BRIDGE
ECONOMIC DEVELOPMENT

PORTLAND METRO CEDS

Conditions Assessment

August 2020

GREATER PORTLAND

Metro

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ABOUT THIS STRATEGY

The process to develop this Comprehensive Economic Development Strategy (CEDS) began in January 2020 through a collaborative effort between Greater Portland Inc (GPI), the regional non-profit economic development organization and Metro, the federally mandated metropolitan planning organization (MPO) for the region. During the initial meetings with regional stakeholders in March, the nation faced shut-downs and was just beginning to reckon with the impacts of COVID-19. The Greater Portland Economic Development District (GPEDD) board decided to pause the CEDS development and focus on a more immediate short-term Economic Recovery Plan, which was approved by the GPEDD board in October 2020. The analyses and recommendations in the Economic Recovery Plan align with this long-term CEDS and is integrated with the recommended actions for the CEDS. The implementation of both the Economic Recovery Plan and CEDS are managed by staff at GPI for accountability and transparent reporting on outcomes.

Recognizing that the impacts of COVID-19 will impact the economy for years to come, this CEDS focuses on long-term strategies for equitable and resilient economic growth. We have defined these core pillars of the strategy as follows:

Strong Economic Growth - A regional economy with increasing Gross Domestic Product (GDP) over time and at higher rates than peers. An economy that is globally connected, driven by emerging technologies, diversified and adaptable, and welcoming to highly skilled entrepreneurial labor, and scalable firms.

Equity – An economic system that ensures under-represented and under-served people have the same level of access to the economy and wealth creation as all other residents.

Resilience – An enduring economic structure that fosters the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow, no matter what kinds of chronic stresses and acute shocks they experience.[1]

The following information is derived from data available prior to the pandemic. However, it is useful in establishing an understanding of the economic barriers and opportunities that reside within a steadier economy. At the same time, the nation is currently grappling with racial inequities and racist systems laid bare by the murder of George Floyd which have routinely presented barriers to job opportunities and wealth creation for black, indigenous, and people of color. These known systemic issues have been exposed by the pandemic and identified throughout this work. Ultimately, the region comprehends and values that it must first address these added barriers to participation in the economy if it is to jump forward.

[1] 100 Resilient Cities

THE GREATER PORTLAND STORY

Greater Portland is home to companies that operate on a global scale such as Nike, Intel and Boeing, which define the Greater Portland industry base. The region excels at creating, making and exporting innovation, ideas and products that generated an increased value of export growth of 22 percent between 2013-2018. The investment of foreign companies such as adidas and Daimler that have located their North American headquarters in Greater Portland advances the region's global position. HP and SEH must vie with foreign company locations in Japan and South Korea for talent and efficiencies. Developing a skilled workforce and building efficient infrastructure, both physical and digital, are important elements to retain the regional competitive advantage on a global stage.

Companies of this region are purpose-driven. The philosophy of the region is to advance economic growth in a manner that allows for equity and manages negative externalities (e.g. traffic, costly housing). The region wants to create jobs and grow enterprises that help to advance its goal of ensuring a more resilient and equitable economy.

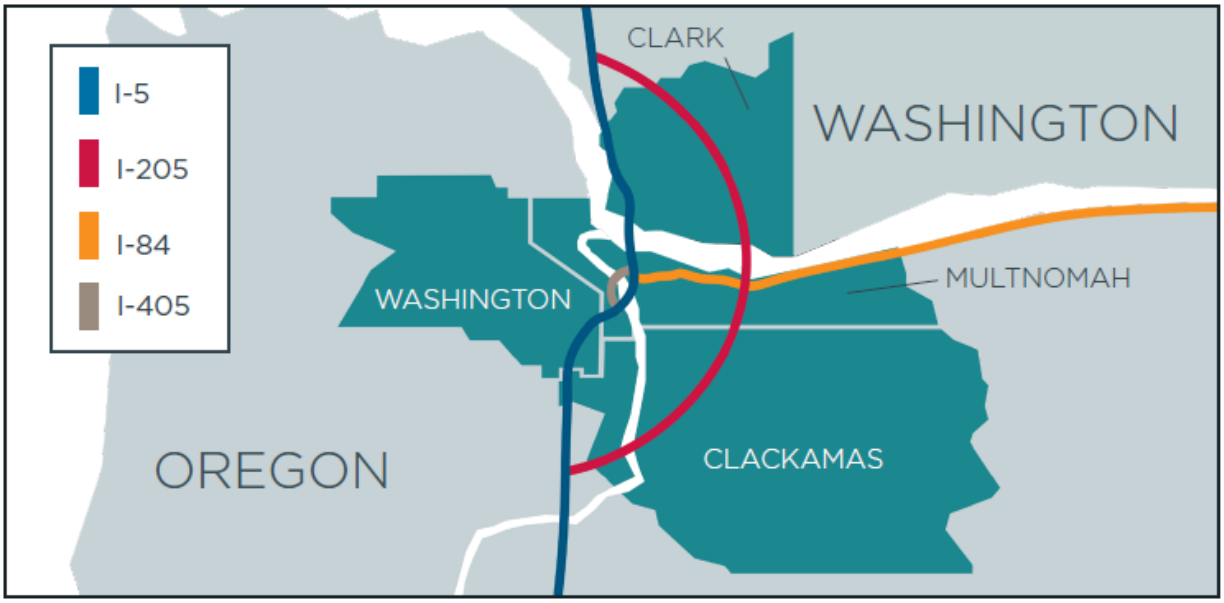
The regional community and retail markets embrace new and local products. Such products are a vital ingredient to the food and beverage industry that is a defining element of the regional brand. The industry values commitments with rural growers that develop personal relationships and encourage innovation. Mutual support and collaboration foster the success of numerous regional brands, such as Bob's Red Mill, Dave's Killer Bread, and Aviation Gin, that are self-described as "aggressively humble."

The Portland region understands that to sustain this ability to create, make and export, it must be diverse. The region is a predominantly white population (8 in 10 residents, or 81.2 percent are white), but public and private leaders are committed to shifting this trend. Its Black population grew 4.3 percent since 2013 to more than 72,000 residents and is better integrated than 11 of its 13 peer regions such as Seattle, Denver, San Francisco and others. The Portland region also has better income equality compared to 12 of its 13 peers, which sets a solid foundation for positive diverse growth.

The State of Oregon's establishment of an urban growth boundary in 1970s to protect farmland and natural areas defines the region's genuine and authentic commitment to environmental protection and ensuring the highest and best use for commercial development. The region's investment in light-rail over freeways during that same time kept the region from sprawling like many of its peers. This same land use planning philosophy was adopted by the State of Washington in 1990 through the Growth Management Act. With pride in a high quality of place, Greater Portland is now one of the most desirable regions for talent to move and stay. With a culture of regional collaboration and organizations that manage transit and the growth boundary, there is a strong foundation to maintain the value of intentional growth that will help the region respond to climate change and other impacts yet to be realized by the COVID-19 pandemic.

REGIONAL OVERVIEW

The Greater Portland region is defined as Clackamas, Multnomah and Washington Counties in Oregon and Clark County in Washington[2] and represents the area of focus for the Greater Portland Economic Development District (GPEDD). Greater Portland's location within the heart of the Pacific Northwest offers access to clean air, abundant water, and sustainable energy.



With a mild climate, the region benefits from limited energy demand induced by extreme temperatures in other regions. Centered between the Pacific Ocean and Cascade mountain range and the gateway to the Columbia River Gorge, the region has access to extraordinary outdoor recreation opportunities. This access to nature and a sustainable environment explains the presence of numerous athletic and outdoor businesses and serves as a compelling attraction to recruit talent.

INFRASTRUCTURE OVERVIEW

Freight movement has historically played a large role in the development of Greater Portland's regional economy. Due to its location at the confluence of the Willamette and Columbia Rivers with access to the Pacific Ocean, the region has long served as a major shipment point in the Pacific Northwest. In addition to the navigable waterways, the Portland area is also served by two Class 1 rail lines, two interstate highways and a network of other major roads. All these factors contribute to Portland's development as a major distribution center for freight. The major interstate routes serving the region include the north/south Interstate-5, which connects the west coast from Canada to Mexico. Interstate-84 runs along northern Oregon, just south of the Columbia River, and extends easterly from I-5. Portland International Airport (PDX) serves as the passenger gateway to domestic

[2] The Greater Portland CEDS focuses on the four identified counties. The Portland Metropolitan Statistical Area (MSA) is comprised of seven counties, which includes the four identified counties and Columbia and Yamhill counties in Oregon and Skamania county in Washington.

and global markets. Portland benefits from strong direct connectivity across the country; roughly three-quarters of domestic passengers fly direct.[3] PDX is also a major freight asset. Portland is one of the country's 20 busiest metropolitan areas in terms of air freight value by foreign exports, and ranks in the top 40 by domestic and global import value.[4]

In addition to transportation infrastructure, Greater Portland's proximity to the Columbia River provides access to the largest hydroelectric power supply in the country and helps make up three-fifths of the net power generation for the region.[5] The region's abundant non-carbon emitting power source contributes to below-average industrial electricity prices in Oregon and Washington. This asset is one critical reason many of the computer and electronics companies, which are heavy power users, originally located in the Portland region.

MULTI-MODAL TRANSPORTATION

High growth industry clusters tend to be located in and rely on investments in multi-modal transportation infrastructure, with a significant reliance on the public transit system. American Public Transportation Association's exploration into the role of transit in supporting high growth business clusters reveals that the situations where public transportation investment is particularly supportive of economic growth are when (1) highways are limited because of build-out, space and density (no more room for highways); (2) highway widening is constrained or inhibited due to other considerations - neighborhood impact, environmental concerns, or workforce preferences (workers don't want to commute long distances); and (3) locational factors where transit availability offers a competitive advantage in attracting workers or co-locating with similar firms with workers that have a desirable skill-set. APTA also indicates that private firms are highlighting the need for increased public transit in addition to their own initiatives to establish shuttle services as this pay out of their bottom line is not desirable and the costs of privately subsidized transit without a public alternative could become a competitive disadvantage.[6]

Among eight case study regions, the employment growth that is at risk because of roadway limitations (and potentially enabled if there is sufficient public transportation service) is on the order of 2.3 times what would otherwise occur by the year 2040. Other actions such as better traffic management and doubling the rate of carpooling help – reducing the unmet capacity need by 15-20%. If 25% of the employment base had the ability to switch to public transportation, this threatened capacity shortfall could be entirely eliminated and release additional job growth in these areas. In Seattle's South Lake Union, APTA calculated that 800 new jobs and $300 million in business output per year could be enabled through added transit capacity. In other regions, the estimate ranges from

[3] Portland Economic Value Atlas Market Scan, Brookings, August 2017

[4] ibid

[5] U.S. Energy Information Administration, 2020 https://www.eia.gov/state/analysis.php?sid=OR

[6] http://clustermapping.us/sites/default/files/files/resource/The%20Role%20of%20Transit%20in%20Support%20of%20High%20Growth%20Business%20Clusters%20in%20the%20U.S..pdf

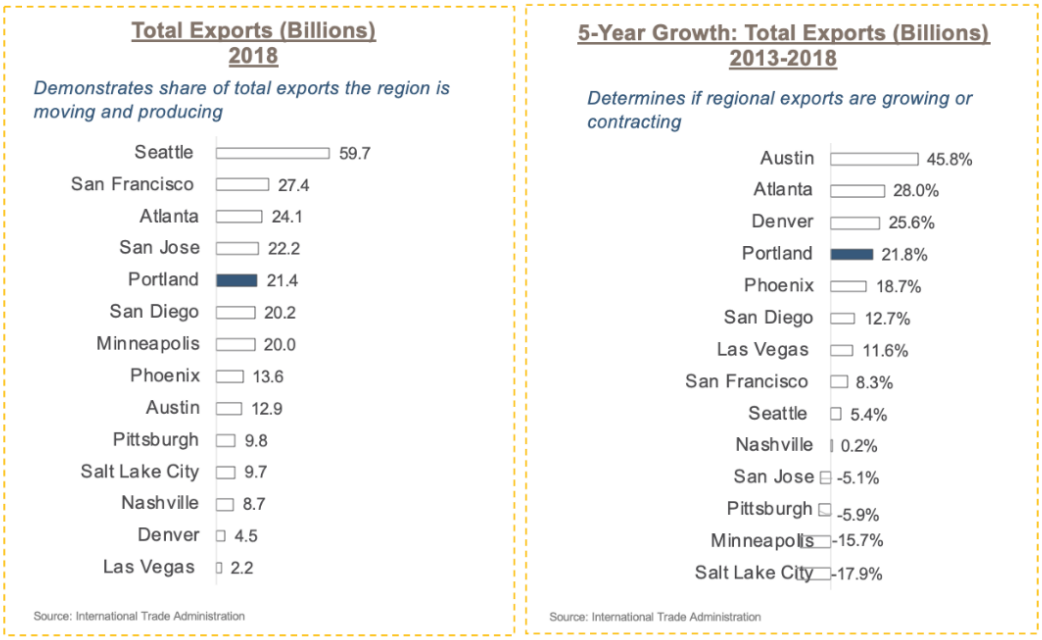
300 jobs and $130 million in business output for Denver's Technology Corridor to 4,000 jobs and $1.9 billion in business output in Boston's Kendall Square.[7]

For the Greater Portland region, this highlights the importance of TriMet services and transit-oriented development to support real estate development activity and concentrations of economic activity in addition to its more notable role in the delivery of workers when road lane expansion to address congestion is more problematic or the mobility of workers from entry level to highly skilled are limited to or exhibit a preference for non-automobile transport.

EXPORTS

Positioned along the west coast, Greater Portland is situated well for access to Asian markets. Exports are critical to Greater Portland's economic growth and job creation. In order for companies to thrive, they must be able to expand their customer bases. Ninety-five percent of the world's consumers live outside the United States, and 79 percent of global GDP growth is projected to occur outside the U.S. over the next five years (Brookings). The Portland region is fortunate to have an economy that can leverage this global connection and provide a diverse number of exports. In 2018, the region exported $21 billion in goods and services, and between 2013 – 2018 enjoyed a 22 percent growth rate. This rate of growth places the Portland region fourth amongst its peer regions, only behind Austin, Atlanta, and Denver.

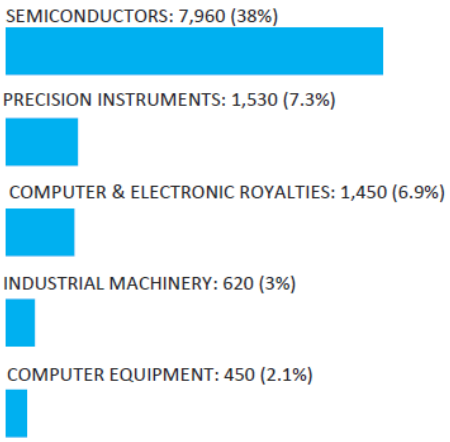
Figure 1: Total Exports 2013 to 2018



[7] ibid

The majority of all exports produced in the Portland region are tied to Computer and Electronics (C&E) industry. As indicated in Figure 2, of the industries that represent two percent or more of the Portland region's exported goods, 54.3 percent pertain to C&E and 3 percent pertain to industrial machinery.

Figure 2: Top Five Industries by Real Exports (Mil) 2017



Source: Brookings Export Monitor, 2018

Almost all of the C&E goods produced in the region move out of the region on a truck. The industry utilizes a freight consolidation area, generally located north of Columbia Boulevard and south of the air terminal, before trucking them north or south from the Portland region to other airports that have strong links to overseas destinations.[8] In addition to C&E, several of the industry clusters that drive the regional economy utilize trucks and highways to move goods.

Table 1: Oregon Transportation Dependency Rating of Oregon's Top Industries

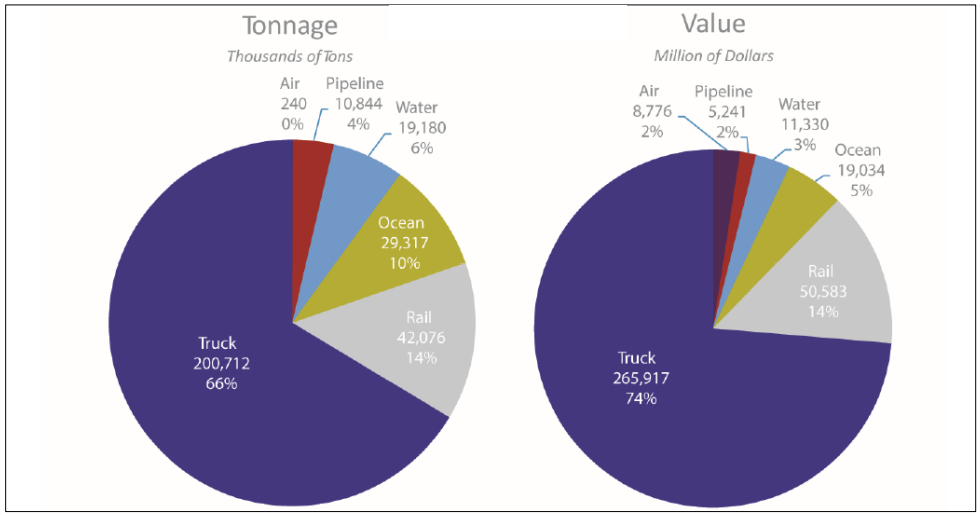
Industry Sector	Highway	Railroad	Water/ Marine	Air	Pipeline
Agriculture, Forestry and Fishing;	High	High (except fishing)	Medium	Low (except Fishing)	Low
Computer and Electronics Manufacturing;	High	Medium	Medium	High	Low
Food Manufacturing;	High	Medium	Medium	Low	Low
Machinery Manufacturing and Metals Manufacturing;	High	High	High	Medium	Low
Wood and Paper Manufacturing;	High	High	High	Low	Low
Retail Trade;	High	Medium (Except long distance)	Medium	Low	Low
Services and Other.	Low	Low	Low	Low	Low

Source: Cambridge Systematics, Parsons Brinckerhoff "Relationship of Freight Transportation to Economic Development"

[8] Metro Regional Freight Plan, 2018

This predominant use of highways by various industries to export goods explains why, measured by value, 74 percent of the commodities traveling from the Portland region is moved by truck.[9]

Figure 3: Greater Portland Flows by Mode



Source: Cambridge Systematics, Port of Portland Commodity Flow Forecast

Trucks will remain the predominant mode of freight transport in the region for the foreseeable future, due to their flexibility, speed, adaptability and availability.[10] The Portland region is not alone in these trends. Throughout the U.S., trucks are the most common mode used to move imports and exports between international gateways and inland locations. This trend is expected to continue with tonnage of international trade expected to grow at a rate of 4 percent per year between 2015 and 2045.[11]

Recent studies on the advance of e-commerce indicate that the rise in demand for quick deliveries is adjusting how truck freight interacts with local distribution networks with fulfillment, warehouse, and distribution centers located in ex-urban locations within or adjacent to the central city. Last-mile carriers have increased their workforces, expanded hours of operation and fleets, and employ not just trucks, but also vans, automobiles, and bicycles, to fulfill customer requirements for rapid, local distribution.[12] These recent shifts and the necessity of moving between modes to meet consumer demand elevate the importance of a well-connected multi-modal freight system that leverages these localized delivery methods alongside strong intermodal connections between the trucking system and air, rail, and marine shipping methods.

[9] Port of Portland Commodity Flow Forecast, March 2015, using 2007 FAF3 data
[10] Metro Regional Freight Strategy, 2018
[11] Freight Facts and Figures, Bureau of Transportation Statistics (BTS), 2017
[12] https://www.portlandoregon.gov/transportation/article/751002

Table 2: US Domestic Mode of Export and Imports by Weight and Value 2012, 2015, 2045

	Millions of metric tonnes			Billions of 2012 dollars		
	2012	2015	2045	2012	2015	2045
Total	**1,814**	**1,824**	**4,020**	**3,746**	**4,177**	**14,566**
Truck[1]	736	783	2,062	2,070	2,273	8,185
Rail	221	212	456	196	211	549
Water	216	238	479	303	378	1,163
Air, air & truck[2]	4	4	18	534	643	2,910
Multiple modes & mail[3]	65	64	192	227	254	935
Pipeline	265	271	530	158	158	305
Other & unknown	4	4	14	39	82	324
No domestic mode[4]	304	248	269	220	179	195

Source: Bureau of Transportation Statistics and Federal Highway Administration, 2016

In addition to simply moving products, just-in-time inventory strategies also make shipments more time-sensitive as a result of decreased inventories at production locations. In turn, reduced congestion and travel time variability is important to facilitate businesses using the just-in-time model.[13] These export trends in the Portland region also align with the overall U.S. trends where electronics serve as the number one export based on value.

Table 3: Top 10 US Commodities by Value, 2015

Value	Billions of 2012 dollars
Electronics	$1,673
Motorized vehicles	$1,467
Mixed freight	$1,458
Machinery	$1,148
Gasoline	$1,129
Natural gas, coke, asphalt[1]	$938
Pharmaceuticals	$903
Fuel oils	$853
Miscellaneous manufacturing products	$791
Other foodstuffs	$710
Top 10 total	**$11,069**
Total, all commodities	**$19,258**

Source: Bureau of Transportation Statistics and Federal Highway Administration, 2017

Electronics not only serve as an important export for the country but is regarded as particularly significant because it is a foundational technology that can give nations an edge in innovation.

[13] Oregon Freight Plan, 2017

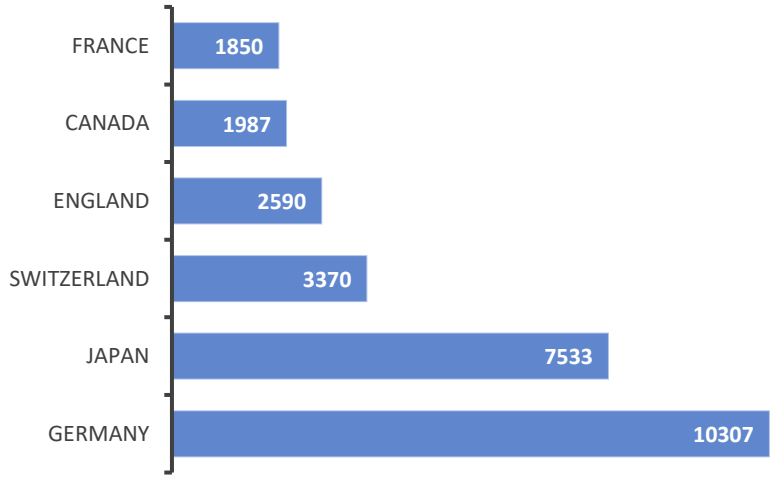
American companies that design and sell chips still account for nearly half of global revenue in the sector, the greatest share of any country. However, the United States only accounts for around 12 percent of global semiconductor production capacity.[14] This limited capacity is a result of locating the majority of the supply chain network including the production of powders, chemicals and equipment in Asia.

FOREIGN DIRECT INVESTMENT (FDI)

FDI is an investment made by a firm or individual in one country into business interests located in another country. Generally, FDI takes place when an investor establishes foreign business operations or acquires foreign business assets in a foreign company. Foreign owned enterprises (FOEs) account for 20 percent higher wages and doubling of money spent on benefits compared to the average U.S. firm, and for 19 percent of all corporate R&D in the U.S., which facilitates the spread of new knowledge, technologies and ideas—all drivers of job creation and economic growth.[15]

The Portland region FDI largely comes from Germany and Japan, which account for 43 percent of the total foreign-owned employment in the region. While German FDI is centered on landmark investments in the region by Daimler and adidas, Japanese investment is spread across a larger number of firms and a variety of sectors such as Shimadzu, Dynic, and Mizuno. Maintaining a strong relationship with company headquarters to assure current investments and encourage future investment is an important strategy to foster a global economy.

Figure 4: Total Employment in Foreign-Owned Enterprises by Country, Greater Portland, 2011



Source: Greater Portland Global, Brookings

[14] Lawmakers push to invest billions in semiconductor industry to counter China, The Business Journals, June 12, 2020

[15] Greater Portland Global Trade and Investment Plan, Brookings and JP Morgan Chase, 2014

The excellent international flight options at Portland International Airport (PDX) offer the opportunity to strengthen the region's opportunity to maintain and expand FDI. As indicated below, there are direct flights to four of the top five countries investing in the Portland region.

Figure 5: Direct International Flights From PDX

Source: Port of Portland

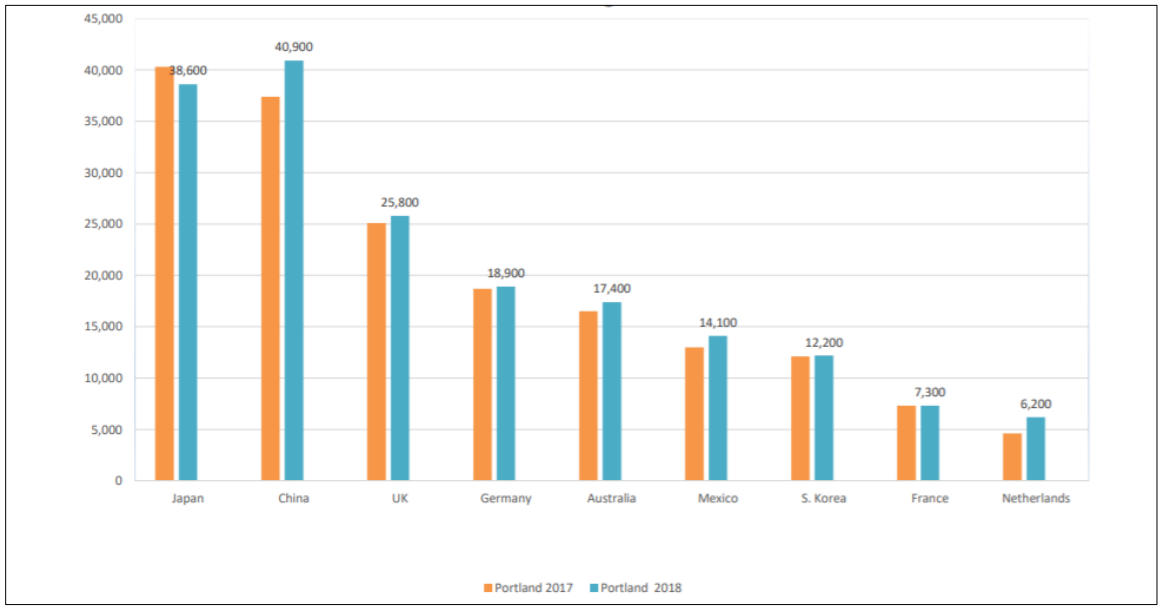
TOURISM

Prior to the significant impact of COVID, the Portland region served as a major travel destination for international visitors. In 2019, the Portland region welcomed 8.8 million overnight person-trips. All told, visitors to the Portland metro area generated $5.6 billion in direct spending. The Portland hotel market was within the top 10 US markets.

