."

by 2040; **$928 million in output; $530 million in GDP** or value added; and **$380 million in wages and compensation** to employees.

This study also finds that by 2040, improving the transportation system investment levels specified in current state and metropolitan area long-range Regional Transportation Plans would generate economic benefits for the state growing to nearly **$1.1 billion per year** by 2040, as shown in **Figure 8.** Cumulatively, Oregon would receive over $24 billion in benefits from these transportation investments, returning over **$2.40 for every dollar spent** on improving the transportation system.

Figure 8: Economic benefits for Oregon per year by 2040

	Portland-metro	Other study metros	Total
Economic benefits*	$822,000,000 ($908 per household)	$327,000,000 ($744 per household)	**$1,058,000,000** ($788 per household)
Jobs**	5,897	2,421	**8,318**

** Includes GDP, traveler non-monetary benefits and societal benefits.*
*** Change to average annual employment level.*

Source: EDR Group

Conclusion

The rewards are high if new investments are made. However, the risks are great for the economy and quality of life in Oregon if additional investments are not undertaken soon. Oregon risks erosion of its competitive position in domestic and international markets as the cost to move goods increases due to congestion. This means thousands of jobs and billions of dollars for the Oregon economy.

Understanding both the benefits and potential risks of transportation infrastructure investment is important. This study is intended to provide useful information to the public, the business community and government decision-makers as they work to reach consensus on transportation policy, prioritize projects and make funding decisions.

Business, civic and government leaders should engage in a discussion about transportation system deficiencies in terms of congestion and resiliency. It impacts costs for businesses, job opportunities, business competitiveness and ultimately state revenue used to fund vital public services. It is critical to continue to invest in the transportation system in order to protect and enhance the state's economy and quality of life.

Associated Oregon Industries

GREATER PORTLAND

Metro

OREGON BUSINESS ASSOCIATION OBA A BALANCED VOICE

OBC Oregon Business Council

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- 2014 Check-up on the Portland-Region's Economic Health
- Portland-Metro's Health Care
- International Trade & The Portland Harbor's Impact
- 2013 Check-up on the Portland-Region's Economic Health
- Higher Education & Regional Prosperity
- 2012 Check-up on the Portland-Region's Economic Health
- Portland-Metro's Manufacturing Sector
- Land Availability: Limited Options
- Portland-Metro's Traded Sector
- 2011 Check-up on the Portland-Region's Economic Health
- International Trade study
- 2010 Check-up on the Portland-Region's Economic Health

About the Value of Jobs Coalition

The Value of Jobs Coalition is based on the premise that in order to have a prosperous, healthy Portland region with a good quality of life, we need more private-sector jobs. The coalition began with an economic study in the fall of 2010, which uncovered troubling economic data about the Portland-metro region. A number of other studies have followed that highlight the region's economic opportunities and challenges. Find out more at: www.valueofjobs.com.

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Revisiting the relationship between traffic congestion and the economy: a longitudinal examination of U.S. metropolitan areas

Wesley E. Marshall[1] · **Eric Dumbaugh**[2]

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Abstract Conventional transportation practices typically focus on alleviating traffic congestion affecting motorists during peak travel periods. One of the underlying assumptions is that traffic congestion, particularly during these peak periods, is harmful to a region's economy. This paper seeks to answer a seemingly straightforward question: is the fear of the negative economic effects of traffic congestion justified, or is congestion merely a nuisance with little economic impact? This research analyzed 30 years of data for 89 US metropolitan statistical areas (MSAs) to evaluate the economic impacts of traffic congestion at the regional level. Employing a two-stage, least squares panel regression model, we controlled for endogeneity using instrumental variables and assessed the association between traffic congestion and per capita gross domestic product (GDP) as well as between traffic congestion and job growth for an 11-year time period. We then investigated the relationship between traffic congestion and per capita income for those same 11 years as well as for the thirty-year time period (1982–2011) when traffic congestion data were available. Controlling for the key variables found to be significant in the existing literature, our results suggest that the potential negative impact of traffic congestion on the economy does not deserve the attention it receives. Economic productivity is not significantly negatively impacted by high levels of traffic congestion. In fact, the results suggest a *positive* association between traffic congestion and per capita GDP as well as between traffic congestion and job growth at the MSA level. There was a statistically insignificant effect on per capita income. There may be valid reasons to continue the fight against congestion, but the idea that congestion will stifle the economy does not appear to be one of them.

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