In 2019, for the seventh consecutive year, Portland International Airport was ranked as the best airport in the United States by Travel + Leisure magazine. The number of international passengers at PDX increased by 87 percent from 2012 to 2019 and domestic travel grew 37 percent during that same time period.[16] As indicated in Table 4, travelers from Japan and China comprised the greatest number of international visitors in the Portland region.

[16] Port of Portland, Travel Portland: State of the Industry, February 2020

Table 4: Overnight Visitors 2017 and 2018, Portland Region



Source: Travel Portland, Tourism Economics: Global City Travel, 2019

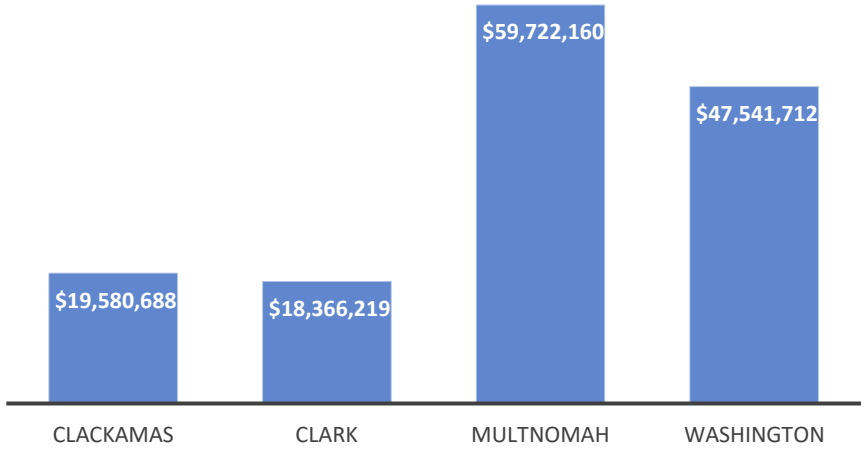
When international tourism travel resumes, Travel Portland's international focus and marketing can strengthen the region's economy by aligning with FDI efforts as well as creating demand as a preferred destination for international and domestic travelers.

STATE ECONOMIC IMPACT

The three Oregon counties in the Greater Portland region are the economic engine for the State of Oregon. In terms of GDP, they were the highest ranked Oregon counties in 2018 totaling $127,000,000.[17] Clark County ranked fifth in counties for GDP in the State of Washington. The Seattle Puget Sound region serves as the largest economy in Washington with a GDP of $367,000,000 in 2018.

[17] Bureau of Economic Analysis, Local Area Gross Domestic Product, 2018

Table 5: Portland Region Gross Domestic Product, 2018



Source: BEA, Bridge Economic Development

Regarding tax structure, Oregon has a corporate income tax at the state level. The State of Washington has a Business and Operation (B&O) tax that is allocated by industry. The tax can also be assessed at the local level, but no city within Clark County does so. Washington has a sales tax, whereas Oregon does not. Both states have a comparable property tax. Washington does not have a personal income tax, whereas Oregon does. Oregon also assesses an income tax for residents that work in Washington. Thus, only residents that both live and work in Clark County are not assessed an income tax.

Figure 6: 2021 State Business Climate Tax Index

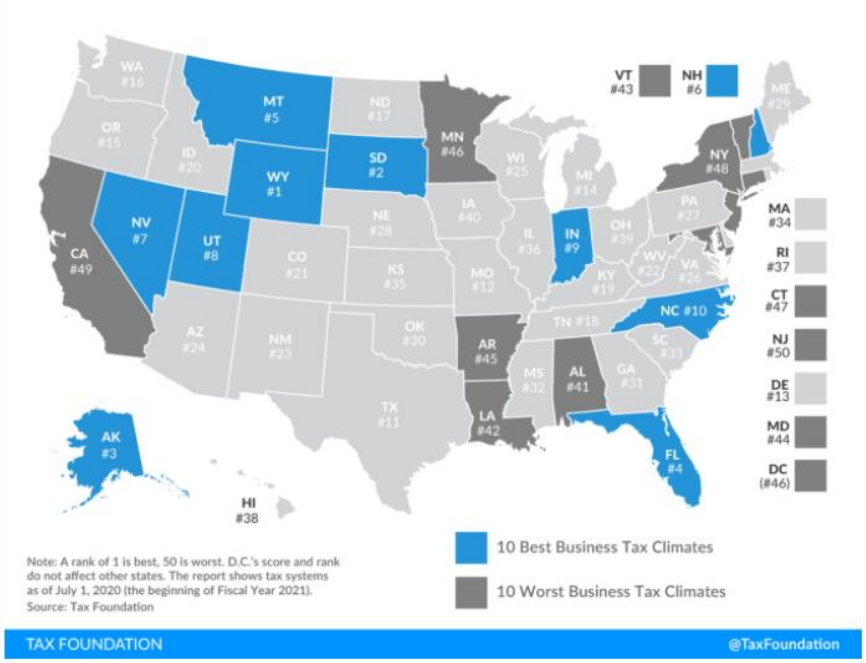


Table 6: State Business Tax Climate Index Ranks and Component Tax Ranks

State	Overall Rank	Corporate Tax Rank	Individual Income Tax Rank	Sales Tax Rank	Property Tax Rank	Unemployment Insurance Tax Rank
Oregon	**15**	49	38	4	16	36
Washington	**16**	40	6	48	18	19

Source: Tax Foundation, 2020

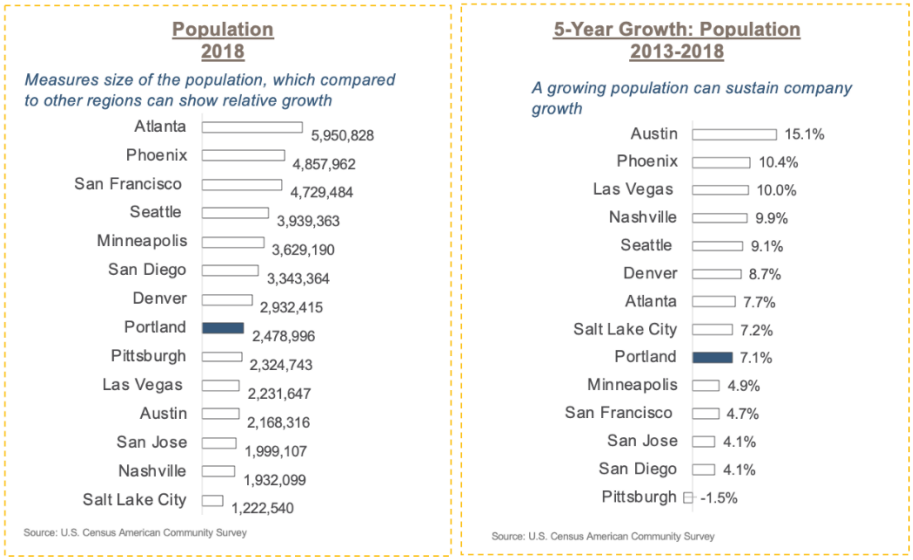
At a regional level, an October 2020 study by the Oregon Business Industry (OBI) Board, identifies impacts of recent tax and fee increases specifically within the City of Portland. According to the report, "given the various tax changes at the city, county, and Metro level, Portland businesses are estimated to experience a 42% increase in taxes due to the enacted and proposed tax changes."

DEMOGRAPHIC & SOCIOECONOMIC PROFILE

To offer context for greater Portland's demographic and socioeconomic profile, this conditions assessment compared the region to 13 peer regions: Atlanta, Austin, Denver, Las Vegas, Minneapolis, Nashville, Phoenix, Pittsburgh, Salt Lake City, San Diego, San Francisco, San Jose and Seattle. Benchmark regions were selected for the following similarities to the Portland region: demographics, economics, industries and geographical location. The following highlights the key takeaways from the profile. Detailed data analysis is provided in Appendix A.

Population. Approximately 2.5 million residents live in the Portland metro – up 7 percent over 2013 and ranking ninth among peers. Greater Portland's recent population growth is similar to Atlanta (7.7 percent) and Salt Lake City (7.2 percent).

Figure 7: Population 2013 to 2018

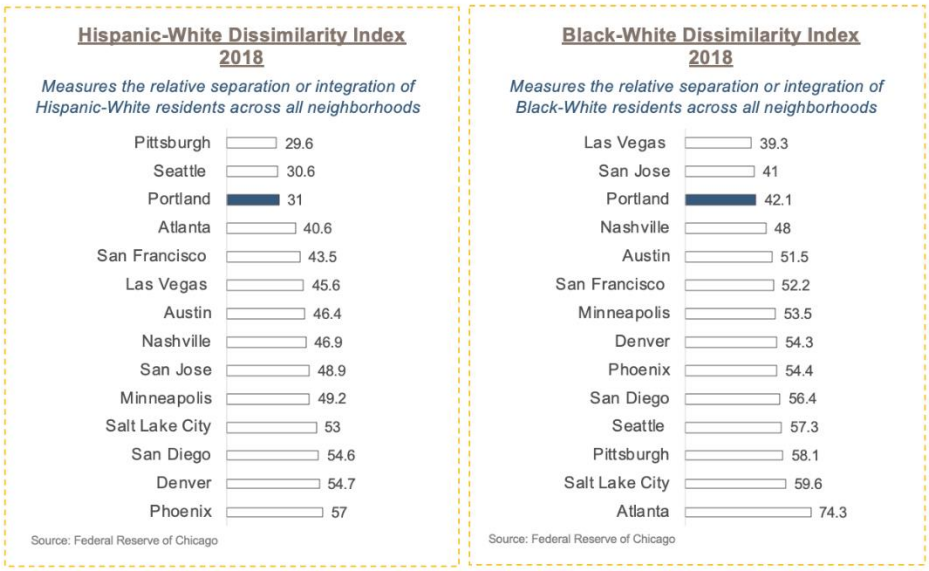


People of Color. 1 in 4 residents (25.8 percent) in the Portland metro are people of color, ranking near the bottom of the peer regions. This share is similar to that of Minneapolis (23.8 percent). As previously noted, Portland's share of Black residents has increased 4.6 percent since 2018 to more than 72,000.

Foreign-born Residents. Approximately 324,000 foreign-born residents live in the greater Portland region, representing just 13 percent of the population and ranking ninth among the peer regions. From 2013-2018, the region's foreign-born population grew 10.7 percent, ranking between Atlanta (12.1 percent) and Phoenix (9.7 percent).

Integrated Community. Portland ranks third in both dissimilarity indexes – Hispanic-White and Black-White – developed by the Federal Reserve of Chicago, representing a fairly well-integrated community.[18] Specifically, these indexes measure the level of segregation between two groups (as noted above), reflecting their relative distributions across neighborhoods within the same metropolitan area.

Figure 8: 2018 Dissimilarity Index

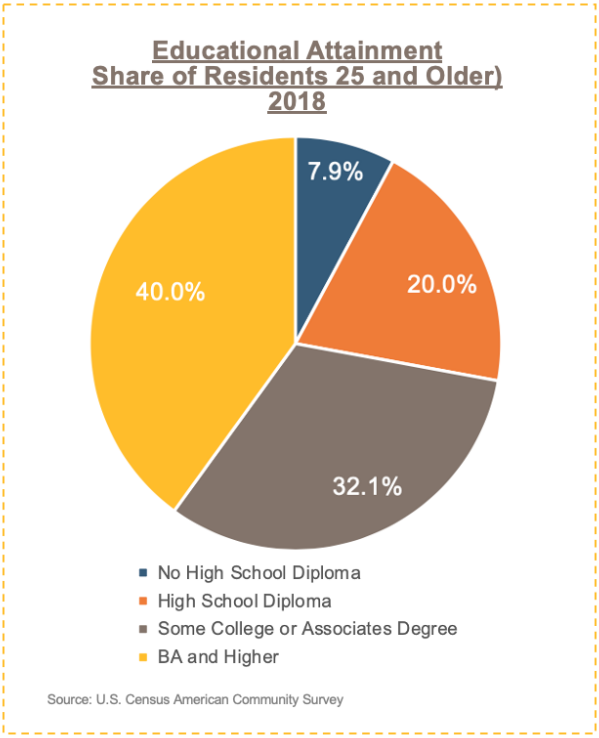


Residents 25 to 34. One out every five residents in Portland are between the age of 20-34 – an 8 percent increase over 2013 that ranks eighth among peers and similar to Nashville (8.9 percent) and Atlanta (7.9 percent). Portland's share of resident 25 to 34 is growing faster than its west coast peers of San Francisco (5.8 percent), Salt Lake City (4.2 percent) and San Diego (2.8 percent).

Educational Attainment. Seven in ten Portland residents have some type of higher-education degree: associate's degree, bachelor's degree, or graduate degree; this ranks fifth among Portland's peer communities and is similar to that of Denver and Minneapolis.

[18] https://www.chicagofed.org/publications/blogs/cdps/2019/updated-peer-city-tool-offers-new-insights

Figure 9: 2018 Educational Attainment



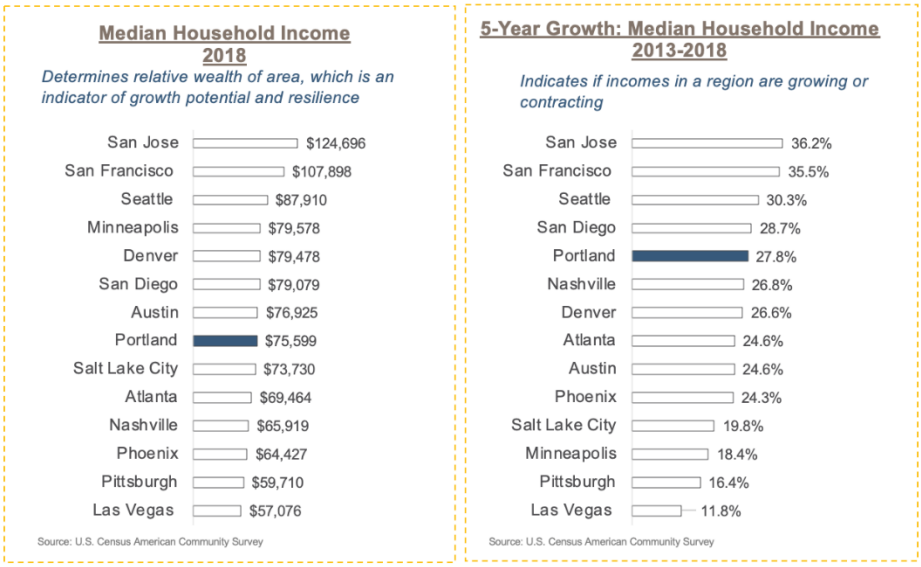
Bachelor's Degree Growth. Four in ten residents in Portland have a bachelor's degree or higher – a 20 percent increase over 2013 and ranking third just behind Austin (25.4 percent) and Las Vegas (20.6 percent).

Educated Movers. Eleven percent of greater Portland residents with a bachelor's degree or higher moved to the region the prior year. One out of every two people who move to Portland (25 and older) has a college degree. This is similar to Nashville and Salt Lake City and ranks sixth among Portland's peer communities.

Low Income Inequality. Among its peer regions, the Portland metro has relatively low-income inequality (Gini coefficient: 0.443), ranking second and just behind Salt Lake City (0.426). The Gini coefficient measures the degree of inequality in a distribution metric among community residents; a higher coefficient reflects a higher level of inequality.

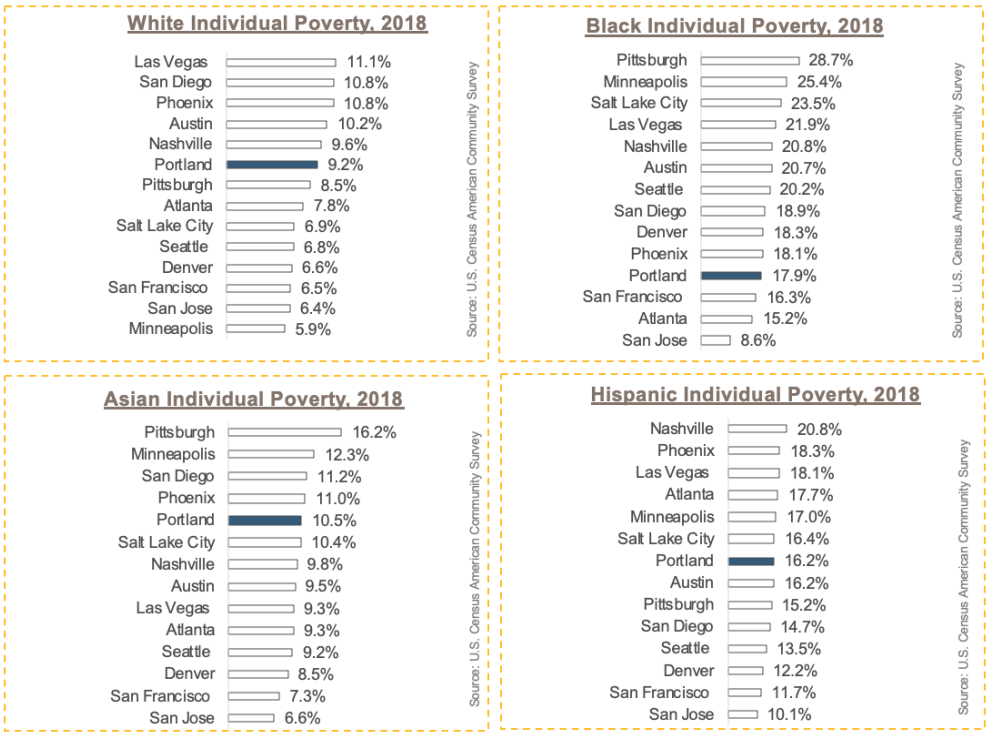
Median Household Income. Since 2013, Portland's median household income has increased 28 percent to approximately $75,600. Portland's income growth is similar to San Diego (27.8 percent), Nashville (26.8 percent) and Denver (26.6 percent). While the region has experienced strong income growth, there's disparity among households in Portland: Black households in Portland earn 37 percent less than the regional average and Hispanics earn 25 percent less.

Figure 10: Median Household Income 2013-2018



Poverty Rates. One in ten Portland residents live below the U.S. poverty rate, ranking among the middle of peer regions and similar to Salt Lake City (8.8 percent) and Pittsburgh (10.8 percent). However, poverty rates for Portland Black and Hispanic residents are nearly two times that of white and Asian people in the region.

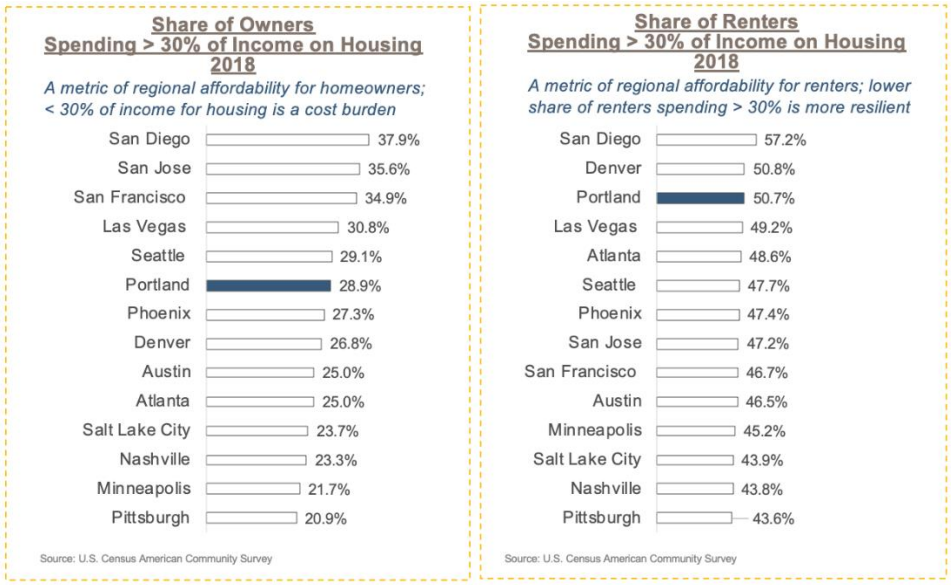
Figure 11: 2018 Poverty Rates Comparison



Disparity Between Men's and Women's Incomes. Women in Portland, on average, earn $50,000, which is 8 percent less than men annually ($60,300). This is similar to Minneapolis and Denver and ranks sixth among Portland's peer regions.

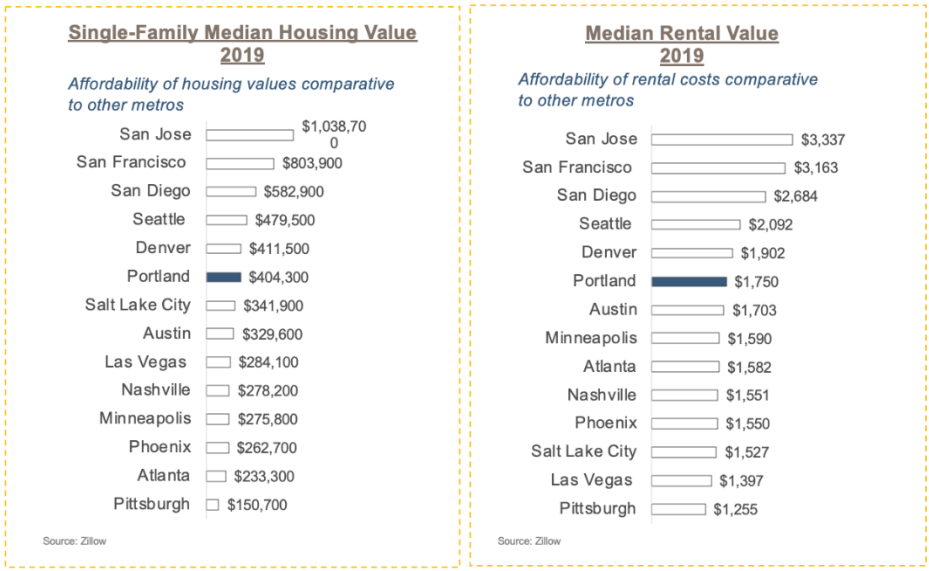
Housing Burden. Three in ten Portland homeowners spend more than 30 percent of their income on housing costs; for renters in the region, this share jumps to 5 in 10 renters.

Figure 12: 2018 Share of Spending on Housing Comparison



Affordable Housing Costs for West Coast Metro. The Portland metro has reasonably priced single-family housing costs ($404,300) and rental costs for a one-bed room apartment ($1,750) – half that of San Jose and San Francisco.

Figure 13: Affordable Housing Costs Comparison



Short Commute. The Portland metro's average commute time is 27 minutes, consistent with the U.S. and ranking in the middle of peers but shorter than Seattle (31.6), Atlanta (32.5) and San Francisco (34.7).

NATIONAL TRENDS

The Portland regional economy is also shaped by trends that impact the entire country (as outlined below). Some of these issues also contribute to racial disparities and inequity.

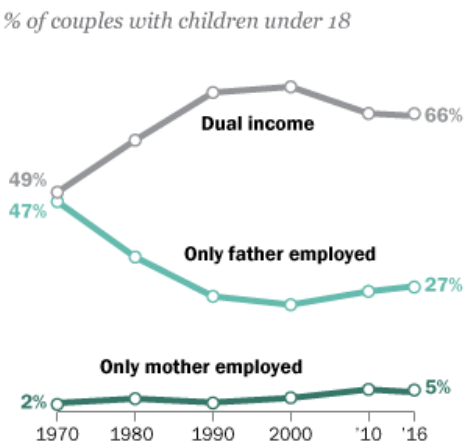
EARLY LEARNING/CHILD CARE

Child care is critical infrastructure for working parents, but it also enables children to be in a setting that promotes their healthy development and school readiness (while their parents work). In this way, child care not only has a direct impact on the economy today, but also impacts the economy of tomorrow. Rigorous evidence from studies of random assignment to high-quality preschool suggests that early childhood policy interventions have wide-ranging long-term impacts.[19] Nobel Prize winning University of Chicago Economics Professor James Heckman's work outlines the great gains to be had by investing in the early and equal development of human potential. He finds that investing in comprehensive birth-to-five early childhood education is a powerful and cost-effective way to mitigate negative consequences on child development and increase adult opportunity. "The gains are significant because quality programs pay for themselves many times over. The cost of inaction is a tragic loss of human and economic potential that we cannot afford."[20]

Education is the determination of a person's health and wealth and requires a strong foundation of early learning. Children that benefit from early learning are more likely to succeed in education attainment and overcome obstacles that create an "opportunity gap": a situation created by circumstances in which people are born—such as their race, ethnicity, ZIP code, and socioeconomic status—that determine opportunities in life.

In addition to improving the lives of youth, child care can facilitate a region's economic growth through its support of increased labor force participation and education of the regional workforce. As the majority of families rely on a dual-income, access to adequate child care is important for maintaining US household incomes, which have stagnated.

Figure 14: Rise in Dual Income Families

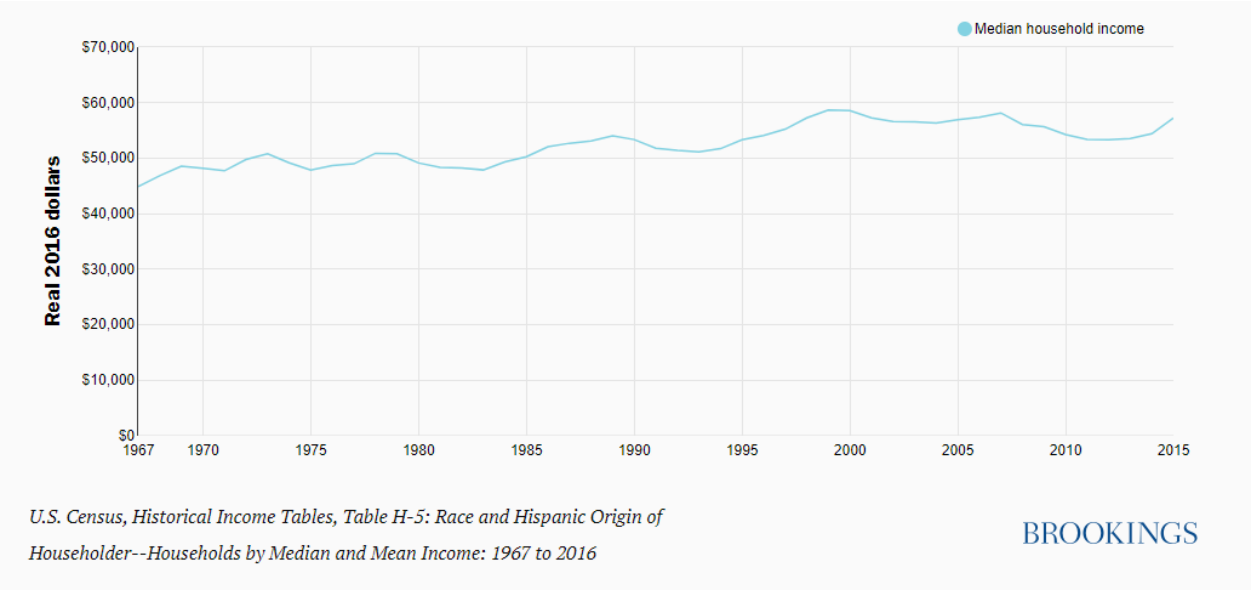


Source: Pew Research Center, 2017

[19] Diane Whitmore Schanzenbach Ryan Nunn Lauren Bauer Megan Mumford Audrey Breitwieser, Seven Facts on Noncognitive Skills from Education to the Labor Market, October 2016

[20] García, Jorge Luis, James J. Heckman, Duncan Ermini Leaf, and María José Prados. "The Life-cycle Benefits of an Influential Early Childhood Program." 2016

Figure 15: US Median Household Income 1967-2016



Unfortunately, while wages are stagnating, the cost of organized child care is increasing and presents a substantial financial hurdle for many working parents with children, especially those working for low wages. The cost of care in the Portland region remains a barrier for many parents seeking to enter or stay in the labor force. The average annual cost of child care in Oregon for an infant is $13,292 in a child care center and $8,990 in a family child care home. In Washington, the average cost is $14,208 in a child care center and $10,812 in a child care home. Put another way, the average annual cost of infant center-based care in the Portland region is 128.3 percent of the cost of tuition and fees at a 4-year Oregon college.[21] Subsidized child care can encourage low-skilled parents to maintain their connection to the labor force or to upgrade their skills through education, thereby contributing to economic growth and productivity over the longer term.

Since 2010, the number of family child care homes in Oregon has declined from 11,146 to 7,598 in 2016 – a decline of 31.8 percent. In Washington, family child care home numbers have decreased from 9,180 to 7,584 in 2016 – a decline of 17.4 percent. For working families, the decline in home-based care reduces the availability of the least expensive care option for families.[22]

In addition to the growing demand for child care and an increasing scarcity of affordable facilities, greater Portland's child care system also has a significant shortage of child care workers. According to the U.S. Bureau of Labor Statistics, there are approximately 3,960 child care workers in the Portland region; a talent pool that is 27 percent smaller than the national average (LQ: 0.73).[23] Recruiting

[21] https://www.ced.org/assets/reports/childcareimpact/fact_sheets/revised/Oregon%20Fact%20Sheet%201312019.pdf
[22] Ibid
[23] U.S. Bureau of Labor Statistics Occupational Employment Statistics 2019

qualified workers for this sector is also more difficult due to low wages; the average annual salary is just $29,000 – half the average overall wage ($58,340) for the metro area.[24]

As a result of the aforementioned challenges, prior to COVID-19, the region was experiencing a demand that exceeded regional supply. Unfortunately, many child care providers closed during the mandatory shut-down to prevent the spread of the coronavirus and were prohibited or could not reopen, which will only make demand for child care services increase. Those facilities that are reopening face stringent requirements regarding ratios of children to providers, sanitizing and physical improvements (e.g. extra dishes, monitors, PPE, thermometers), and physical improvements to the facility to meet social distancing requirements. Some child care providers are making these investments to meet anticipated demand from families; however, with the increasing spike in coronavirus cases, families are ultimately not placing their children in facilities and the centers do not realize the return on investment. Additional details on the COVID-19 specific challenges for child care providers and the strategies that respond are contained in the Greater Portland Economic Recovery Plan.[25]

According to the Child Care in State Economies: 2019 Update study, and discussions with local providers, there was a decrease in home-based businesses for the following reasons.

- More qualified teachers necessitate higher wages. This results in lower net earnings from operating a home-based child care business if they are to remain affordable for low-income families.
- An aging home-based child care workforce reaching retirement age. This aging workforce is at high-risk for COVID-19 infection and even more likely to leave the child care industry.
- The cost of compliance with health and safety regulations as the federal government and states have sought to better protect the safety of children in child care (depending upon the level of deficiencies among home-based programs). These compliance regulations are even more complex to meet social distancing and sanitary requirements due to COVID-19.

Increasing the supply of child care is critical for the economy to maximize the full potential of the available workforce. More importantly, providing early learning is an important investment in communities that help ensure they can realize their human and economic potential.

K-12 SKILLS DEVELOPMENT

As outlined by the Oregon Business Council, career technical education (CTE) and science, technology, engineering, and math (STEM) education are essential for all students, regardless of their aspirations. These studies not only impart important technical skills and knowledge to succeed in a technology-based economy, they also enhance student agency, creativity, critical thinking, problem

[24] Ibid
[25] https://greaterportlandinc.com/home/greater-portland-economic-recovery-plan.html

solving, teamwork, adaptability, and habits of mind and dispositions that make for future success. Most importantly, CTE and STEM education greatly affect learners' engagement, achievement, and persistence in school. This is illustrated by results for "CTE concentrators," students who complete a CTE program of study along with their other graduation requirements. Recent data show that 87.5 percent of Oregon CTE concentrators graduate from high school in four years compared to 72 percent of Oregon students generally – a 15.5-point differential. For historically underserved CTE concentrators, the graduation rate compared to their peers is 18 to 24 percent higher.[26]

The states of Washington and Oregon are aware of this and have implemented various efforts pertaining to CTE and STEM courses as well as career pathway programs. These are all extremely important and beneficial. However, strong engagement with private traded-sector businesses is also required. Several businesses from various industries that were interviewed for the development of this strategy all stressed the importance of K-12 education to developing their workforce. Some go beyond advocating for K-12 education. For example: SEH America, located in Vancouver, WA, is one of the region's largest silicon wafer manufacturers. SEH has partnered with the Evergreen Public Schools over the last 10 years to provide STEM related work linked with learning internships in high-tech manufacturing to motivated high school juniors and seniors. Further alignment of K-12 skills development with regional industry such as this will foster a resilient economy that retains companies that can easily access and hire local highly skilled talent.

RACIAL WEALTH DISPARITY

The net worth of a typical white household is nearly ten times greater than that of a typical Black household, and eight times greater than a Hispanic household. According to a survey by the Federal Reserve in 2017, the median net worth of African-Americans ($17,600) was only a tenth that of non-Hispanic whites ($171,000).[27] Furthermore, nearly 20 percent of Black households have zero or negative net worth compared to 14 percent of households identifying as other or multiple race,[28] 13 percent of Hispanic households, and only nine percent of white households.[29]

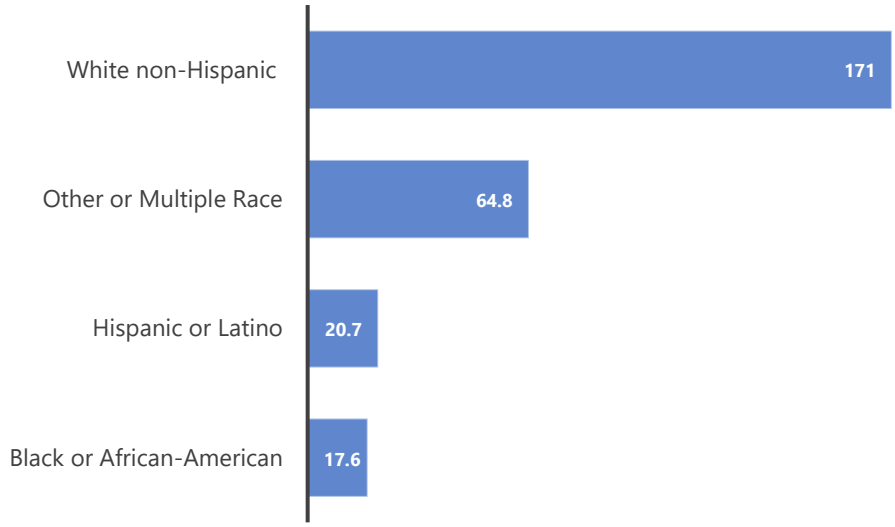
[26] Pathways to a success: A proposed CTE-STEM investment strategy, Oregon Business Council

[27] Recent Trends in Wealth-Holding by Race and Ethnicity: Evidence from the Survey of Consumer Finances, Federal Reserve, September 2017

[28] Other families--a diverse group that includes those identifying as Asian, American Indian, Alaska Native, Native Hawaiian, Pacific Islander, other race, and all respondents reporting more than one racial identification.

[29] ibid

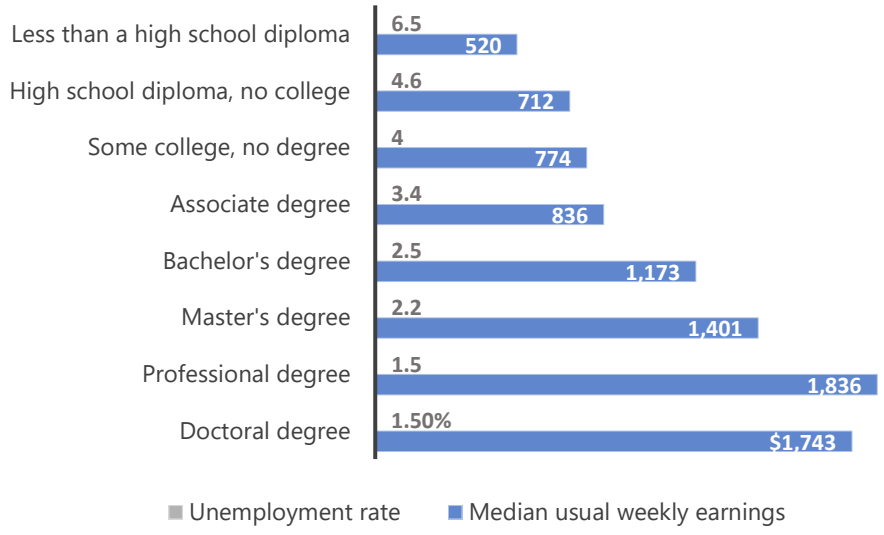
Figure 16: Family Median Net Worth, Thousands of 2016 Dollars



Source: Federal Reserve Board, Survey of Consumer Finances

Net worth, or wealth, includes income, homes, stock-market investments, businesses, and other owned assets, minus debt. As the following chart shows, higher income levels are correlated with educational attainment. However, ensuring parity in college degree attainment alone will not solve the racial disparity in the wealth gap.

Figure 17: Median Weekly Earnings and Unemployment Rate by Educational Attainment, 2017



Source: Bureau of Labor Statistics, 2017

White and Black households with the same degree do not have the same amount of wealth. There are many factors behind this disparity. For example, white college graduates are significantly more likely to receive financial support from their parents for education and for the purchase of a home—a

positive contributor to net wealth—while Black college graduates are significantly more likely to support their parents—a negative contributor to net wealth.[30]

Real estate equity and the transfer of wealth are important determinants of household wealth creation. However, generations of Black Americans have had limited access to real estate assets due to discriminatory policies throughout the 20th century including the Jim Crow era's "Black Codes" strictly limiting opportunity in many southern states, prior to Federal Housing Administration (FHA) lending restrictions,[31] and redlining. In addition, research shows that Black-owned real estate is systemically (and historically) devalued, leading to less wealth creation than the same assets for White households.[32]

Business ownership is another significant (and perhaps the most important) source of wealth creation. In the U.S., approximately 77 percent of wealth created in 2015 came from owning a private company or professional firm.[33] Research shows that business ownership is also associated with higher levels of economic mobility.[34] And yet, there are significant racial disparities in business ownership rates and business performance (i.e., revenue and profitability) that lead to even more disparities in wealth creation.

In the U.S.: "Nationally, people of color represent about 40 percent of the population, but only 20 percent of the nation's 5.6 million business owners with employees. The U.S. could have millions more businesses if women and minorities became entrepreneurs at the same rate as white men." [35] Businesses owned by people of color earn just 48 percent of the revenue of white-owned firms.[36]

Wealth disparities matter because wealth is a safety net that keeps households from being derailed by temporary setbacks and the loss of income. This safety net allows people to take career risks knowing that they have a buffer when success is not immediately achieved. Family wealth allows people (especially young adults who have recently entered the labor force) to access housing in safe neighborhoods with good schools, thereby enhancing the prospects of their own children. Wealth affords people opportunities to be entrepreneurs and inventors. And the income from wealth is taxed at much lower rates than income from work, which means that wealth begets more wealth.[37]

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[30] Tatjana Meschede, Joanna Taylor, Alexis Mann, and Thomas Shapiro, ""Family Achievements?": How a College Degree Accumulates Wealth for Whites and Not for Blacks," Federal Reserve Bank of St. Louis Review, First Quarter 2017, pp. 121-37.

[31] Rothstein, Richard. Color of Law. 2017

[32] Perry, Andre. Know Your Price: Valuing Black Lives and Property in America's Black Cities. 2020

[33] Benson, R. (2015). Wealth Creation through Business Ownership. *American Business Advisors*.

[34] Perspectives on Inequality and Opportunity from the Survey of Consumer Finances, Janet Yellen, October 2014

[35] Liu, S. & Parilla, J. "Businesses owned by women and minorities have grown. Will COVID-19 undo that?" Brookings. April 14, 2020. https://www.brookings.edu/research/businesses-owned-by-women-and-minorities-have-grown-will-covid-19-undo-that/

[36] Zeuli, K., Nijhius, A., Eberhardt, P., O'Shea, K., & Verchot, M. (2018). Helping entrepreneurs of color grow their business: Early insights from the Ascend 2020 initiative. Boston: MA, ICIC. 2015 U.S. Census Bureau Annual Survey of Entrepreneurs data for privately held firms with paid employees.

[37] Examining the Black-white wealth gap, Brookings, February 27, 2020

DISRUPTIONS

The CEDS evaluation focused on the economic trends and disruptions that are most likely to impact the region's economy going forward. The main disruptions considered include: Automation/E-commerce, Gig-Sharing Economy, Remote Work and Co-working; Natural and Economic Disasters: Climate/Pandemic/Earthquake. The following information is a summary of the memoranda produced by ECONorthwest in September 2020. (Appendix C)

Automation/Ecommerce

Automation is the substitution of tasks previously completed with human labor with machines or automated programs. The primary goal of automation is to increase productivity and lower unit costs. Automation can, and often does, complement other human labor, freeing up workers' capacity for other tasks. Current research on automation indicates that it is not likely to replace occupations entirely. In most current examples, automation either through machines, artificial intelligence, or more basic scripts of computer code replaces redundant and laborious tasks. According to a study by McKinsey, only 5 percent of occupations are susceptible to be completely automated. But, the study concludes, 30 percent of tasks can be automated in 60 percent of occupations. The study showed that, in Portland, 45 percent of tasks are vulnerable to automation.

Increased automation could have positive net benefits for the Portland region such as increased economic productivity, in the form of GDP, which allows for existing manufacturing companies to stay and grow within the region. At the same time, it will impact jobs that are traditionally routine and sometimes not desirable. Improving the skills of the workforce to work in more challenging and higher-wage jobs is critical for balancing the impacts of automation.

The emergence of e-commerce is likely to have unequal impacts on regional economies and workers. E-commerce giants like Amazon are rapidly expanding their national presence through technological innovations for consumers and massive scaled expansions of their logistics systems. The growing e-commerce sector is already impacting the traditional retail sector, and many stores are unable to compete with prices offered on e-commerce outlets. Alternatively, traditional retail stores are moving more operations to e-commerce platforms to respond to consumer preferences. These shifts will have an impact on land use patterns and, although data shows that e-commerce is still a minority of total retail spending, the sector continues to grow rapidly.

E-commerce distribution and fulfillment centers are beginning to make site location decisions in ways that are very different than traditional warehousing and distribution users. Recent development trends of distribution and fulfillment centers indicate that there is a broad size range of facilities and land demands; from small urban last-mile facilities to large regional distribution facilities. Urban and suburban infill sites are likely to play a more important role for e-commerce fulfillment centers. Oftentimes, development standards and use allowances on large format retail infill and redevelopment sites prohibit small or medium fulfillment centers due to their misalignment with the needs of modern e-commerce developments.

Gig-Sharing Economy, Remote Work and Co-working

The gig-sharing economy (also called the "sharing economy") refers to the emergence of technology platforms to either facilitate the sharing of capital assets (e.g. Airbnb enables home sharing) or the facilitation of tasks directly between workers and consumers (e.g. Taskrabbit, or Uber). Much of this work is organized through a third-party, web-based platform. However, this form of work has been taking place before the emergence of these technological platforms. The "sharing economy" can also encompass what is sometimes categorized as "informal economy" work, such as house cleaning or landscaping. The distinction between these two groups of gig-sharing economy workers ("gig-workers") is important as it informs present disparities within the economy. For example, high skilled freelance gig-workers may be able to benefit from the flexibility provided by web-based platforms. On the other side, "necessity entrepreneurs" are less likely to be able to access worker benefits and have limited opportunities for wage increases.

The emergence of remote work builds on the slow gains of telecommuting trends that started with the growth of internet related occupations in the 1990s. Remote work describes the situation where a worker conducts their work in a physical location apart from their firm's location or staff that do not co-locate in one location. As knowledge-based occupations have continued to grow in recent decades, remote work has become more and more popular for knowledge economy workers that desire to live in high quality of life areas. The trend is also beneficial for firms as they are able to access talented workers beyond the confines of their local labor pool.

Co-working refers to spaces for small businesses or entrepreneurs to meet dynamic market conditions and scale up or down more easily through providing flexible office space and amenities typically provided by a larger company. These spaces, while they began with minimalist designs intended to foster a collaborative environment, have evolved into companies themselves with an associated culture and office design. With worker preferences evolving to prefer some of the amenities offered by co-working spaces over traditional office spaces, some larger companies have sought out co-working spaces to house certain teams (e.g., R&D).

Areas in the region that have services and amenities nearby residential locations where workers can work from home and access daily needs are poised to be more competitive if remote work continues to increase. Inner-ring suburbs and regional centers with existing and planned services to meet the needs of both residents and workers could capture a higher share of mobile workers who are making residential location decisions that are more flexible or without a requirement to commute to a physical office as frequently as in the past. Co-working spaces have predominantly been located in high density employment areas as a function of market demand. Trends in increasing remote work activity could lead to a need for more dispersed co-working facilities throughout the region as workers might need scheduled meeting or office space.

Natural and Economic Disasters: Climate/Pandemic/Earthquake

Natural disasters like earthquakes and pandemics—as demonstrated by the COVID-19 pandemic—can cause a sudden stop to regional economic activities. In addition, more expansive effects of

climate change are starting to impact economies worldwide in a variety of ways. Together, these natural disasters have disparate and varying impacts that relate to the scale and type of event and the nature of the natural disaster itself.

Current economic disruptions caused by the COVID-19 pandemic demonstrate the power of a natural disaster to impact local economies. The initial shock at the onset of the COVID-19 pandemic hit the national economy harder than any event since the Great Depression and the impacts of the pandemic are far reaching. Not only have businesses and organizations needed to identify and put in place new procedures in workplaces, schools, and commercial centers but a massive and society-wide modification of behaviors (e.g., mask wearing and working remotely) has been needed to protect the health of those most vulnerable. The current pandemic also shows the interconnected nature of the economy; with a halt to most retail activity (and most conspicuously at restaurants), millions are without work.

Climate change, the human-activity induced altering of the climate on the global scale, is likely to impact economies around the world in a whole host of ways; from an increase in extreme weather events to incremental changes in the balance of local ecosystems. To fully mitigate, or more likely adapt to climate change impacts, major shifts are needed in risk management systems, architecture, healthcare, emergency response systems, finance, and much more.

Perhaps the greatest natural threat to the Greater Portland region's economy is the Cascadia Subduction Zone (CSZ) earthquake. Predicted to be as strong as 9.0 on the Richter scale, this likely calamitous earthquake is estimated to cause $4.3 billion in lost income in the first month after the initial shock of the CSZ event. The cumulative impact of business and economic disruption of a CSZ event is likely to have major impacts to the Portland's Gross Regional Product (GRP) for years after the event.

WHAT IS ECONOMIC DEVELOPMENT?

In preparing an economic development strategy, it is important to have a common understanding of terminology and desired outcomes. This section provides the foundational background that informs the implementation actions.

TRADED VS. LOCAL

Traded sector (also referred to as an export or basic sector) businesses include industries and employers which produce goods and services that are consumed outside the region where they are produced and therefore bring in new income to the area (e.g., metals and machinery, food processing). Workers in the traded sector tend to have higher educational attainment, work more hours, and earn higher average wages than local sector business.

As the traded sector increases employment and wages, it also fosters an environment that allows entrepreneurs to develop skills and resources on the job that may encourage them to start a new business and increase employment opportunities within the region. Furthermore, certain traded sector companies foster a supply chain effect that creates the need for additional companies to supply components of a product that is manufactured.

Local sector business consists of industries and firms that are likely to be present in every region. They produce goods and services that are consumed locally in the region where they were made, and therefore circulate existing income in the area (e.g., breweries, physician offices, banks). These businesses are important as they make a community distinct, depending how they are provided by local businesses, and provide amenities to attract young professionals and families that drive the new economy. A sampling of traded vs. local sector businesses in the Portland region is indicated below.

Figure 18: Example of Greater Portland Traded and Local Sector Businesses

Source: Bridge Economic Development

Table 7 highlights the average wage difference between traded sector jobs and local sector jobs across the U.S. As the job base expands, a community is more attractive to employees because there are more options for career growth. In turn, once the employment base grows, competition will occur and ultimately increase wages. Highlighting the strength of traded-sector jobs, the US employment base currently consists of 36 percent traded-sector jobs, which has 50 percent of the income.[38]

[38] US Cluster Mapping

Table 7. Annual Average Wage Comparison, USA, 2018

NAICS	Industry	US Average Annual Wage 2019
TRADED SECTOR		
55	Management of Companies and Enterprises	$126,310
51	Information	$119,605
54	Professional, Scientific and Technical Services	$100,699
31-33	Manufacturing	$69,920
42,48-49	Wholesale Trade, Transportation and Warehousing	$67,279
11	Agriculture, Forestry, Fishing	$37,212
LOCAL SECTOR		
23	Construction	$64,826
71	Arts, Entertainment, and Recreation	$40,056
44-45	Retail Trade	$33,611
72	Accommodation and Food Service	$22,491

Source: Bureau of Labor Statistics, QCEW data

Additionally, there is an interdependence or multiplier impact between traded and local sector companies. In general, adding one additional skilled job in the traded sector generates 2.5 jobs in local goods and services.[39] A strong local sector depends on a strong traded sector. And a stronger traded sector-based economy is more resilient to economic shocks like those created by COVID-19 pandemic and other natural disasters.

Local sector businesses typically have a low barrier to entry and serve as an opportunity for under-represented and under-resourced individuals to gain access into the market and build wealth. Therefore, local sector businesses are often considered an equity on-ramp opportunity. However, it is important to not entirely focus on local sector businesses as an opportunity for equity. By only using a local cluster focus in disinvested neighborhoods, a region can ultimately exacerbate income inequality as underserved and under-represented communities are not connected to higher wage employment opportunities among tradable industries. Therefore, it is important to provide equitable opportunities within traded sector industries as well. This strategy considers both traded and local sectors as part of the overall economy and how they both provide distinct contributions and opportunities for the region.

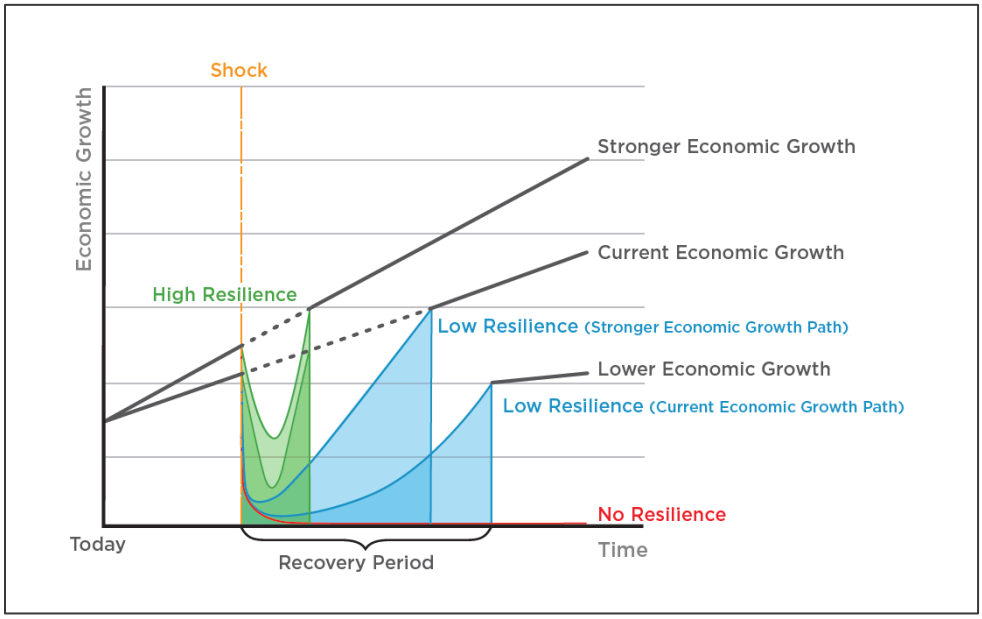
CORE PILLARS

Resilience and economic growth are both vital for healthy economies in uncertain times. A resilience plan will not grow the economy. It only ensures that a region gets back on track—to whatever economic growth trajectory they were on before the crisis—more quickly in the best of scenarios. If a local economy is resilient, the recovery period will be much shorter than an economy with little or no resilience. If a local economy is not resilient, it may never return to its former economic growth path.

[39] Local Multipliers, Enrico Moretti, May 2010

History is littered with stories of company towns and cities defined by a single industry that are decimated after major economic shocks. Mill towns in New England, followed by mill towns in the South. The so-called Rust Belt Region. Detroit. Once their primary industries (and largest employers) moved or faltered, the economic foundation of these once thriving areas crumbled. Places that recovered from the last recession included cities with high educational attainment, a diverse and adaptable workforce, attainable housing prices and rents, ongoing capital investment indicating the availability of significant public resources, and those that are not dependent on the cyclical nature of a single industry. As an example, despite being in a state with a high dependency on the oil and gas industry, Dallas and Austin fared better than Houston after the last recession due to more diversified economies.[40]

Figure 19: Impact of Resilience on Economic Growth



Source: Feeding Cities Group and Bridge Economic Development

Resilient regions invest equally in addressing chronic stressors associated with economic inequality, which plagues all of our communities: poverty, limited education attainment, unemployment, health disparities, racial biases, etc. As the current pandemic is showing, disasters disproportionately impact our most vulnerable populations. Regions will need to address those left behind before they can jump forward. Based on this understanding, the strategy is built upon the following strategy elements:

Strong Economic Growth- A regional economy with increases to GDP that outpace its peers by advancing global connections, embracing emerging technologies, and adapting more effectively through investments in a highly skilled, entrepreneurial labor, and scalable firms.

Equity – An economic system that ensures under-represented and under-served people have the same level of access to the economy and wealth creation as all other residents.

[40] https://stedc.atavist.com/best-recession-recovered-cities

Resilience – An enhanced capacity of individuals, communities, institutions, businesses, and systems to survive, adapt, and grow, no matter what kinds of chronic stresses and acute shocks they experience.[41]

INDUSTRY OVERVIEW

In developing an economic development strategy, it is critical to build upon a foundation of industry strength. In doing so, investments will leverage existing economic momentum, and provide new businesses opportunities for sustainable development within a viable industry. Furthermore, employees will benefit from working within an industry with career mobility and growth opportunities.

INDUSTRY CLUSTERS

An industry cluster is a geographic concentration of related industries in a particular location. Clusters are a foundational element to regional economies, making them uniquely competitive for jobs and private investment. They consist of companies, suppliers, and service providers, as well as government agencies and other institutions that provide specialized training and education, information, research, and technical support.[42] Various regions across the U.S. have unique clusters making them distinct: Boston, MA has biotech whereas Spartanburg, SC has textiles. Industry clusters function on a regional metropolitan statistical area (MSA) level because assets such as workforce and transportation infrastructure are not constrained by local municipal boundaries. Therefore, in order to effectively grow an industry cluster, it is important to leverage existing assets and collaborate on a regional and state level.

The greater Portland region is fortunate to have an economy that is grounded on several diverse and strong industries. Standard economic development practice utilizes a location quotient (LQ) as a way of discovering the traded-sector industries or occupations that are truly unique and specialized in a regional economy (compared to the national average). LQ is calculated by comparing an industry's or an occupation's share of regional employment with its share of national employment. Any LQ higher than 1.20 is considered significant. The industries shown in Table 8 have an LQ over 1.40. Given the region's desire to build a more equitable and resilient economy, they are then evaluated quantitatively for level of equity and resilience (detailed data analysis provided as Appendix B). The quantitative scores below are a summation of more than 30 metrics; a lower score represents a more high-performing cluster across the pillars of economic growth, equity and resiliency. The various attributes of each cluster are outlined below and additional information is contained in the appendices on what each summary ranks score includes.

[41] 100 Resilient Cities

[42] Porter, Michael. Clusters and the New Economics of Competition. Harvard Business Review. November-December 1998 Issue

Table 8: Portland Metro Industry Clusters

	Economic Growth Score (Rank Summary)		Equity Score (Rank Summary)		Resilience Score (Rank Summary)		Overall Score Summary
Computer and Electronics	12		23		48		**83**
Software	25		34		53		**112**
Apparel and Outdoor	30		22		67		**119**
Metals	28		31		61		**120**
Food and Beverage	30		22		73		**125**
Clean Tech	38		31		60		**129**
Design and Media	33		33		66		**132**

Source: Bridge Economic Development

Conventional economic development strategies simply select the industries with the strongest LQ to focus actions. In evaluating Equity and Resilience, there is a more detailed understanding of the barriers and opportunities facing each industry – some of which apply to several industries and some of which are specific to vital growth sectors in the region. Therefore, this strategy will not identify a few industry clusters for focused actions. Instead, recognizing that several different clusters inter-relate, the strategy identifies actions that will involve and address the needs across different industries. For example, business leaders from Computer and Electronics, Apparel and Outdoor and Software identified the critical importance of improving the culture of the Portland region to make it more open and welcoming to diverse people. Therefore, the strategy implementation should focus on improving diversity for the sake of all industries, not just one. Other examples of cross-sector investments include efforts to scale up small businesses, support entrepreneurs, enhance existing infrastructure and shared assets between industries, and foster new technological innovations.

Additionally, in developing the actions, it is important to recognize that clusters are not just tied to the regional economy, but also to the regional identity. Industry clusters such as Athletic and Outdoor (Nike and Columbia), Food and Beverage (Bob's Red Mill and Smith Tea), and Design and Media (stop-motion filming and international architects) help define the Portland region's brand, ethos, and authentic reputation. Alignment of these assets for marketing toward FDI and talent attraction would be an opportunity to leverage several clusters and rather than focusing on just a few with strong LQs.

INNOVATION ECOSYSTEM

The job of economic development professionals is not to pick which idea or technology may succeed, but to create a fertile ground where innovation will thrive locally and become a pipeline to the region's next emerging sector. A recent Brookings report "The Case for Growth Centers: How to spread tech innovation across America" outlines the critical imbalance of the growing innovation

economic sector across the United States.[43] It outlines the importance of targeted policies to foster innovation in a few U.S. metropolitan areas that are poised to benefit from investing in the nation's highest-tech, highest-R&D "advanced" industries.[44] Greater Portland is one of those few regions poised for such investment. Recommended policies include a comprehensive mix of research funding, targeted investment tax credits, development of highly skilled STEM workers (through STEM education/training and visa preferences), federal regulatory exemptions and business financing, and land and infrastructure supports for visionary, pro-innovation placemaking.

SMALL BUSINESS FORMATION

Small businesses fall under several categories and sizes, as indicated in Table 9. In developing tactical actions to support small business growth, it is important to recognize that small businesses are not uniform and those in different size categories face different challenges in accessing financing and technical support, and not all small businesses are positioned to scale.

Table 9: Small Business Categories

Small Business Type	General Sector	Example Business	Capital Source	Size Employees	Ability to Scale
Self-employed/Gig Microenterprise	Local	Neighborhood services: food, health, construction and maintenance	$50,000 or less non-traditional bank/CDFI	0-10	Low - Medium
Main Street	Local	Restaurant, retail	$250,000 traditional bank or CDFI	1-10	Low
Entrepreneur/Startup	Traded	IT, clean tech, bioscience	Above $250,000 venture capital (VC)	0 - 50	High
Growth-oriented	Local	Construction, real estate, health care	Above $500,000 traditional bank	10 – 499	Medium-High
Growth-oriented	Traded	Manufacturing, design, IT	Above $500,000 traditional bank	10 – 499	Medium-High

Source: Bridge Economic Development

A slowdown in business formation may threaten what likely has been a significant source of economic opportunity for many families below the very top in income and wealth.[45] Small businesses are also

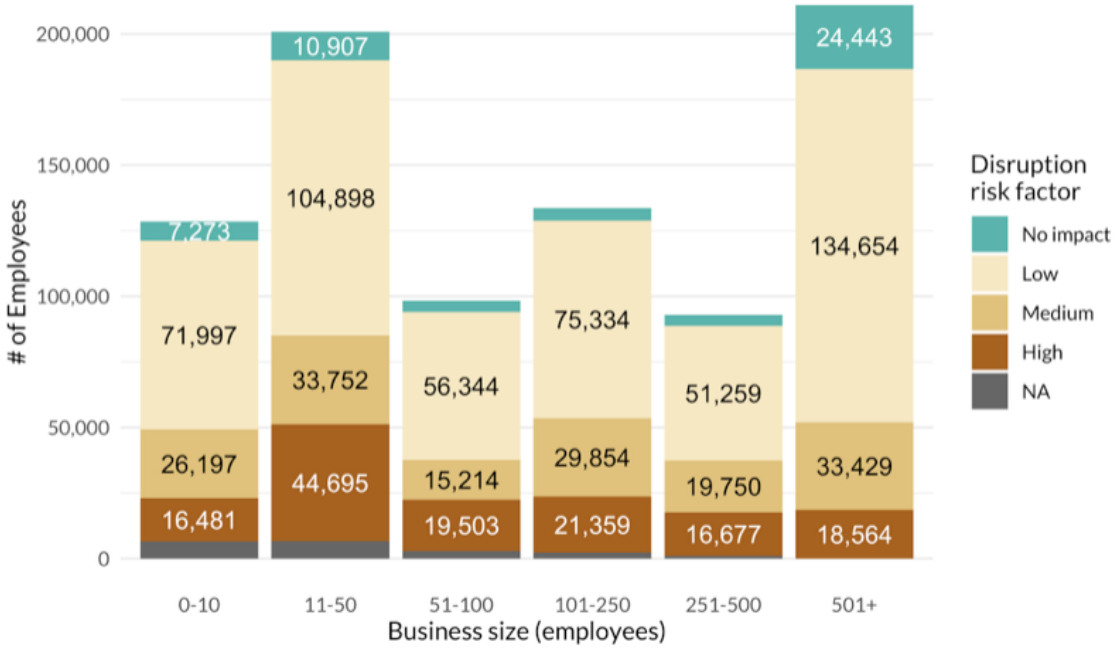
[43] https://www.brookings.edu/research/growth-centers-how-to-spread-tech-innovation-across-america/

[44] Of the 13 industries listed, the following are represented in the Greater Portland industry clusters: computer and peripheral equipment manufacturing, communications equipment manufacturing, semiconductor and other electronic components manufacturing, navigational, measuring, electromedical, and control instruments manufacturing, aerospace product and parts manufacturing, software publishers.

[45] Perspectives on Inequality and Opportunity from the Survey of Consumer Finances, Janet Yellen, October 2014

important drivers of employment opportunities across the region. As indicated in the following figure, small businesses with 11-50 employees are second only to large corporations (501+ employees) in terms of employment share (23 percent and 24 percent respectively). Additionally, the segment of small businesses with 11-50 employees are most likely to scale, driving future growth. Yet, these same businesses face the greatest risk of disruption. The recovery plan revealed the importance of all small businesses, but specific interventions have been needed to stabilize and reopen businesses with 11-50 employees as they are particularly vulnerable to disruption.

Figure 20: Disruption Risk by Business Size, Portland Metro Tri-county area



Source: QCEW, ECONorthwest Analysis

As identified by Teconomy Partners, LLC, it is important to note that, while most entrepreneurs start by forming small businesses, not all small businesses are entrepreneurial. Small business owners develop companies to generate wealth and provide employment and income for themselves and others; entrepreneurs are interested in creating innovative products or services that lead to further investment and growth. Understanding the different motivations and needed support services for these two types of businesses is important in developing the strategy and actions.

SWOT

As part of the strategy development process, a series of workshops was facilitated by Slalom in February 2020. Participation included economic development practitioners, workforce, higher education, and local government. Information from the workshops was supplemented by additional information from businesses and service providers. The consistent themes regarding the Greater Portland region's strengths, weaknesses, opportunities and threats (SWOT) are summarized and updated to include additional partner input in Table 10.

Table 10: Strengths, Weaknesses, Opportunities and Threats in the Portland Metro Tri-county area

	HELPFUL	HARMFUL
	Strengths	**W**eaknesses
Internal to Region	• Geographic intersection of trade corridors: river, roads, rails • Strong quality of service at PDX International Airport and export infrastructure • Utilities - abundant clean water, low-cost non-carbon generating power • Quality of Life – access to outdoors, affordable on West Coast • Proximity to trade markets in Asia • Global leaders in key industry clusters • Culture of entrepreneurship and innovation • In-migration of talent • Brand of people (authentic, quirky, innovative) • Land management policy that seeks to balance social, environmental, and economic values • Bi-state cooperation and regional collaboration • A number of higher education institutions including WSU-Vancouver and Portland State University	• Limited diversity and inclusion of BIPOC individuals • Limited pathways to prosperity and limited access to quality early skills development • Supply vs demand issues with workforce and education • Aging transportation infrastructure (I-5 bridge structural resilience) and multi-modal system • Limited vacant, development-ready land • Homelessness and housing affordability • Weak small business growth and scaling • Limited VC funding, R&D resources • Limited capital to invest in new businesses • Loss of corporate headquarters over last few decades • Over-reliance on a few enterprise companies • State tax bases insufficient to support investment • The region's comparatively large hospitality and tourism sector is particularly vulnerable to economic trends and disruptions.
	Opportunities	**T**hreats
External to Region	• Cost of living in other markets makes Portland a considered region for office expansion • Remote work opportunities expand talent attraction • Knowledge-based economy demands creative and STEM based workforce – jobs that can't be easily automated • Leverage competitive advantage in footwear/apparel industry and advance new technology industry • Strategic trade infrastructure, global connections • Emerging startups and makers culture can be leveraged to support future industry innovations • Active specialty food and beverage product entrepreneurs and diverse and innovative business ventures in the food industry	• COVID-19 pandemic and resulting recession • E-commerce impact on retail • Remote work implications for talent and real estate • Vulnerability to natural disaster (climate/wildfires and Cascadia earthquake event) • Racial wealth disparity and inequity • K-12 education system provides uneven skills and education development • Lack of available and quality child care • Declining federal funding and resources to support infrastructure • Job replacement (disruption from automation, AI, emerging tech) • Manufacturing supply chain shifting to Asia • Increasing political polarization • US protectionist trade policy • Inconsistent tax and regulatory landscape

KEY FINDINGS AND CONCLUSION

The above information and feedback from industry cluster business leaders was distilled into the following key findings that are considered to be the most important factors facing the region by GPEDD. These key findings shape the ultimate Strategy, which is provided as separate stand-alone document.

Talent Pipeline

- Need to engage K-12 for early skills development and opportunity
- Black, Indigenous, people of color (BIPOC) individuals are not realizing economic mobility
- Diverse talent is the future economy
- Rise of remote work will have equity implications

Equitable Access to Industry Clusters

- Some traded sectors offer greater access to diverse individuals than others
- Fabricators (metals, food & beverage) need automation equipment, while skilling-up workforce, to remain competitive and stay in region
- Industries least likely to automate have higher education requirements and are less diverse

Innovation

- Regional innovation strength largely driven by computer and electronics, but should leverage competitive advantage in footwear and apparel
- Computer and electronics industry supply chain is increasingly solidifying its presence in Asia
- Region faces weak small business growth and scaling
- Ecommerce impact on retail can be an opportunity for businesses to diversify market
- Small businesses are emerging in response to pandemic impacts out of necessity

Infrastructure/Environment

- Affordable infrastructure (e.g. digital access, affordable housing) is needed to build workforce skills
- Climate change must be addressed
- Earthquake impacts on infrastructure will be significant
- Export ecosystem relies heavily on trucks and roads
- Regional site selection data shows that the average site needed for a new building is approximately 17 acres

APPENDIX A

Portland Metro CEDS

BRIDGE
ECONOMIC DEVELOPMENT

Benchmarking Profile

April 2020

The benchmarking profile compared Portland to 13 peer regions across 6 indicators of growth and resilience

Peer Regions

- Atlanta
- Austin
- Denver
- Las Vegas
- Minneapolis
- Nashville
- Phoenix
- Pittsburgh
- Salt Lake City
- San Diego
- San Francisco
- San Jose
- Seattle

Indicators

- People + Diversity
- Vitality
- Innovation
- Talent
- Equity
- Quality of Place

Benchmarking Profile

Evaluates Portland's competitiveness (economic growth) and resilience within the context of peer regions

Overall Scorecard

Indicator	Why Measure	Portland Rank /13 Total Peers*
People + Diversity	• Examines a region's demographic diversity, which creates stronger innovation and global linkages, and creates more resilience and adaptability	**7**
Vitality	• Assesses the health of the traded-sector economy, which is the primary foundation for a strong regional economy and indicator for economic growth and resilience	**8**
Innovation	• Evaluates strength of the regional ecosystem to produce new ideas and companies	**10**
Talent	• Measures the quality and type of existing workforce in a region, which is an important factor for business retention and growth	**7**
Equity	• Evaluates who is benefitting from growth within a region	**8**
Quality of Place	• Evaluates quality of place, which is an important factor in attracting and retaining talent, population growth and resilience, and attracting new business and investment	**5**

Note: An average rank of all indicator

Good | Caution | Poor

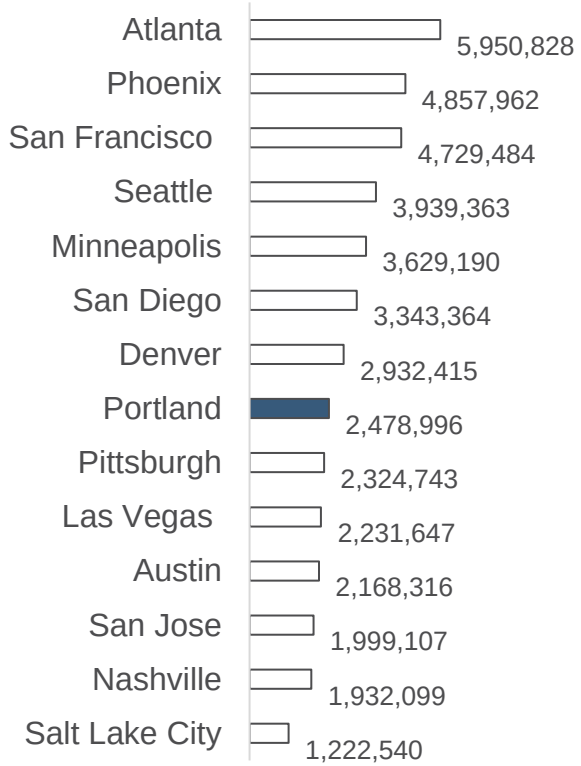
People + Diversity

Examines a region's demographic diversity, which creates stronger innovation and global linkages, and creates more resilience and adaptability

Approximately 2.5 million residents live in the Portland metro – up 7% over 2013 and ranking 9th among peers

Population 2018

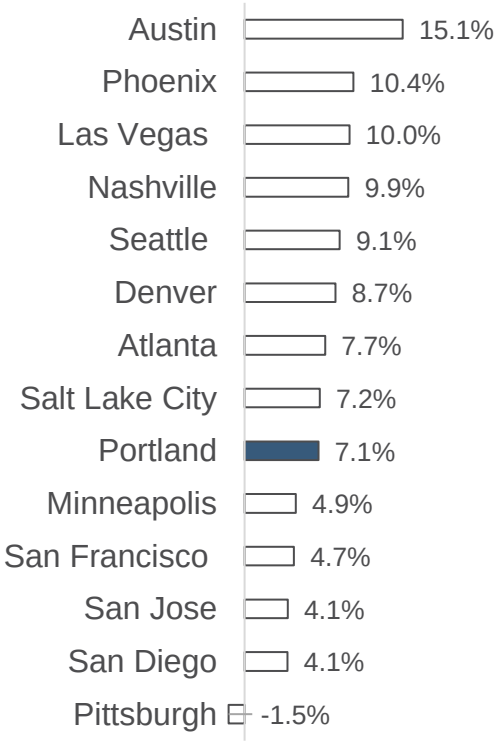
Measures size of the population, which compared to other regions can show relative growth



Source: U.S. Census American Community Survey

5-Year Growth: Population 2013-2018

A growing population can sustain company growth

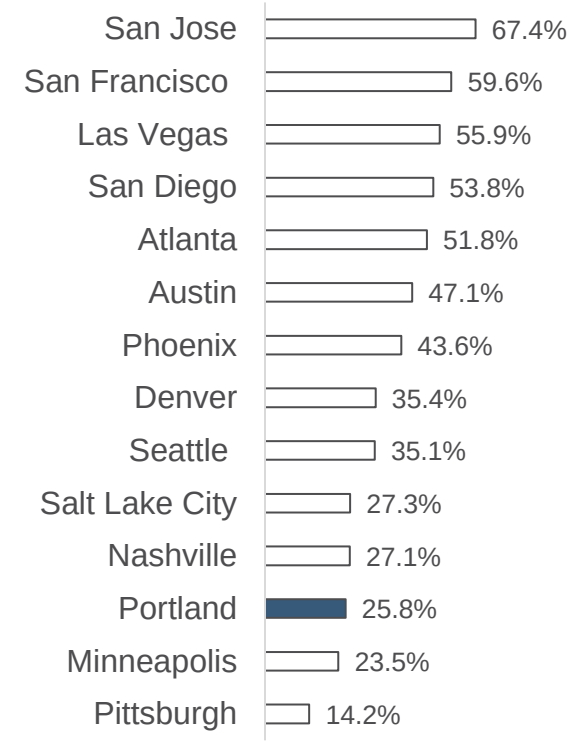


Source: U.S. Census American Community Survey

1 in 4 residents in Portland are people of color ranking near the bottom of the peer regions

People of Color(Share of Residents) 2018

Share of minority residents in a region, an indicator of diversity

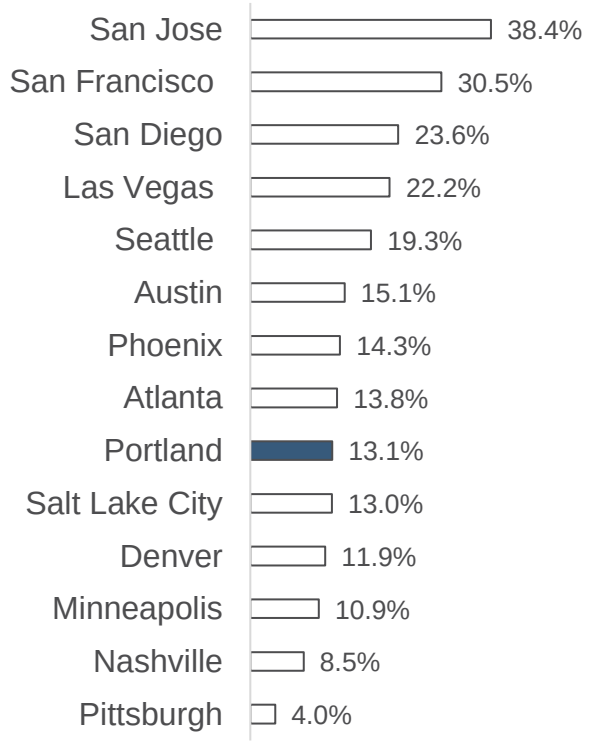


Source: U.S. Census American Community Survey

Just 13% of Portland's residents are foreign-born, ranking 9th among peers

Foreign-Born Population (Share of Residents) 2018

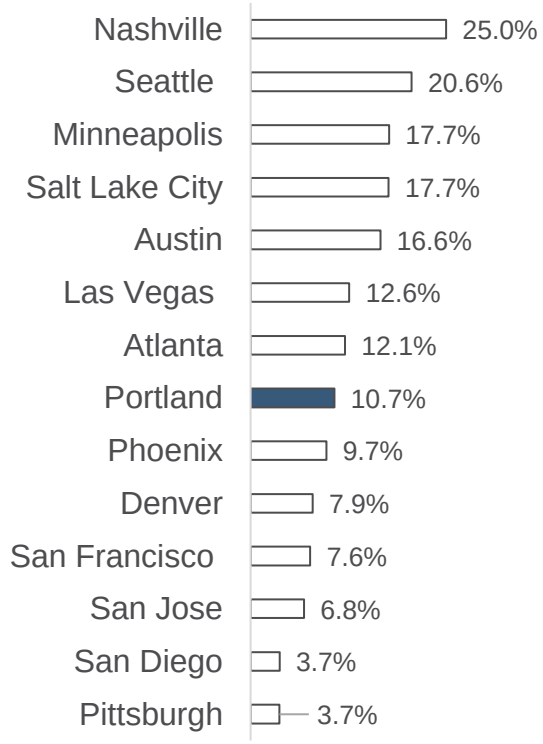
Represents the share of international residents



Source: U.S. Census American Community Survey

5-Year Growth: Foreign-Born 2013-2018

A growing international population indicates global linkages and diverse ideas for innovation

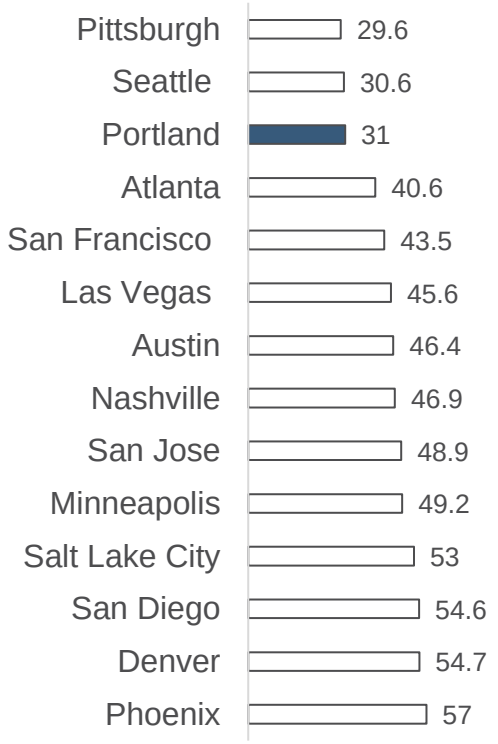


Source: U.S. Census American Community Survey

Portland scores well on both dissimilarity indexes, representing a fairly well-integrated community

Hispanic-White Dissimilarity Index 2018

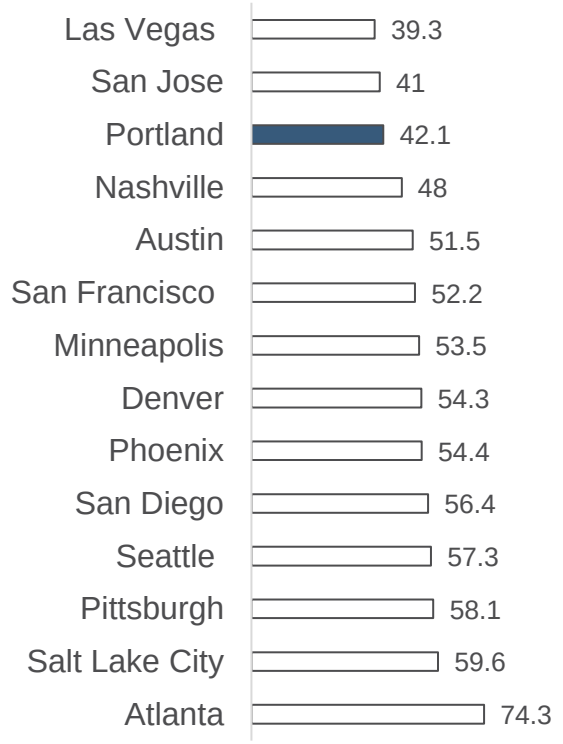
Measures the relative separation or integration of Hispanic-White residents across all neighborhoods



Source: Federal Reserve of Chicago

Black-White Dissimilarity Index 2018

Measures the relative separation or integration of Black-White residents across all neighborhoods



Source: Federal Reserve of Chicago

People + Diversity

Examines a region's demographic diversity, which creates stronger innovation and global linkages, and creates more resilience and adaptability

Scorecard

Metric	Strong Growth	Resilience	Why Measure	Portland Rank /14 Total Peers
Population Size	X		• Measures size of the population, which compared to other regions can show relative growth	**8**
Population Growth	X		• A growing population can sustain company growth	**9**
Minority Population	X	X	• Represents a diverse population	**12**
Foreign-born Residents	X	X	• Indicates global linkages and diverse ideas for innovation	**9**
Hispanic-white Dissimilarity	X	X	• Measures the relative separation or integration of Hispanic-White residents across all neighborhoods. If high, this suggests a segregated population, which limits growth and resilience	**3**
Black-white Dissimilarity	X	X	• Measures the relative separation or integration of Black-White residents across all neighborhoods. If high, this suggests a segregated population, which limits growth and resilience	**3**

Good | Caution | Poor

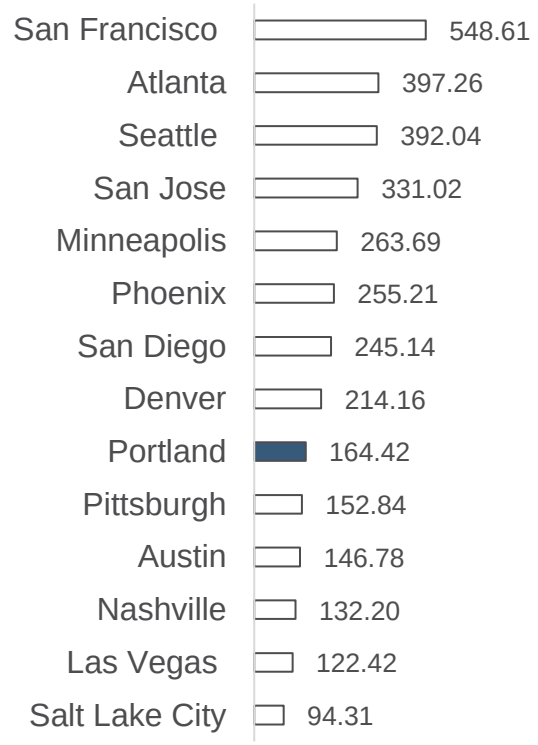
Vitality

Assesses the health of the traded-sector economy, which is the primary foundation for a strong regional economy and indicator for economic growth and resilience

From 2013-2018, Portland's gross regional product expanded by one-third

Gross Regional Product (GRP) (Billions), 2018

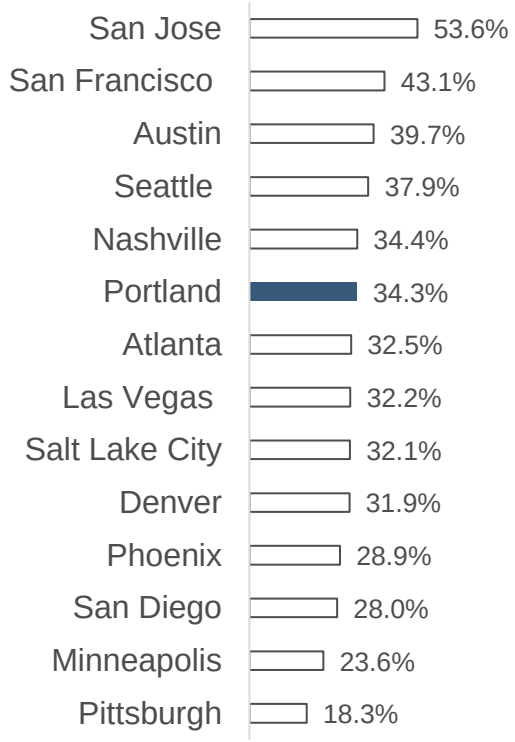
Measures size of the economy, which can be used to show relative size as indicator of growth potential



Source: Bureau of Economic Analysis

5-Year Growth: Gross Regional Product 2013-2018

Determines if the GDP is growing over time

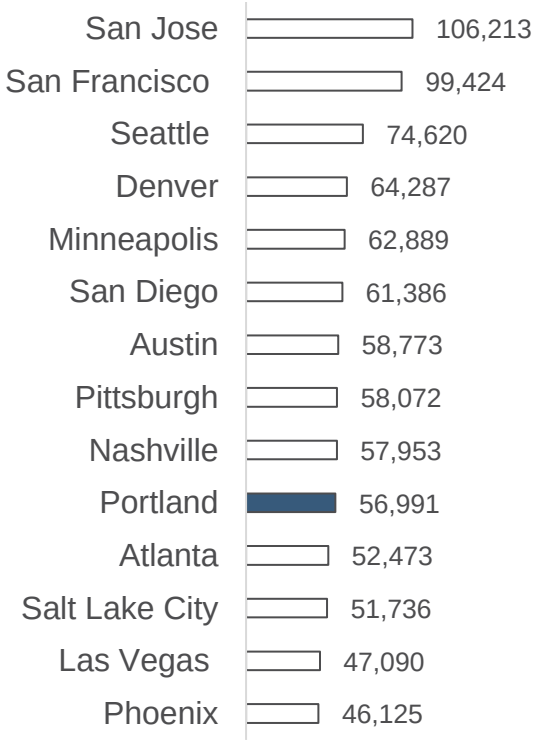


Source: Bureau of Economic Analysis

Portland's GRP per capita is just nearly half that of San Jose and San Francisco, but ranks 4th for growth

GRP Per Capita 2018

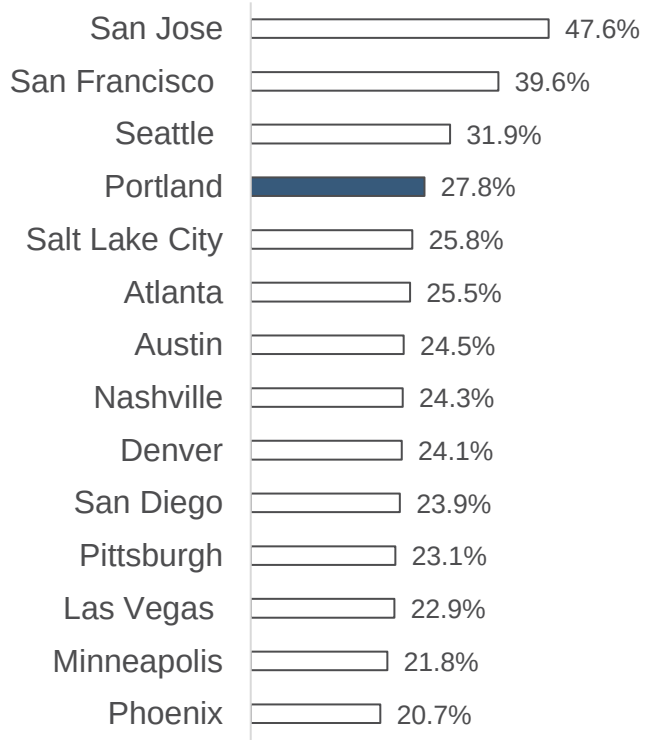
Relative strength of GDP based on size of population, which can be used to show relative size as indicator of growth potential



Source: Bureau of Economic Analysis

5-Year Growth: GRP Per Capita 2013-2018

Determines if the GDP per capital is growing over time

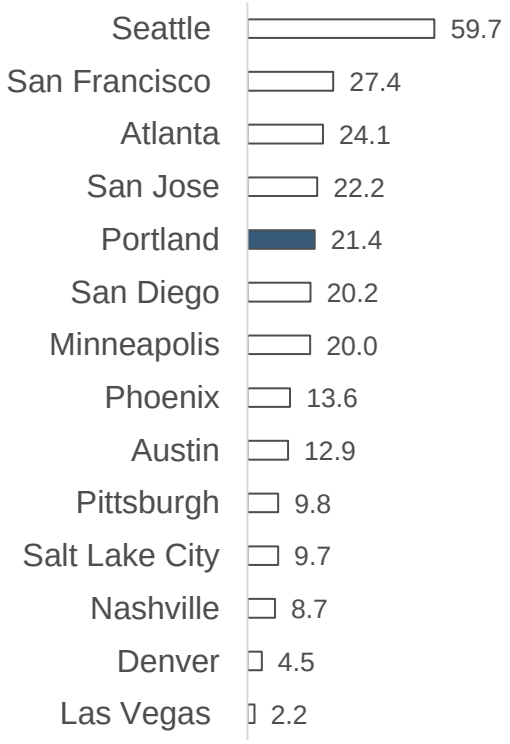


Source: Bureau of Economic Analysis

Portland exported 21.4 billion tons of exports – up 22% over 2013 and ranking 4th in growth

Total Exports (Billions) 2018

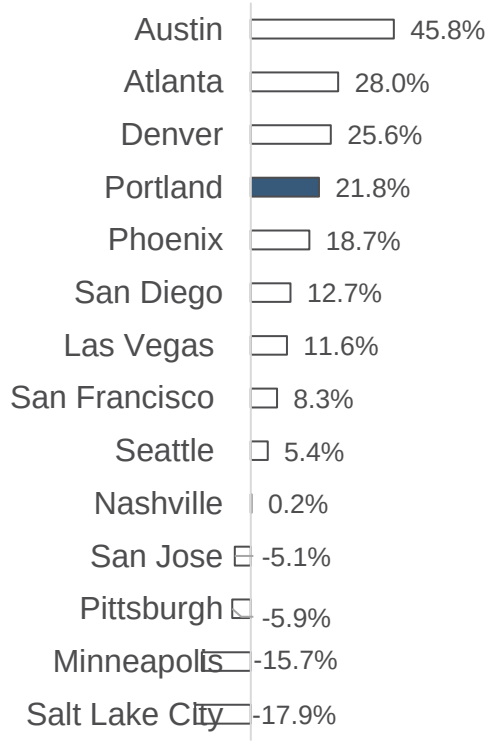
Demonstrates share of total exports the region is moving and producing



Source: International Trade Administration

5-Year Growth: Total Exports (Billions) 2013-2018

Determines if regional exports are growing or contracting

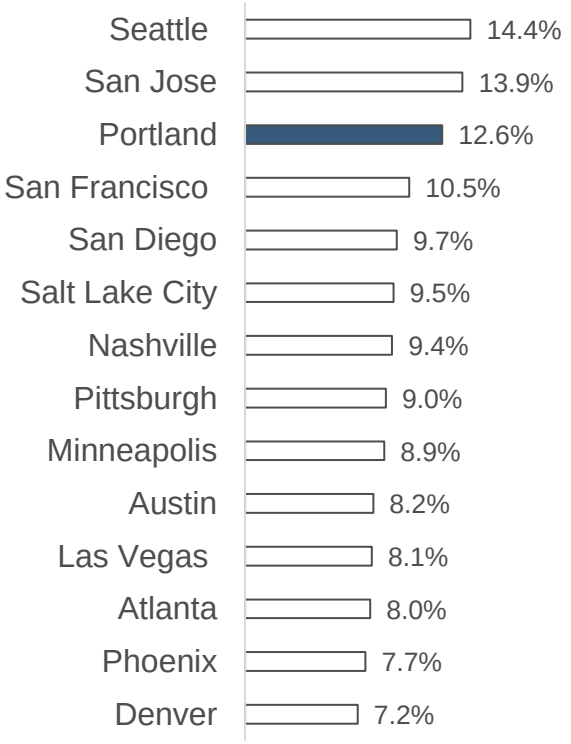


Source: International Trade Administration

Thirteen percent of Portland's GRP is driven by exports, ranking 3rd among peers

Export Share of Gross Regional 2018

GDP includes factors such as consumption. Isolating the share of exports that drives the economy is an indicator of growth potential

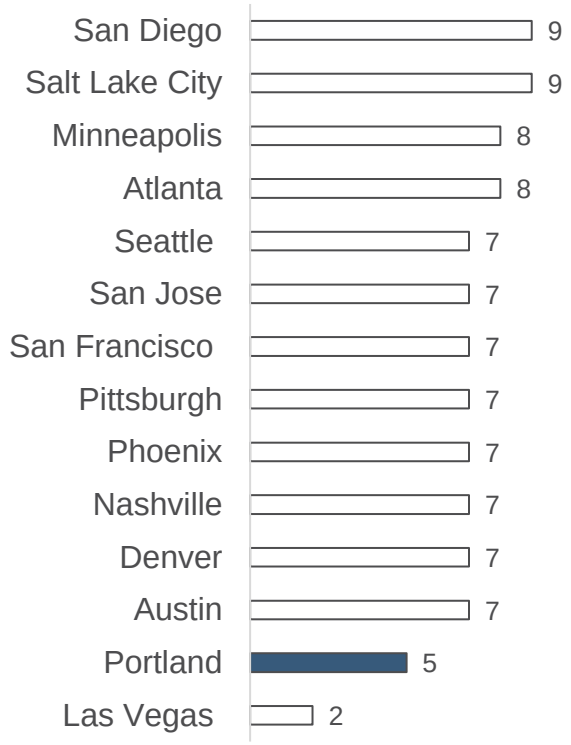


Source: International Trade Administration

Portland has 5 strong traded-sector clusters, according to the U.S. Cluster Mapping Project

Number of Strong Traded Sector Clusters 2018

The greater the number of strong, traded clusters indicates economic growth potential and resilience

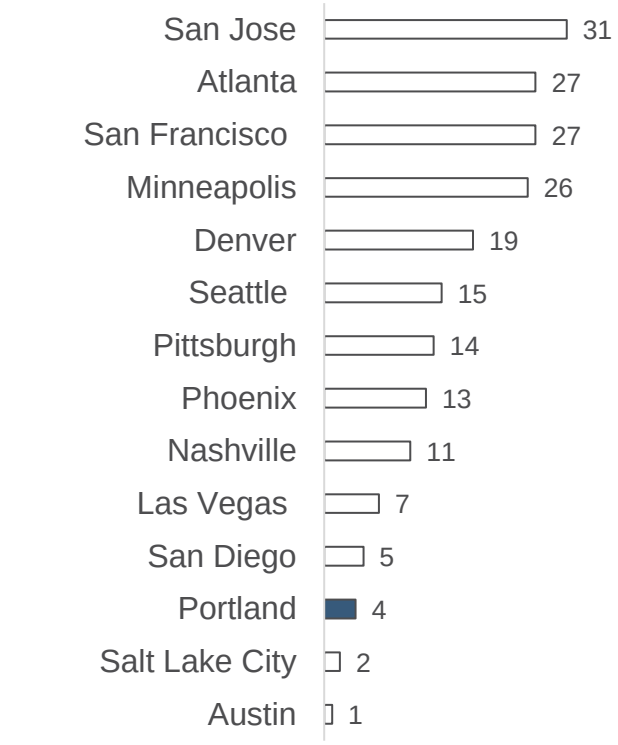


Source: U.S. Cluster Mapping Project

Portland has 4 Fortune 1000 companies, ranking 12th among peers and just above Salt Lake City and Austin

Number of Fortune 1000 Companies 2018

The greater the number of larger anchor companies indicates economic resilience

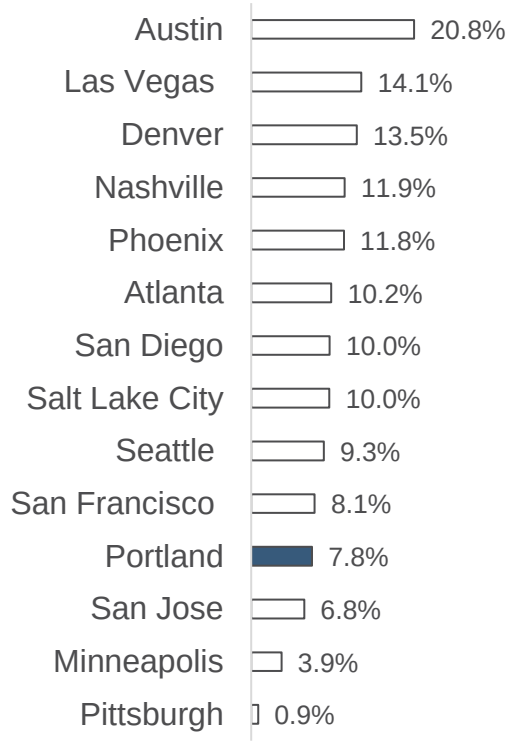


Source: Fortune 1000

In 2017, approximately 70,200 businesses operated in Portland – an 8% increase over 2012

5 Year Growth: Business Establishments 2012-2017

Growth suggests region is retaining and supporting the growth of its businesses



Source: U.S. Census County Business Patterns

Vitality

Assess the health of the traded-sector economy, which is the primary foundation for a strong regional economy and indicator for economic growth and resilience

Scorecard

Metric	Strong Growth	Resilience	Why Measure	Portland Rank /14 Total Peers
Total Gross Domestic Product	X		• Measures size of the economy, which can be used to show relative size as indicator of growth potential	**9**
GDP Growth	X		• Determines if the GDP is growing over time	**6**
GDP Per Capita	X		• Relative strength of GDP based on size of population	**10**
Export Growth	X	X	• Demonstrates growth in products/ services the region is selling to other markets	**4**
Exports Share of GDP	X	X	• GDP includes factors such as consumption. Isolating the share of exports that drives the economy is an indicator of growth potential.	**3**
Number of Traded Clusters	X	X	• The greater the number of strong, traded clusters indicates economic growth potential and resilience	**13**
Fortune 100 HQs	X	X	• The mix of small and large businesses are important to the resilience for a region.	**12**
Business Establishment Growth	X	X	• Growth suggests region is retaining and supporting the growth of its competitive industries	**11**

Good | Caution | Poor

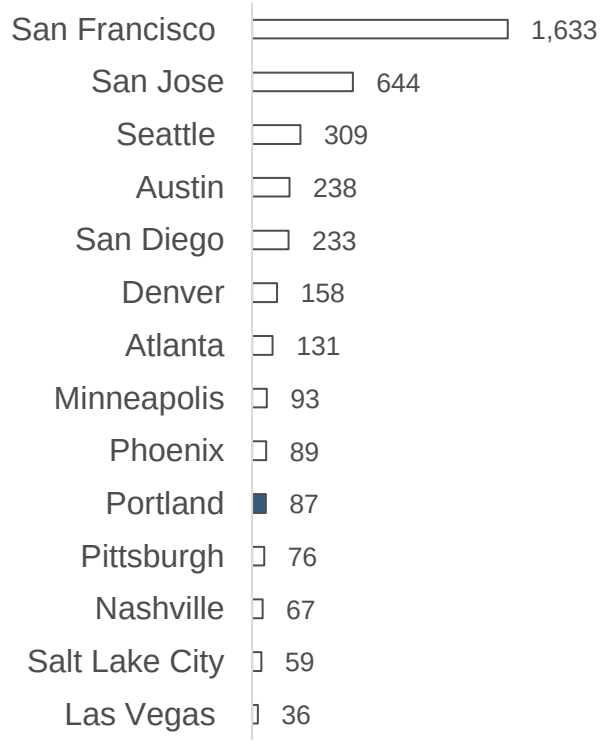
Innovation

Evaluates strength of the regional ecosystem to produce new ideas and companies

The Portland metro sees approximately 87 venture capital deals annually, ranks 39th in the world

Average Annual Venture Capital (VC) Deals 2015-2018

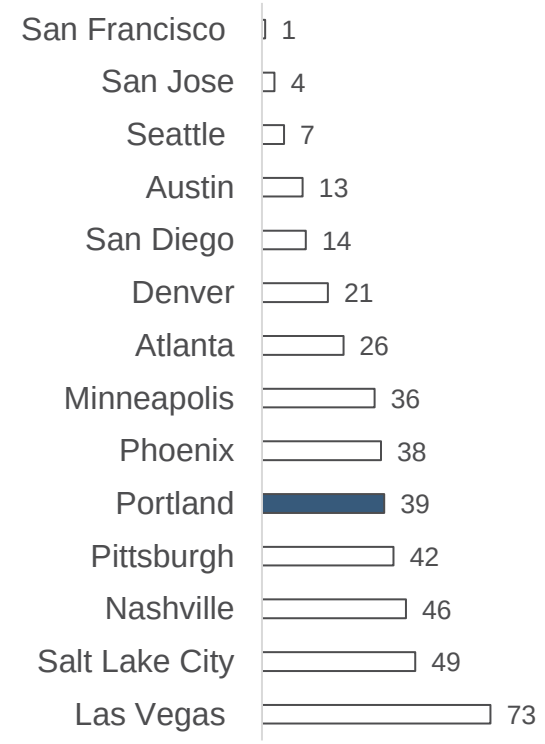
Determines number of companies that will potential scale their level of growth



Source: Pitchbook

World Rank: Average Annual VC Deals 2015-2018

Provides global context for a region's number of annual VC deals

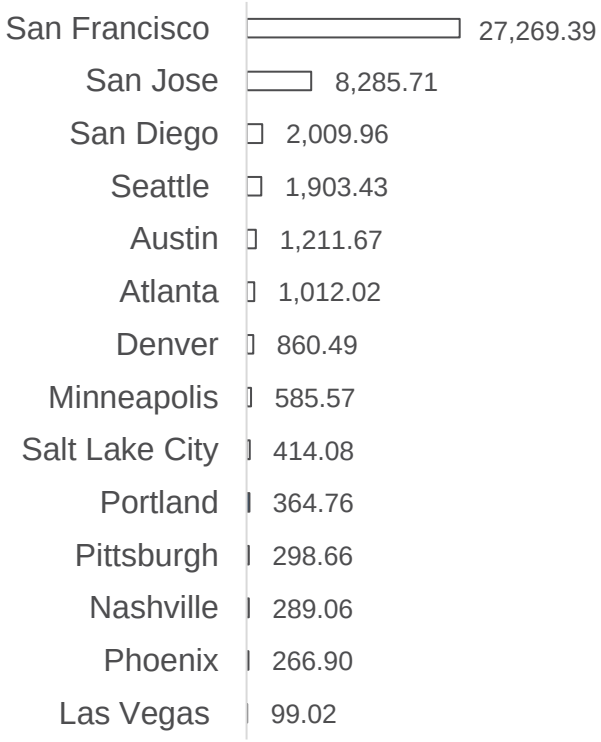


Source: Pitchbook

Portland startups receive approximately $365 million in venture capital, ranking 55th in the world

Average Annual Venture Capital (VC) (Millions) 2015-2018

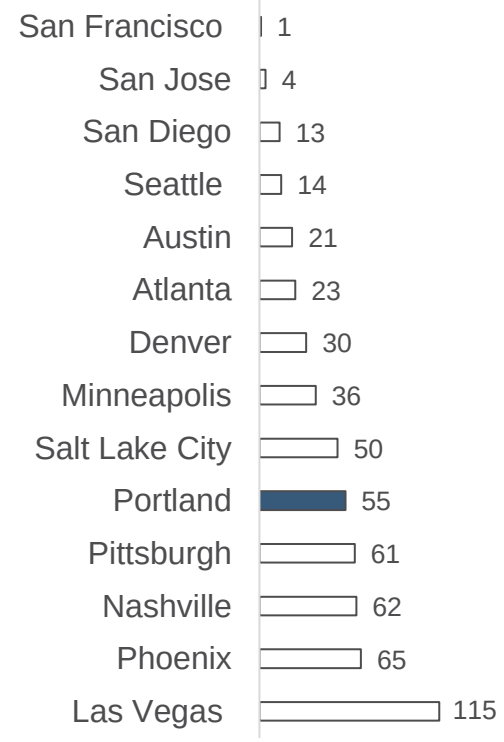
Determines number of companies that will potential scale their level of growth



Source: Pitchbook

World Rank: Average Annual VC 2012-2017

Provides global context for a region's number of annual VC dollars

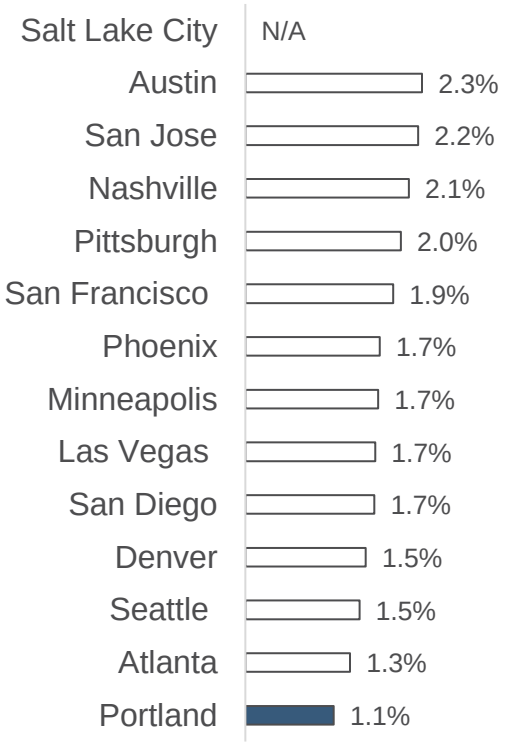


Source: Pitchbook

Just 1% of Portland's small businesses scale to medium size enterprises after 10 years – ranking last

Kaufman: Share of Scaleups 2017

Prevalence of companies that start small and become medium-sized businesses or larger by their tenth year of operation

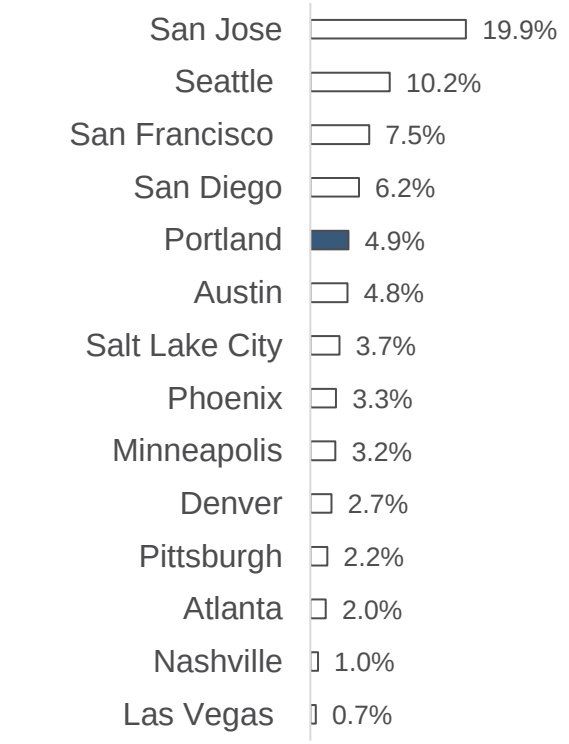


Source: Kauffman Foundation

Innovation industries account for 5% of employment in Portland – ranking 4th among peers

Innovation Industries (Share of Employment) 2018

Measuring the share of regional workers part of innovation sectors



Source: Brookings Institution

Among its peers, Portland is the only metro with no main campus presence for a tier-I university

Presence of Tier I Research Institution 2020

Main campus presence of tier 1 research institution – a catalyst for innovation and R&D

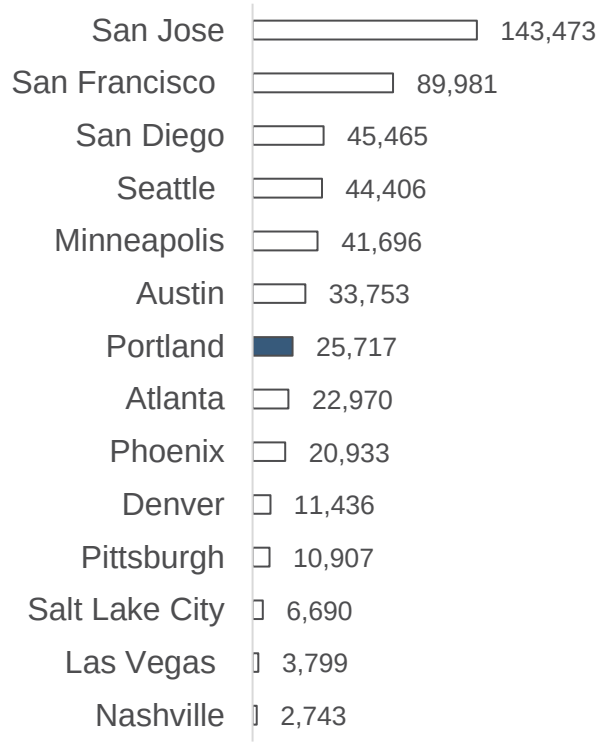
	Tier 1 Research University Main Campus
Atlanta	Yes
Austin	Yes
Denver	Yes
Las Vegas	Yes
Minneapolis	Yes
Nashville	Yes
Phoenix	Yes
Pittsburgh	Yes
Portland	**No**
Salt Lake City	Yes
San Diego	Yes
San Francisco	Yes
San Jose	Yes
Seattle	Yes

Source: Kauffman Foundation

Portland accounts for 1.6% of all U.S. patents – nearly 26,000 from 2000-2015

Total Patents 2000-2015

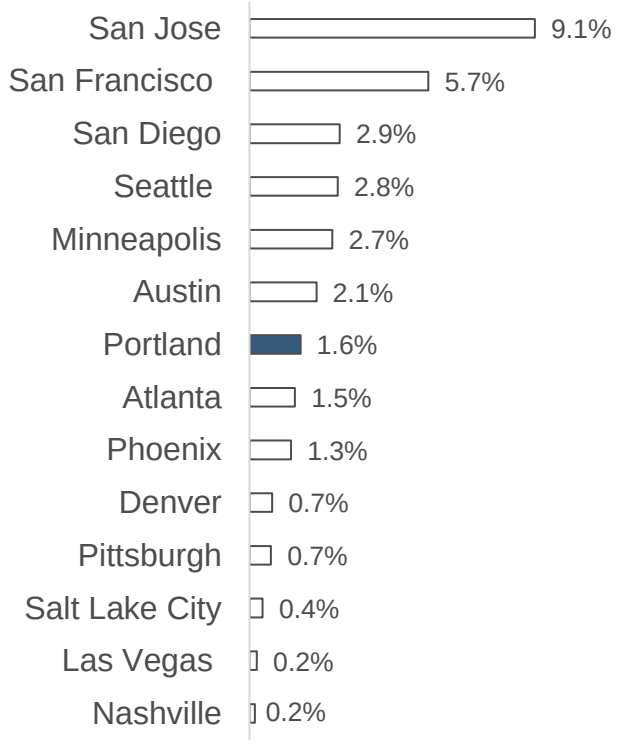
Key indicator of R&D and innovation output



Source: USPTO

Share of Total U.S. Patents 2012-2017

Determines regional share of U.S. innovation

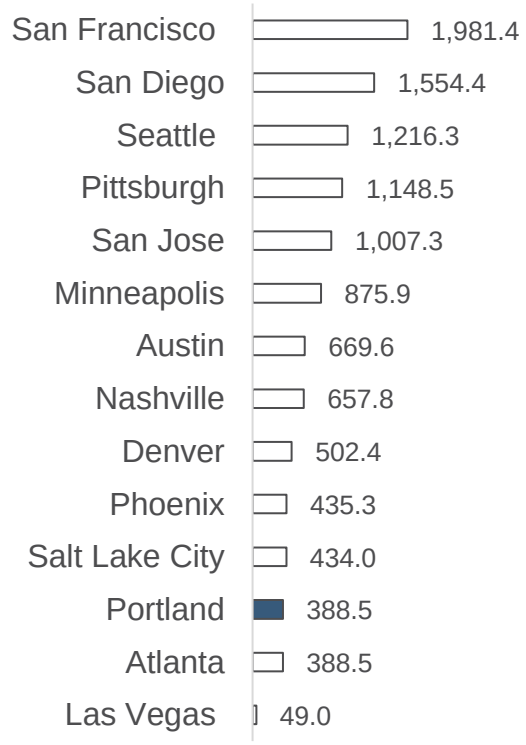


Source: USPTO

Annually, Portland sees $388.5 million in higher-ed R&D, a 14% annual increase from 2009-2018

Average Annual Higher ED R&D (Millions) 2009-2018

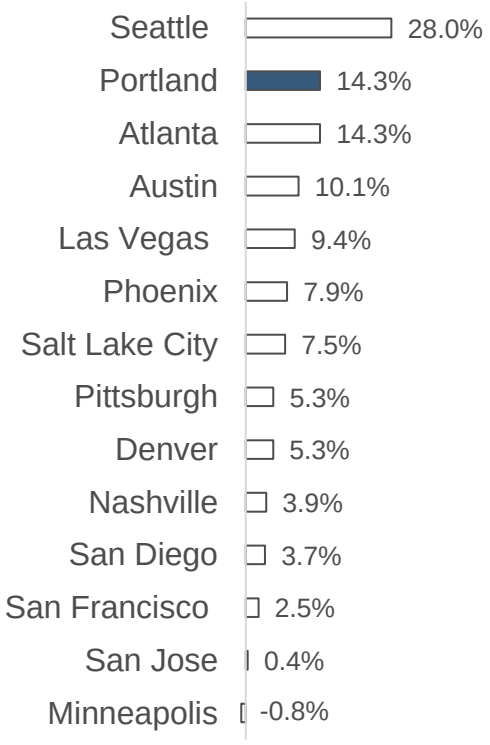
A resiliency indicator if there is an infrastructure (e.g., labs, students) to support R&D



Source: National Science Foundation

Average Annual Growth: Higher ED R&D 2009-2018

Represents if R&D dollars are growing or contracting in a region

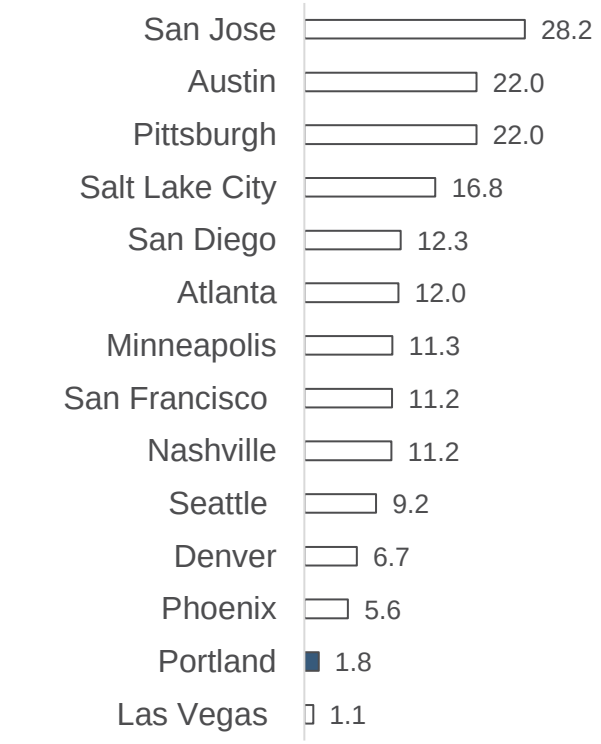


Source: National Science Foundation

Portland ranks second to last among its peers for STEM doctoral students, just 1.8 for every 100K

STEM Doctoral Students Per 100K 2017

Determines if region has highly-skilled, science related workforce to support start-ups and growth



Source: National Science Foundation

Innovation

Evaluates strength of the regional ecosystem to produce new ideas and companies

Scorecard

Metric	Strong Growth	Resilience	Why Measure	Portland Rank /14 Total Peers
VC Deals	X	X	• Determines number of venture capital (VC) companies that will potentially scale their level of growth	10
VC Capital	X	X	• Determines number of companies that will potentially scale their level of growth	10
Share of Scaleups	X	X	• Prevalence of companies that start small and become medium-sized businesses or larger by their tenth year of operation.	14
Innovation Industries	X	X	• Measuring the share of regional workers part of innovation sectors	5
Presence of Tier 1 Research	X	X	• Main campus presence of tier 1 research institution – a catalyst for innovation and R&D	14
Patents	X		• R&D output that is key indicator of innovation since it is basis for business growth and start ups	7
University R&D Per Capita	X		• Amount of investment in R&D that generates innovation	12
STEM PhD Students	X		• Determines if region has highly-skilled, science related workforce to support start-ups and growth	13

Good | Caution | Poor

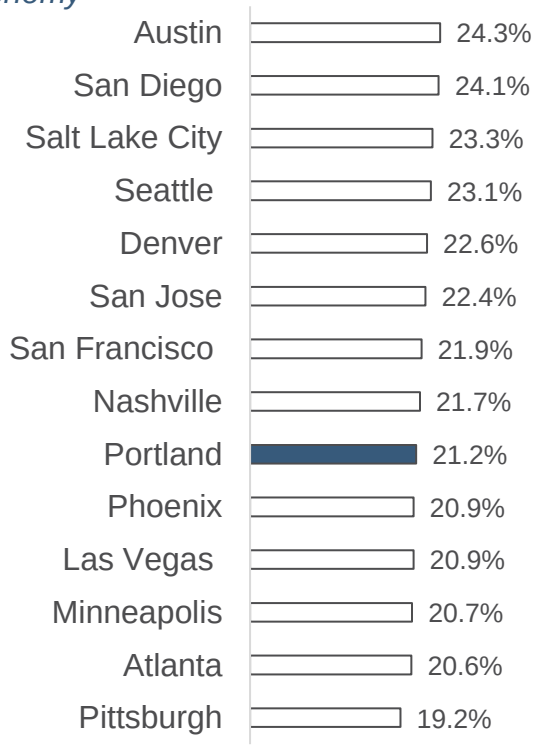
Talent

Measures the quality and type of existing workforce in a region, which is an important factor for business retention and growth

1 our every 5 residents in Portland are between the age of 20-34 – an 8% increase over 2013 that ranks 8th

Residents 20 to 34 (Share of Population) 2018

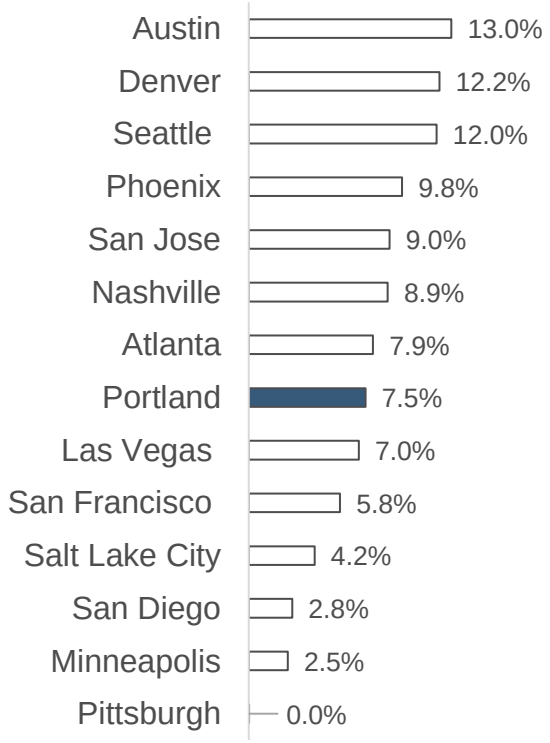
A young workforce is needed to sustain a growing economy



Source: U.S. Census American Community Survey

5 Year Growth: Residents 20 to 34 2013-2018

Determines if a specific age cohort for a region is growing or contracting

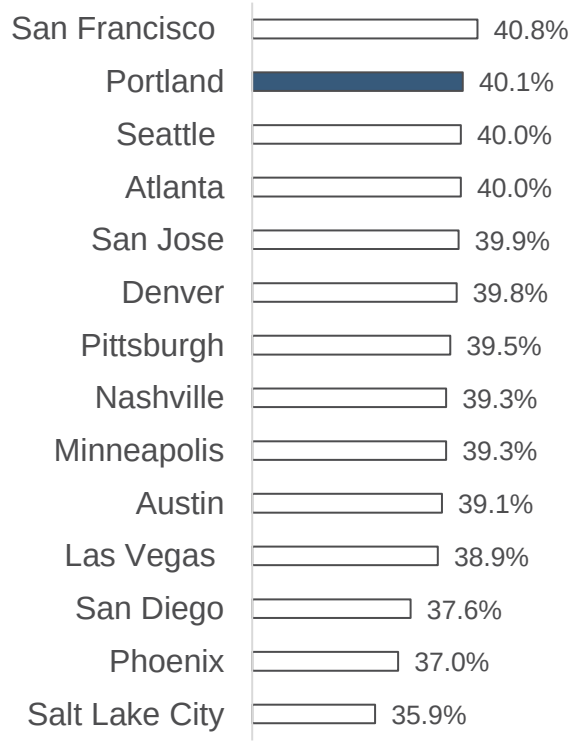


Source: U.S. Census American Community Survey

4 in 10 residents in Portland are the ages of 35 to 64, ranking second among peer regions

Residents 35 to 64 (Share of Population) 2018

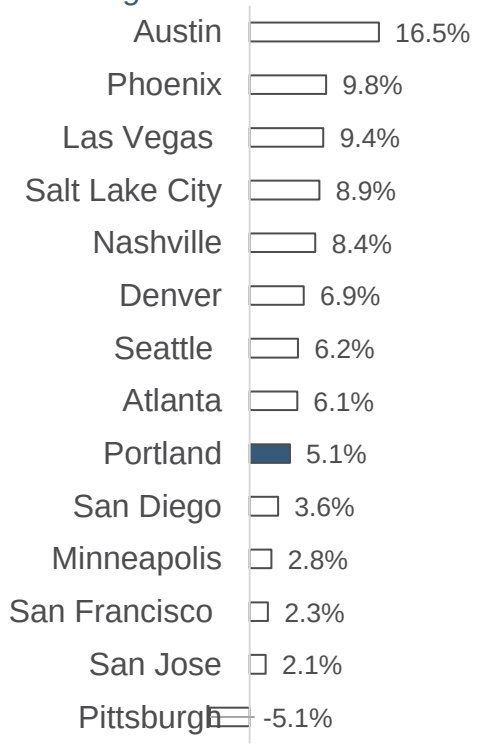
A young workforce is needed to sustain a growing economy



Source: U.S. Census American Community Survey

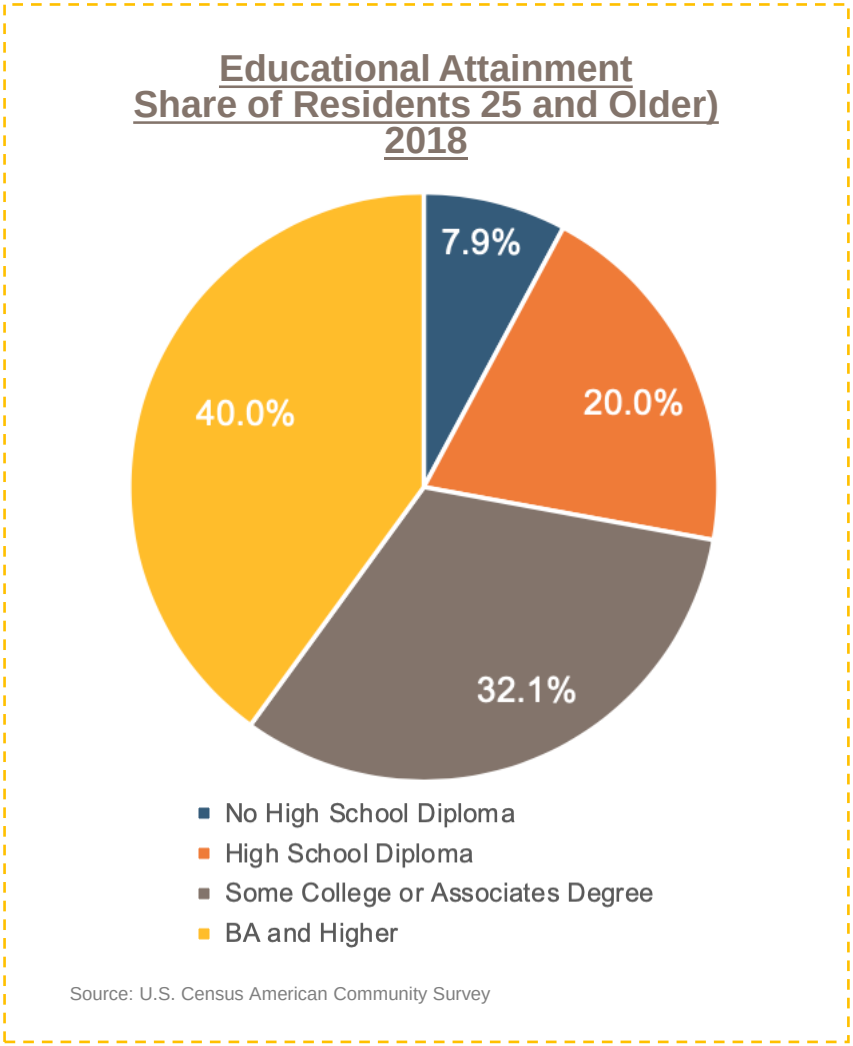
5 Year Growth: Residents 35 to 64 2013-2018

Determines if a specific age cohort for a region is growing or contracting



Source: U.S. Census American Community Survey

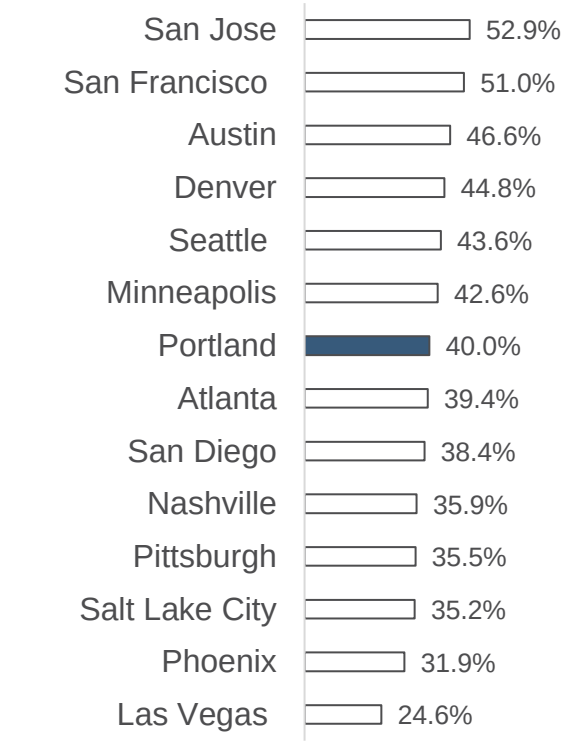
7 in 10 Portland residents have some type of higher-education degree: associates, BA, or graduate



4 in 10 residents in Portland have a BA or higher – a 20% increase over 2013 and ranking 3rd among peers

BA Degree or Higher (Share of Residents 25 and Older) 2018

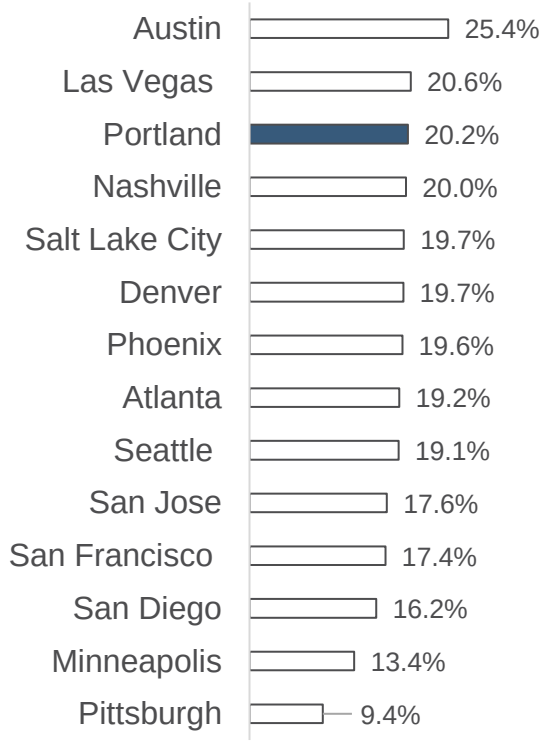
Higher-educated workforce can perform more highly skilled jobs, will more easily be able to switch jobs during economic disruptions



Source: U.S. Census American Community Survey

5 Year Growth: BA Degree or Higher 2013-2018

Determines if the share of residents with higher education is increasing or decreasing

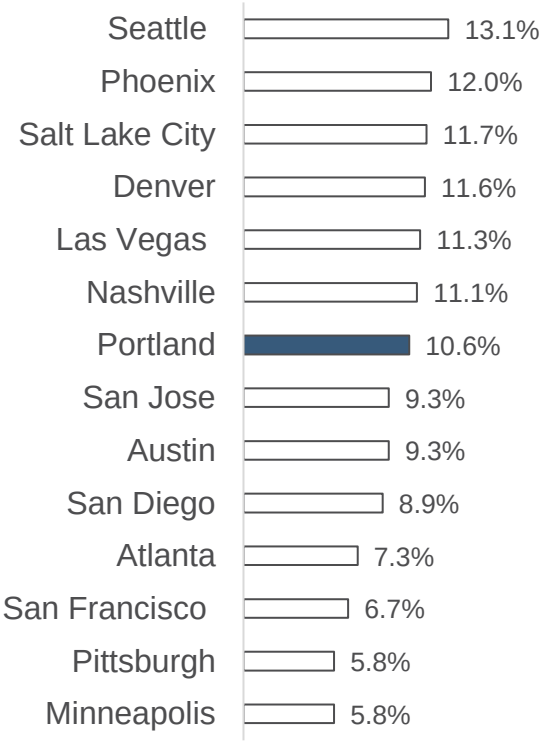


Source: U.S. Census American Community Survey

11% of Portland's residents with a BA degree or higher moved to the region the prior year

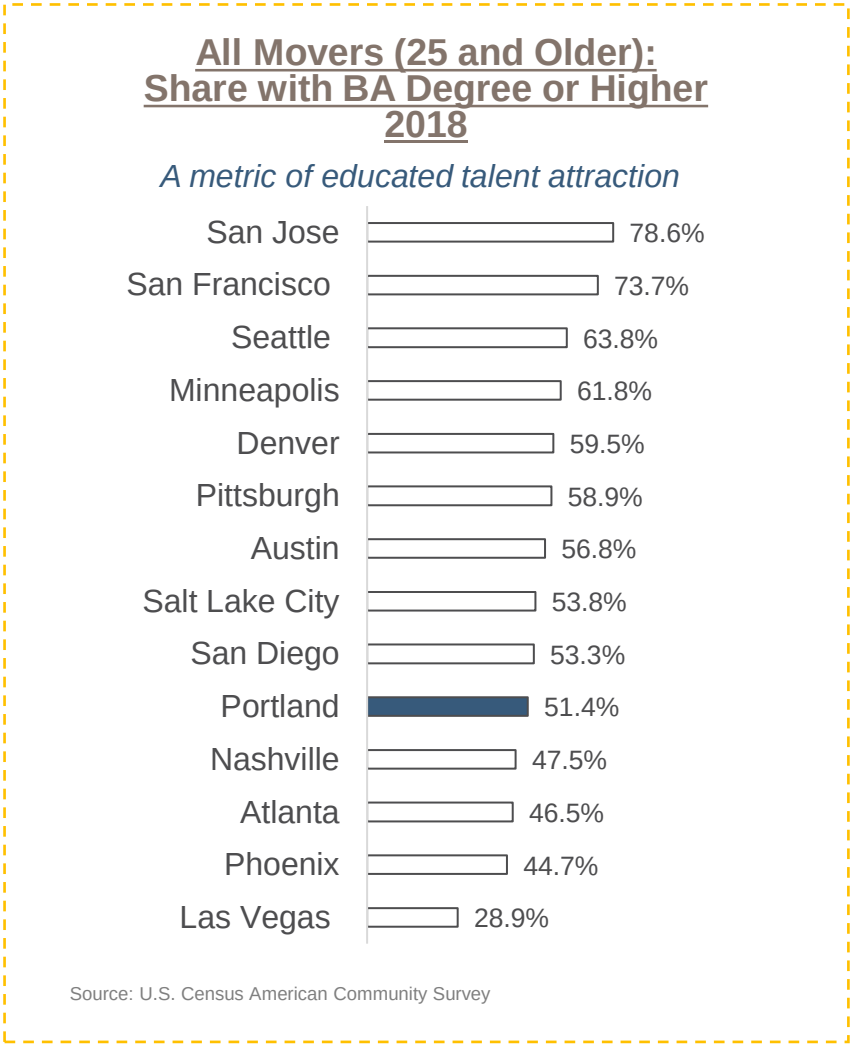
Share of Residents with BA and Higher Who Lived Outside the Region 1-Year Ago 2018

A metric of educated talent attraction



Source: U.S. Census American Community Survey

1 out of every 2 movers to Portland (25 and older) has a BA or higher – ranking 10th among peers



Talent

Measures the quality and type of existing workforce in a region, which is an important factor for business retention and growth

Scorecard

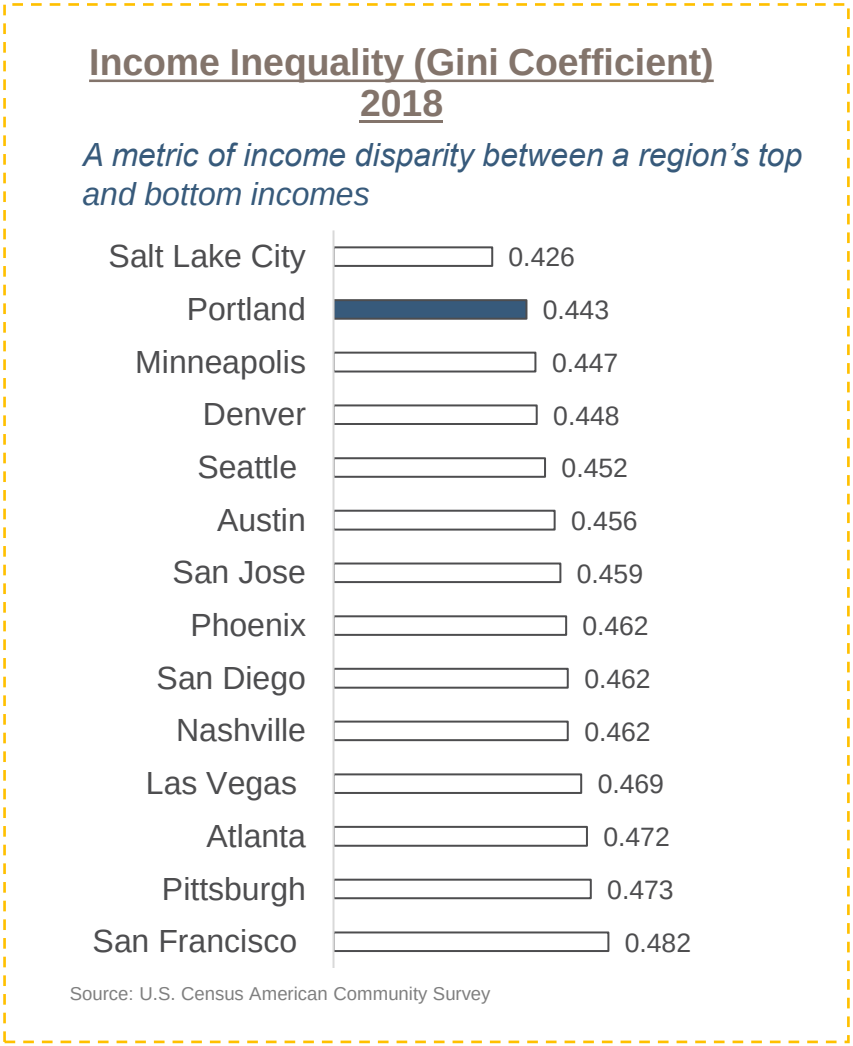
Metric	Strong Growth	Resilience	Why Measure	Portland Rank /14 Total Peers
Residents Age 20-34	X	X	• A young workforce is necessary to sustain the economy	**9**
Residents Age 35-64	X	X	• This age group represents more experienced workforce with desired management skills.	**2**
Bachelor's Degree or Higher (Share of Workforce)	X	X	• Higher-educated workforce can perform more highly skilled jobs, will more easily be able to switch jobs during economic disruptions	**7**
Share of Residents w/ BA or Higher that Moved to the Region 1-Year Ago	X	X	• Indicates if the region is attracting more highly-skilled workers	**7**
Share of Total Movers With a BA Degree or Higher	X	X	• A metric of educated talent attraction	**10**

Good | Caution | Poor

Equity

Evaluates who is benefitting from growth within a region

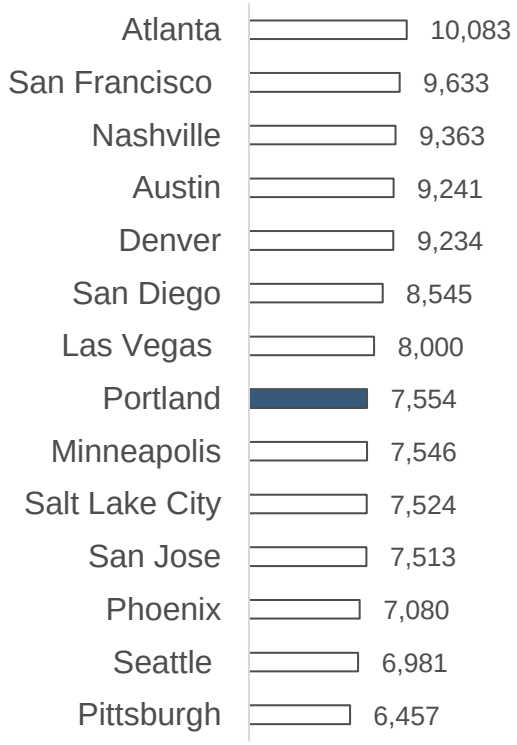
Among its peers, Portland has relatively low income inequality – ranking 2nd



For every 100K residents, 7,500 workers in Portland are freelancers or part of the "gig economy"

Non-Employers Per 100K 2017

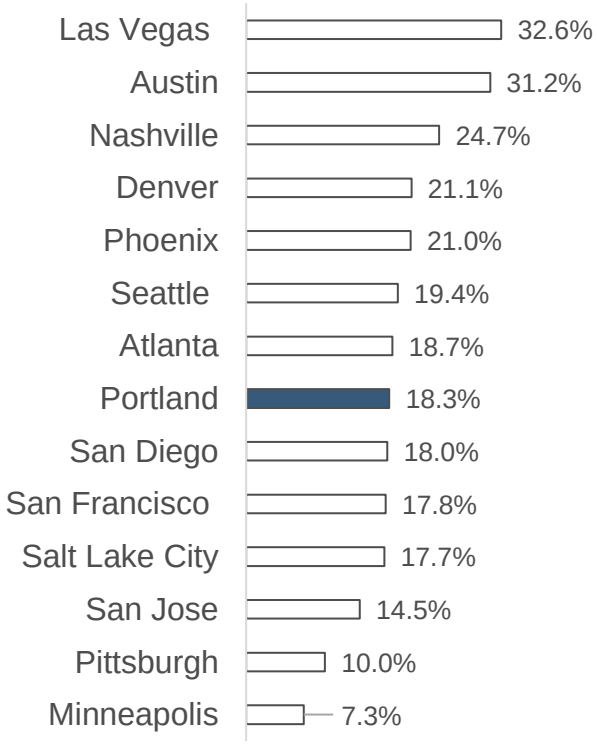
A metric of those possibly working without benefits and most vulnerable to economic shock



Source: U.S. Census Non-Employer Statistics

5-Year Growth: Non-Employers 2012-2017

Determines if a region's 1099 or gig employment base is growing

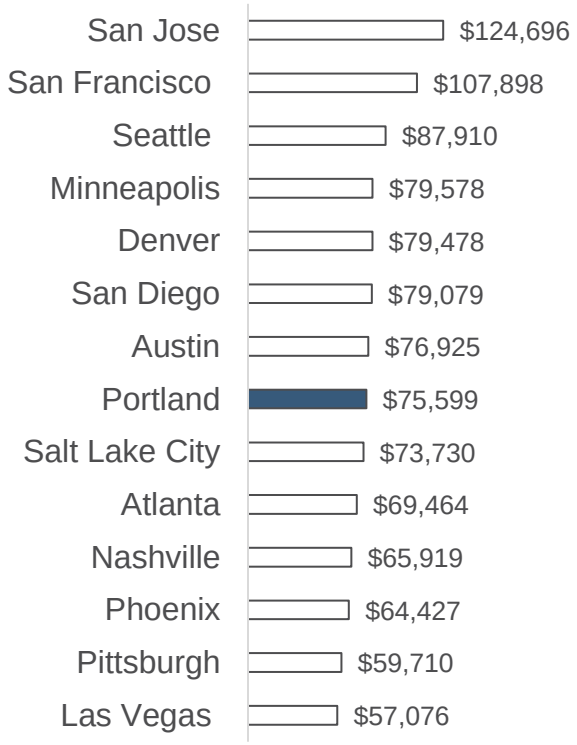


Source: U.S. Census Non-Employer Statistics

Since 2013, Portland's median household income has increased 28% to approximately $75,600

Median Household Income 2018

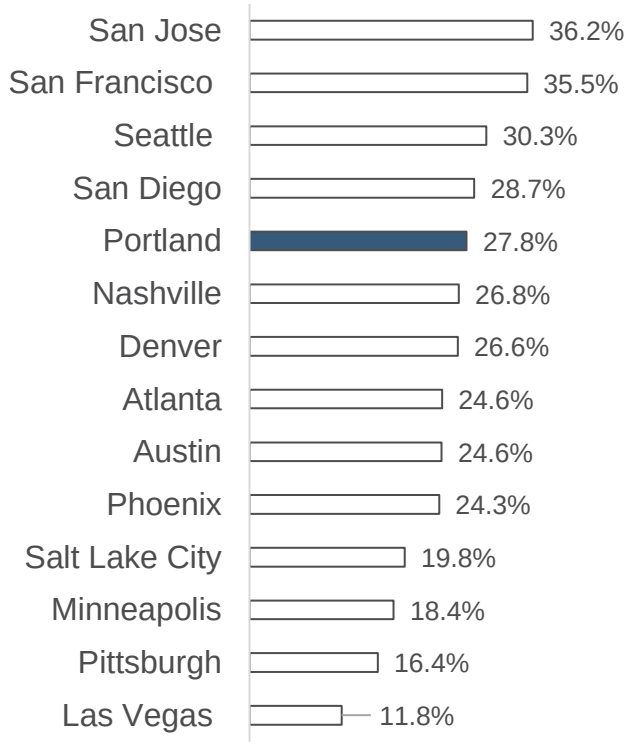
Determines relative wealth of area, which is an indicator of growth potential and resilience



Source: U.S. Census American Community Survey

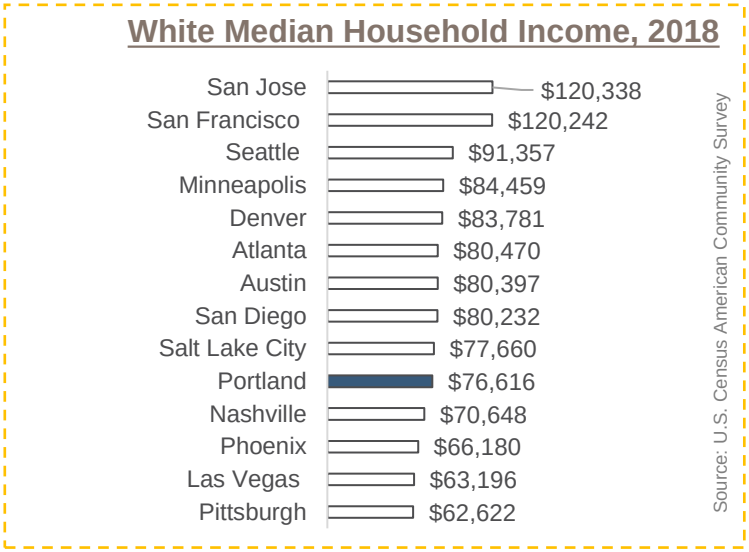
5-Year Growth: Median Household Income 2013-2018

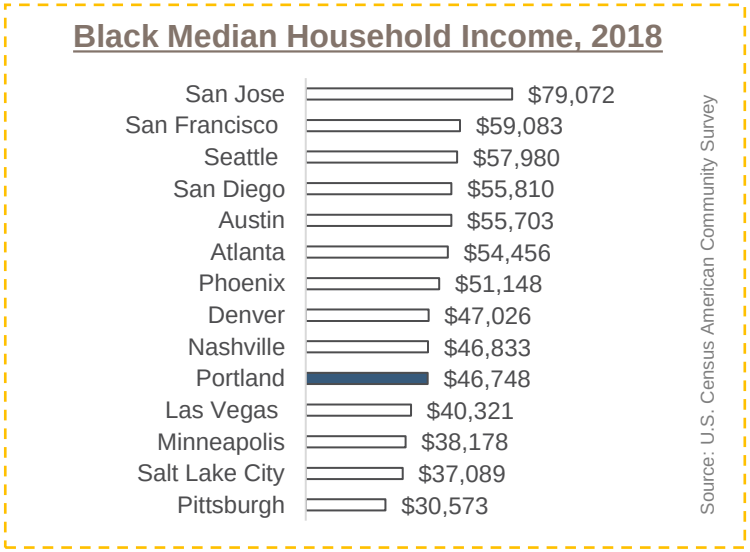
Indicates if incomes in a region are growing or contracting

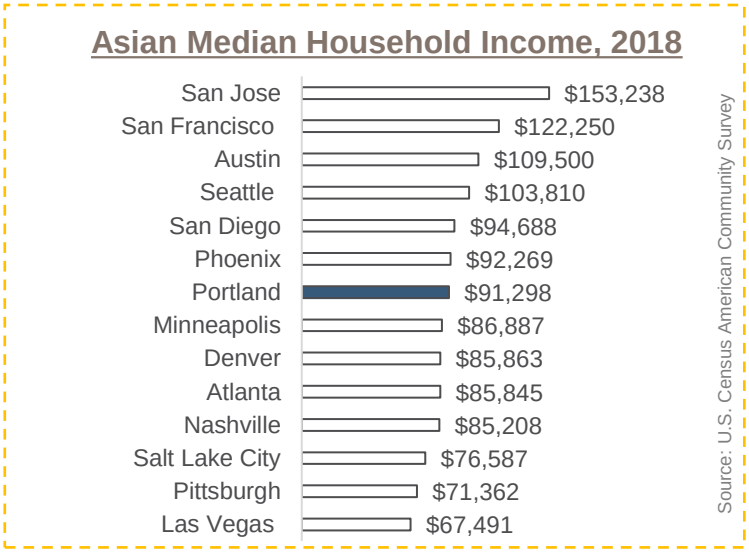


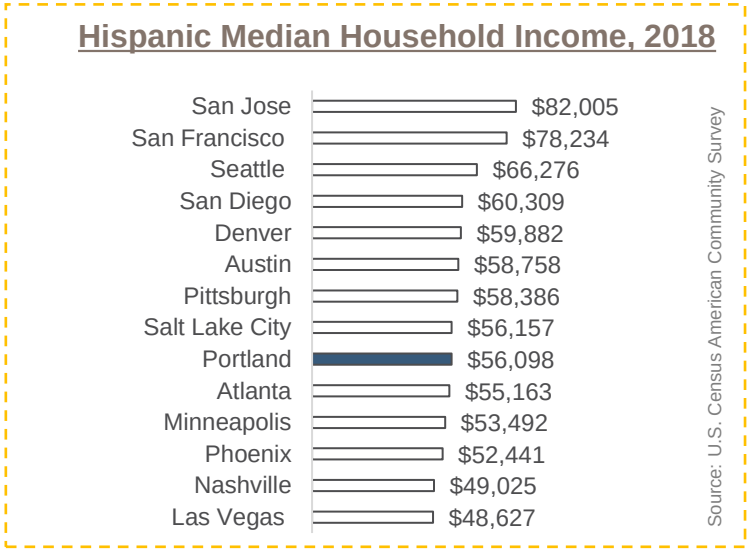
Source: U.S. Census American Community Survey

Black households in Portland earn 37% less than the regional average; Hispanics 25% less





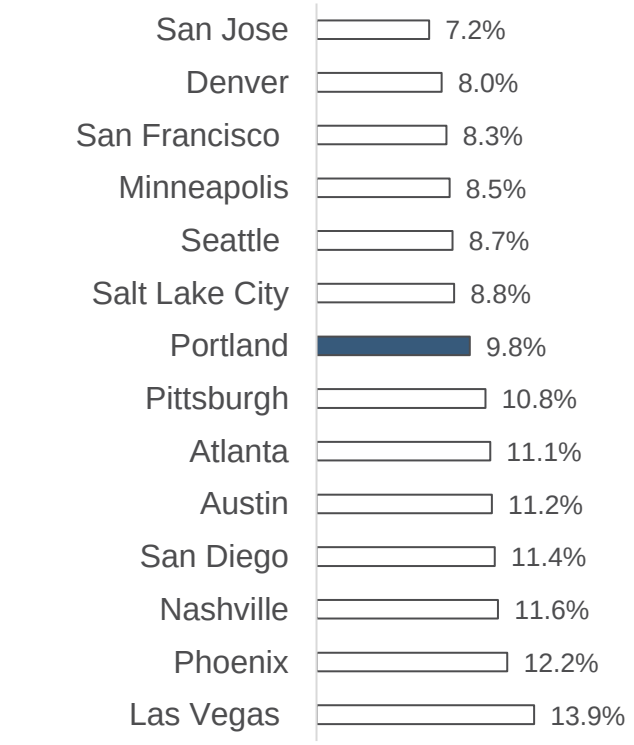




1 in 10 Portland residents live below the poverty ranking among the middle of its peer communities

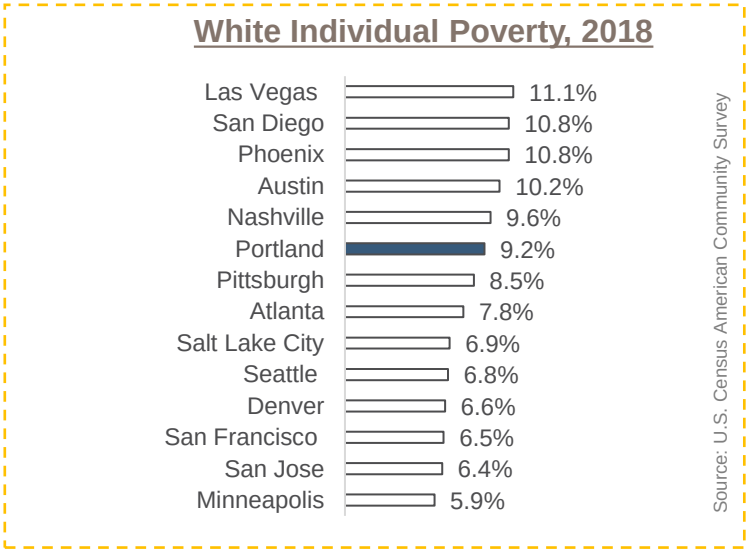
Individual Poverty Rate 2018

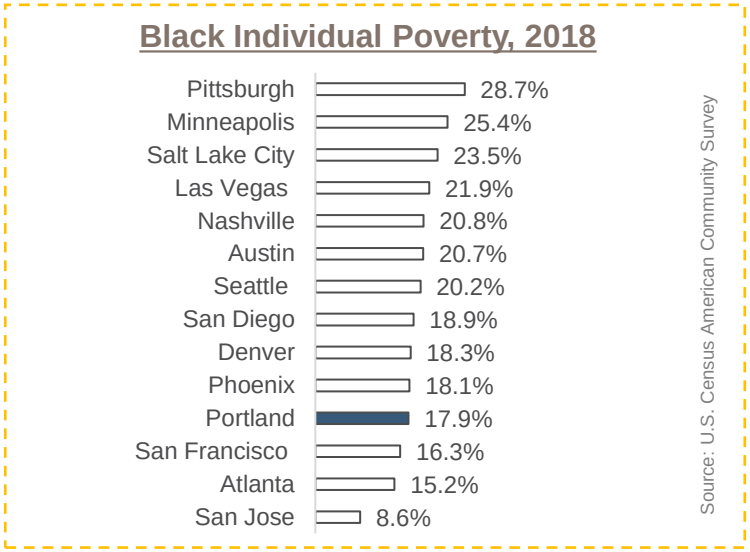
A high poverty rate shows inequitable economic growth and hinders resilience

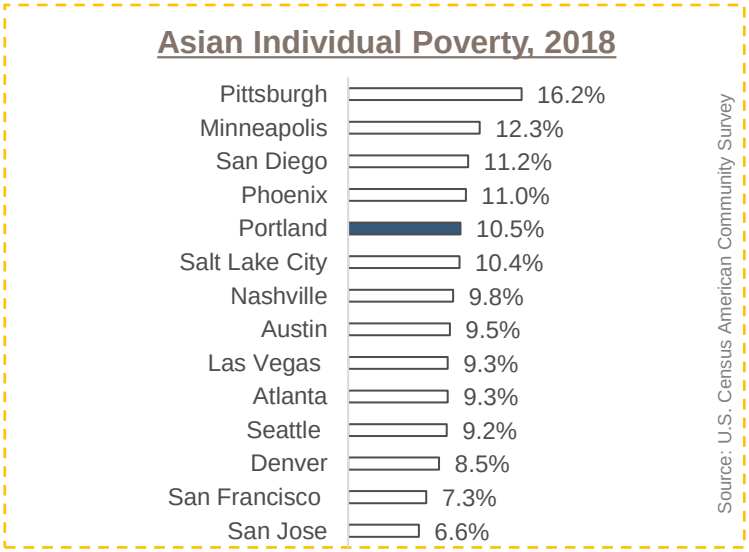


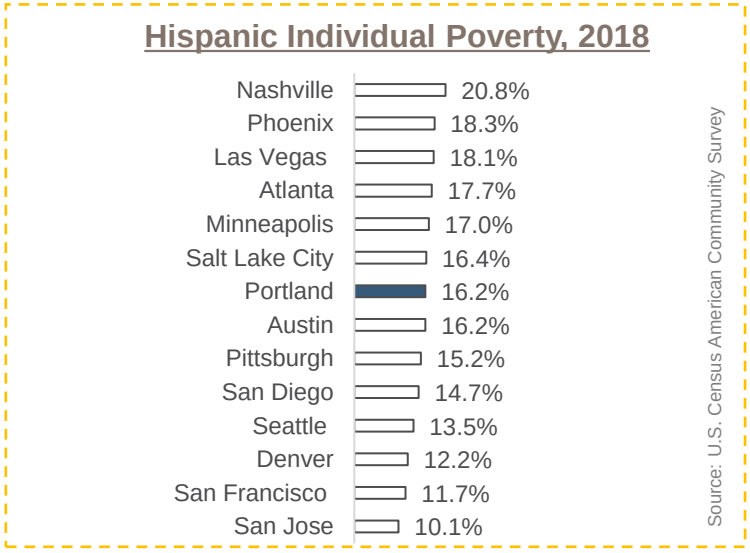
Source: U.S. Census American Community Survey

Poverty rates for Portland black and Hispanic residents are nearly 2x that of white and Asian individuals





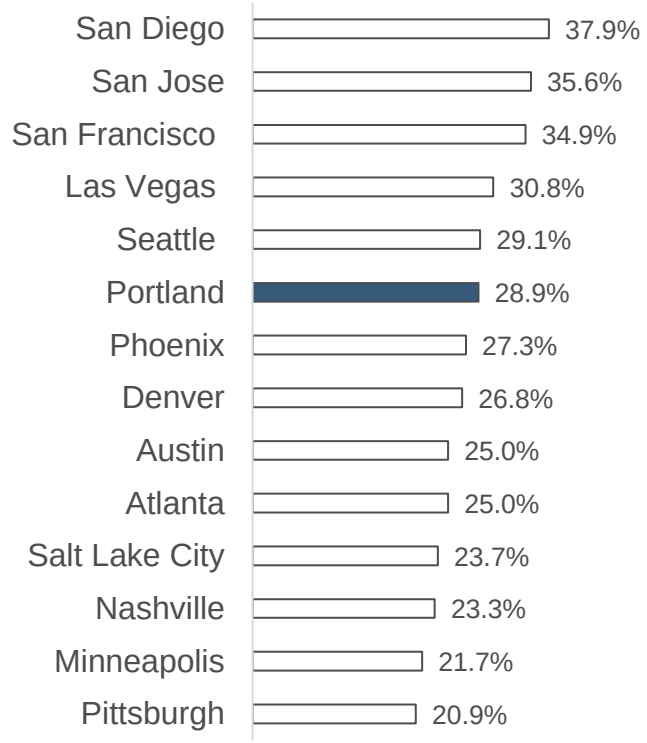




3 in 10 Portland homeowners spend more than 30% of their income on housing costs; 51% of renters

Share of Owners Spending > 30% of Income on Housing 2018

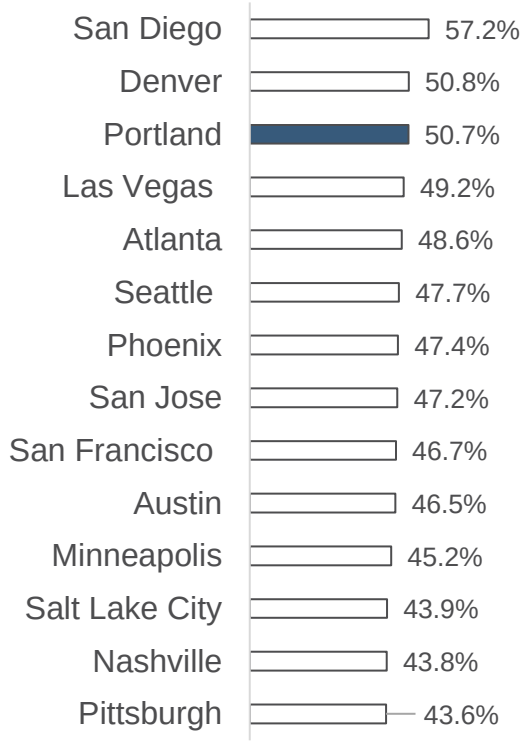
A metric of regional affordability for homeowners; < 30% of income for housing is a cost burden



Source: U.S. Census American Community Survey

Share of Renters Spending > 30% of Income on Housing 2018

A metric of regional affordability for renters; lower share of renters spending > 30% is more resilient

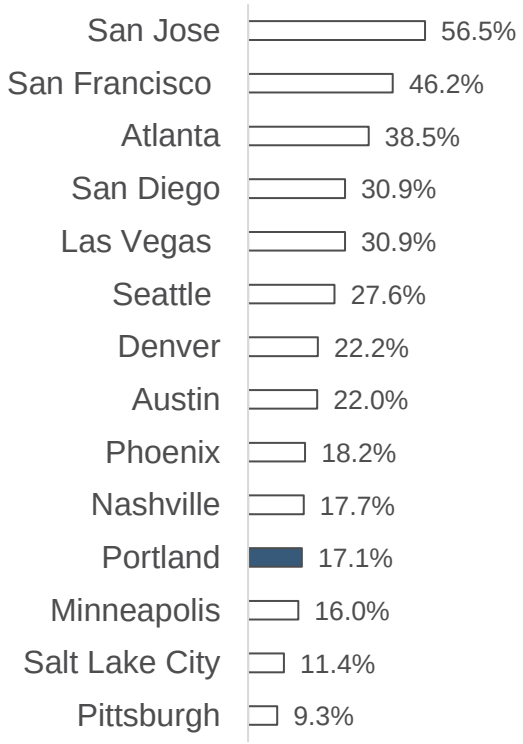


Source: U.S. Census American Community Survey

17% of startups, less than 1 in 5, in Portland are minority-owned, ranking 11th among peer communities

Share of Startups Minority-Owned (Firms Less than Years Old) 2016

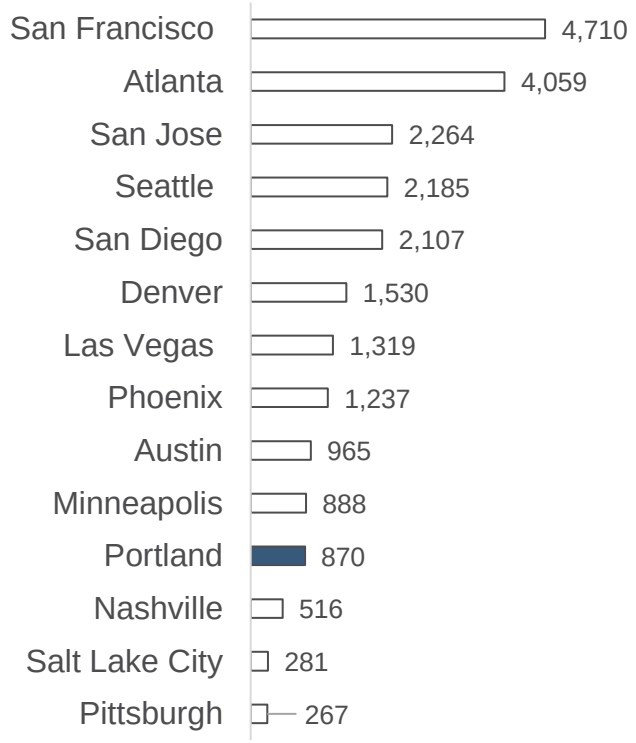
Diverse ownership indicates growth potential and resilience



Source: U.S. Census

Minority Owned Startups (Firms Less than Years Old) 2016

A count of minority-owned startups

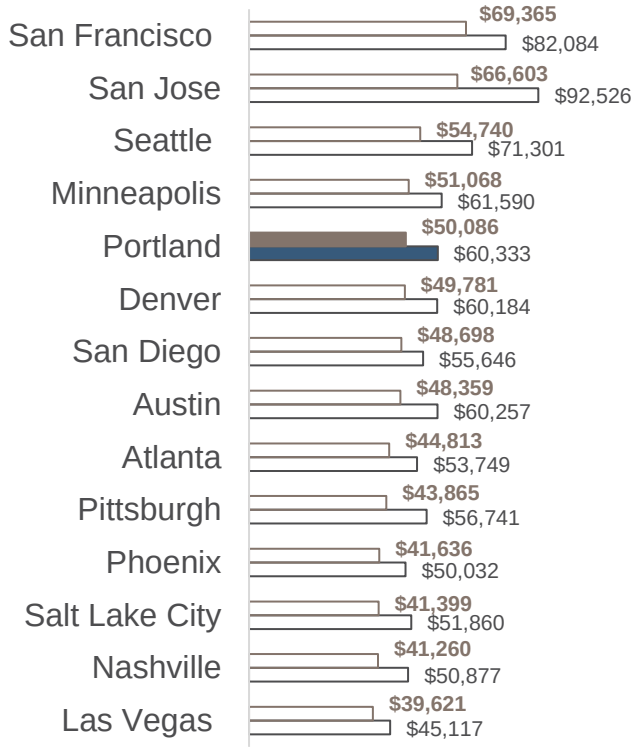


Source: U.S. Census

Women in Portland, on average, earn 8% less than men annually, approximately $10,000

Men v. Women: Annual Median Wage 2018

Measurement of the median annual individual wage



Source: U.S. Census American Community Survey
Note: Brown is women wage

Equity

Evaluates who is benefitting from growth within a region

Scorecard

Metric	Strong Growth	Resilience	Why Measure	Portland Rank /14 Total Peers
Income Inequality Index		X	• A metric of income disparity between a region's top and bottom incomes	**2**
Non-employers (Gig Workers)	X	X	• A metric of those possibly working without benefits and most vulnerable to economic shock	**7**
Median Household Income	X	X	• Determines relative wealth of area, which is an indicator of growth potential and resilience	**8**
• White				**10**
• Black				**10**
• Asian				**7**
• Hispanic				**9**
Poverty Rate	X	X	• A high poverty rate shows inequitable (and ultimately limited) economic growth and hinders resilience	**7**
• White				**9**
• Black				**4**
• Asian				**10**
• Hispanic				**8**
Share Of Minority Owned Startups	X	X	• Diverse ownership indicates growth potential and resilience	**11**
Share House-Burdened	X	X	• A metric of regional affordability for homeowners; < 30% of income for housing is a cost burden	**9**
Share Rent-Burdened		X	• A metric of regional affordability for renters; lower share of renters spending > 30% is more resilient	**12**
Wages By Gender	X	X	• Indicates if women are receiving equal pay	**6**

Good | Caution | Poor

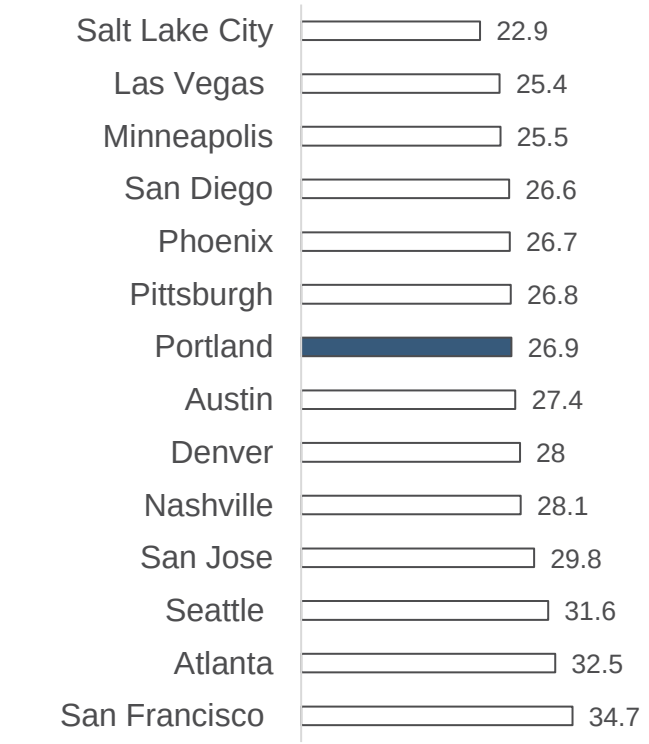
Quality of Place

Evaluates quality of place, which is an important factor in attracting and retaining talent, population growth and resilience, and attracting new business and investment

Portland's average commute is 27 minutes, consistent with the U.S. and ranking in the middle of peers

Mean Commute Time (Minutes) 2018

A quality of place metric an indicator of how much time (social and productivity) is lost commuting

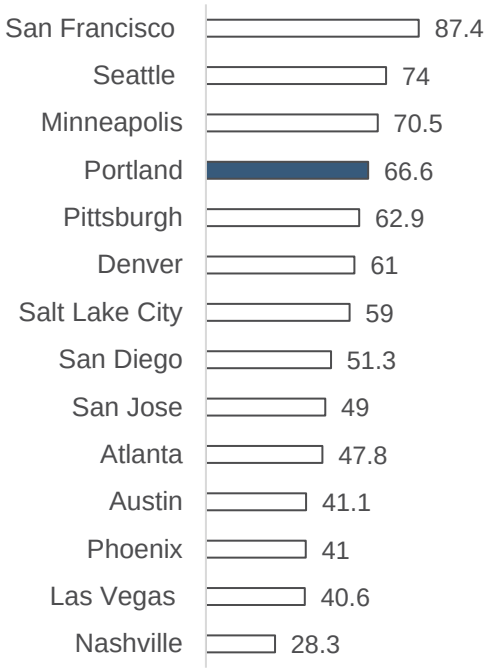


Source: U.S. Census American Community Survey

Portland has a robust walking, biking and transit network

Walk Score 2018

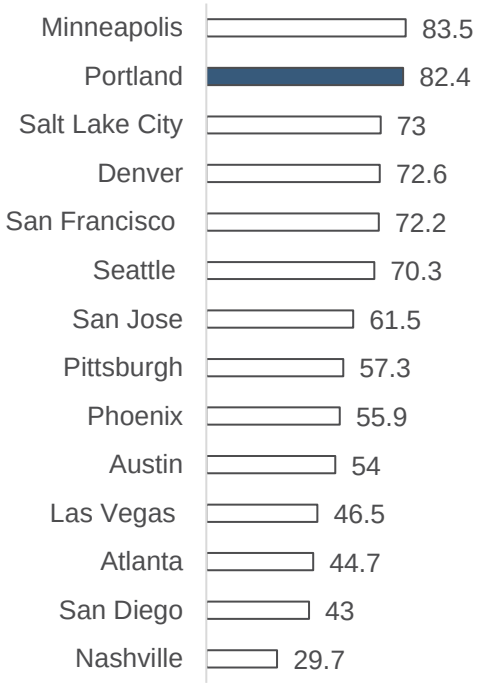
Walkability indicator



Source: Walk Score

Bike Score 2018

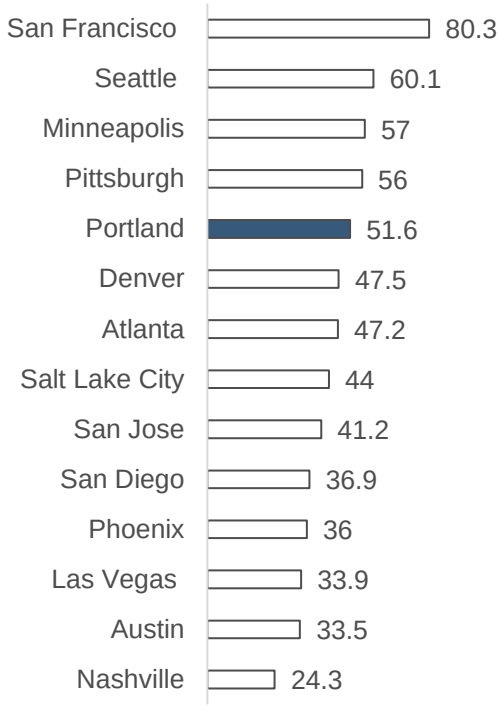
Measurement of biking network



Source: Walk Score

Transit Score 2018

Evaluates transit access

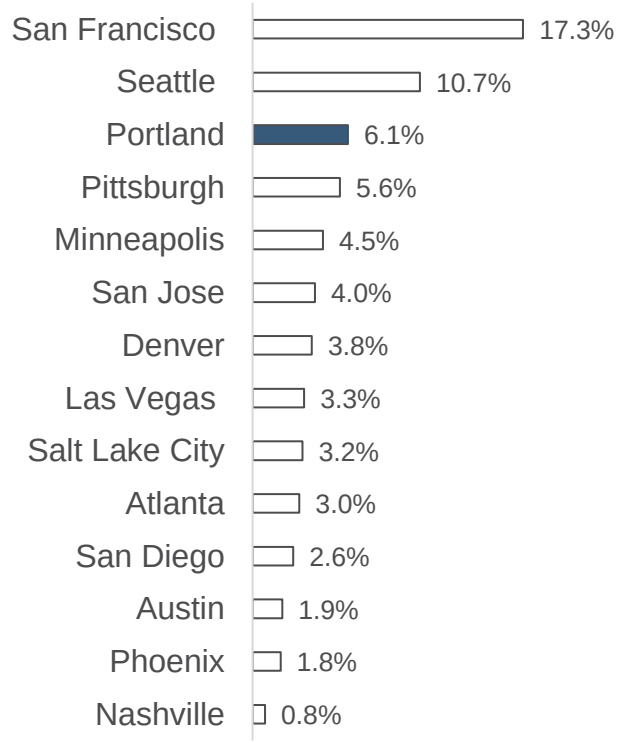


Source: Walk Score

Nearly 10% of Portland workers take public transit or bike/walk to work, ranking 3rd among peer regions

Public Transportation Use (Share of Workers) 2018

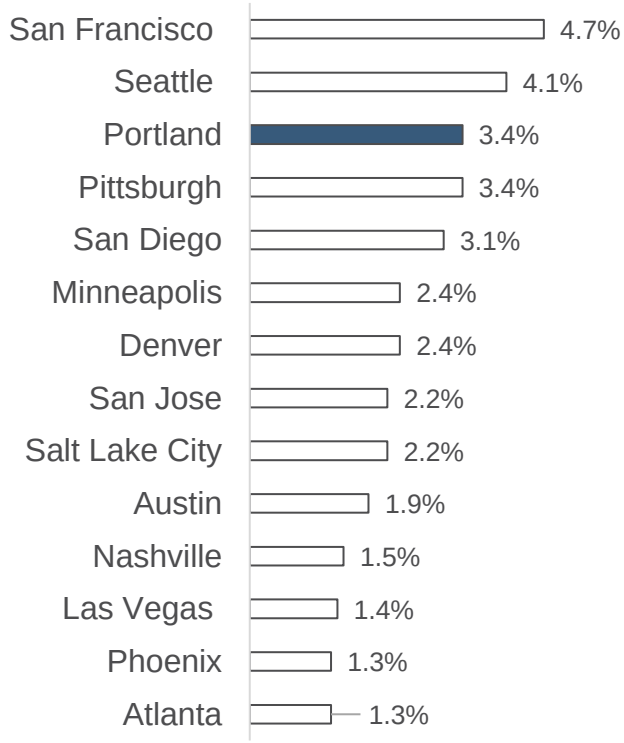
A indicator of a strong regional transportation system



Source: U.S. Census American Community Survey

Walk or Bike to Work (Share of Workers) 2018

A metric that indicates the strength of the active mobility network in a region

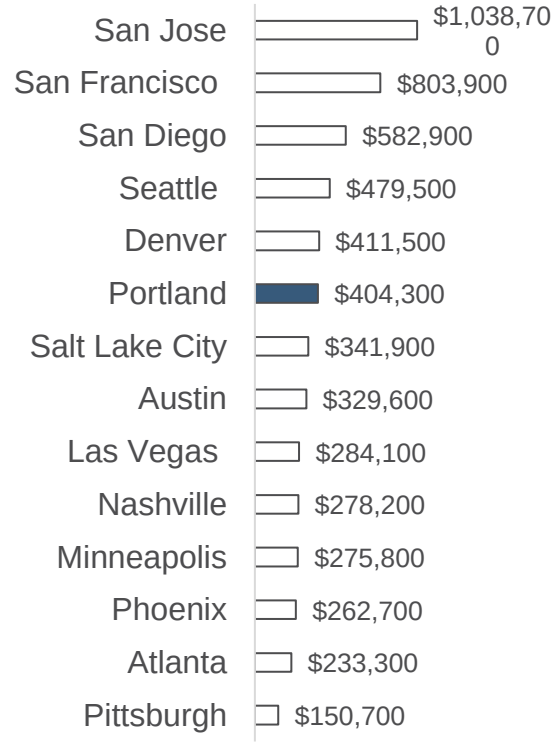


Source: U.S. Census American Community Survey

Portland has reasonably priced housing and rental costs – ½ that of San Jose and San Francisco

Single-Family Median Housing Value 2019

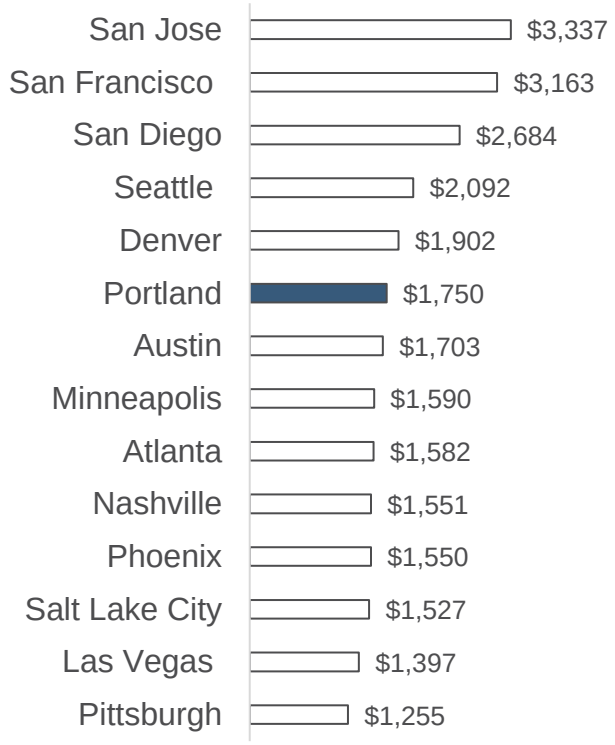
Affordability of housing values comparative to other metros



Source: Zillow

Median Rental Value 2019

Affordability of rental costs comparative to other metros



Source: Zillow

Quality of Place

Measures the quality and type of existing workforce in a region, which is an important factor for business retention and growth

Scorecard

Metric	Strong Growth	Resilience	Why Measure	Portland Rank /14 Total Peers
Mean Commute Time	X		• A quality of place metric an indicator of how much time (social and productivity) is lost commuting	**7**
Walk Score	X		• Walkability indicator -- a talent attraction variable	**4**
Bike Score	X		• Measurement of biking network	**2**
Transit Score	X	X	• Evaluates transit access	**5**
Share of Use Transit	X	X	• Indicates strength of transit system which offers alternatives to automobile dependency and indicates resilience and access to jobs	**3**
Share of Bike or Walk to Work	X		• Indicates the strength of the active mobility network in a region	**3**
Median Single-Family House Price	X	X	• Affordability of home-ownership comparative to other metros	**9**
Median Rental Value	X	X	• Affordability of rental costs comparative to other metros	**9**

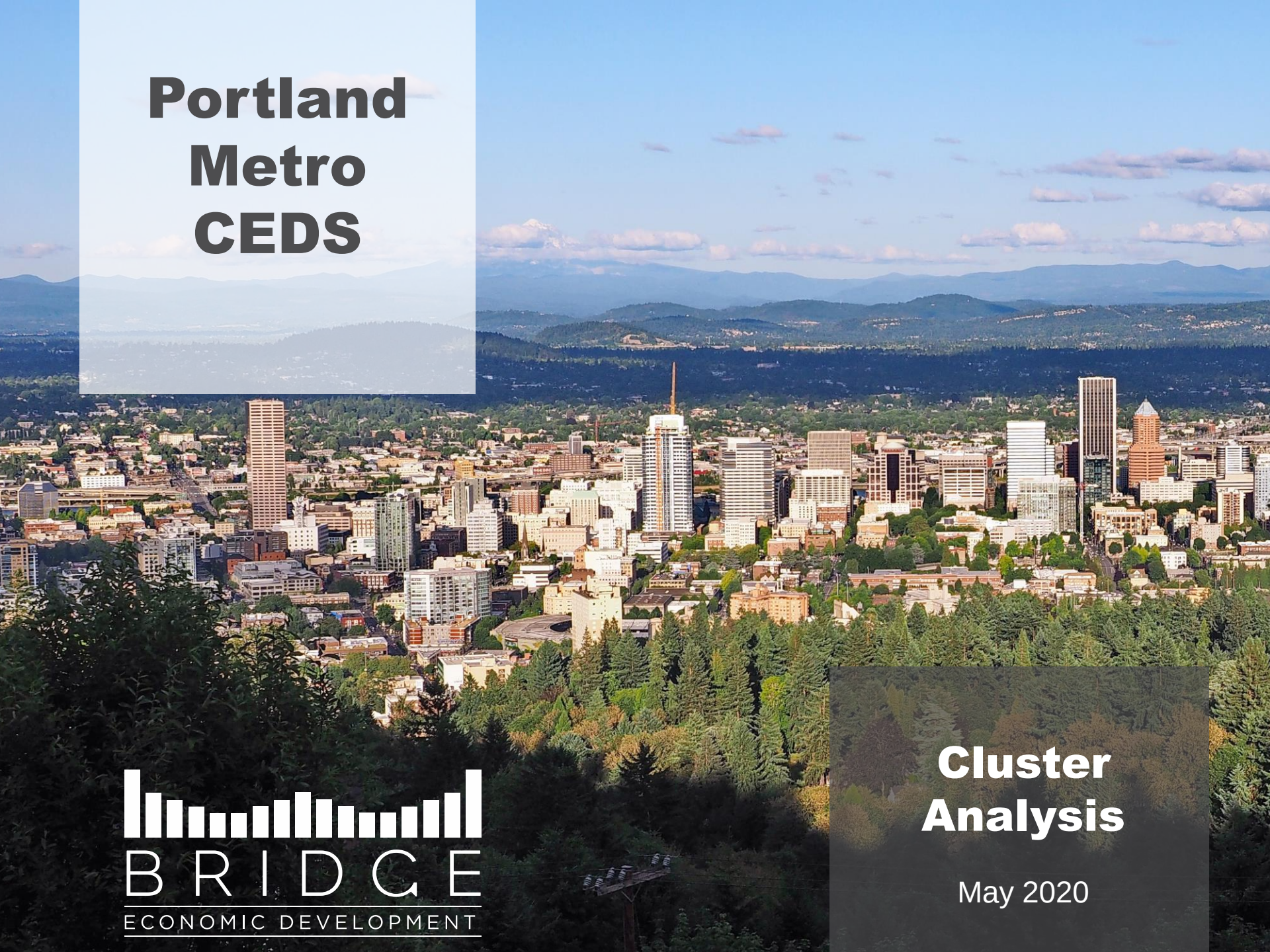
Good | Caution | Poor

Prepared For: GREATER PORTLAND Metro

Prepared By: BRIDGE ECONOMIC DEVELOPMENT

APPENDIX B

Portland Metro CEDS



BRIDGE
ECONOMIC DEVELOPMENT

Cluster Analysis

May 2020

Traded Sector Ranking Charts

Portland Cluster Ranking Chart: Economic Growth, Equity and Resilience

	Economic Growth Score (Rank Summary)	Equity Score (Rank Summary)	Resilience Score (Rank Summary)	Overall Score Summary Rank
Computer and Electronics	1	3	1	1
Software	2	7	2	2
Apparel and Outdoor	4	1	6	3
Metals	3	5	4	4
Food and Beverage	5	1	7	5
Clean Tech	7	4	3	6
Design and Media	6	6	5	7

Source: EMSI 2019.4 dataset.

Portland Cluster Ranking Chart: Economic Growth

	Overall Cluster LQ (2019)		Share of Cluster Employees in Sub Sectors LQ > 1.25 (2019)		Total Employment (2019)		5-Year Job Growth Rate (2014-2019)		GDP (In Billions) (2019)		GDP Per Worker (2019)		Employees Per Business (2019)		Economic Growth Score (Rank Summary)
Computer and Electronics	14.91	1	92.2%	1	41,045	1	9.5%	6	$11.9	1	$289.93	1	114	1	1
Software	1.53	6	46.4%	5	32,169	2	29.3%	1	$8.8	2	$273.56	2	8	7	2
Metals	4.14	3	81.9%	3	22,266	4	-0.9%	7	$3.3	4	$148.21	5	39	2	3
Apparel and Outdoor	4.26	2	82.8%	2	8,101	7	18.5%	4	$1.5	7	$185.16	3	16	5	4
Food and Beverage	2.24	4	68.7%	4	18,538	5	24.5%	2	$2.4	5	$129.46	7	22	3	5
Design and Media	1.48	7	44.9%	7	25,282	3	22.7%	3	$4.2	3	$166.13	4	10	6	6
Clean Tech	1.79	5	45.7%	6	14,174	6	10.5%	5	$2.0	6	$141.10	6	17	4	7

Source: EMSI 2019.4 dataset.

Portland Cluster Ranking Chart: Equity

	Share of Female Employees (2019)		Share of Non-White Employees (2019)		Share of Black Employees (2019)		Share of Hispanic Employees (2019)		Share of Talent w/ a BA Degree or Less (2019)*		Share of Jobs at Risk for Automation (Index > 100) (2019)*		Earnings Per Workers (2019)		Equity Score (Rank Summary)
Apparel and Outdoor	44.4%	1	28.4%	3	2.9%	2	10.3%	3	74.8%	3	53.4%	5	$93,113	5	22
Clean Tech	29.1%	5	23.7%	5	1.8%	5	10.3%	4	47.8%	5	40.5%	4	$100,700	3	31
Computer and Electronics	27.8%	6	38.4%	1	2.8%	3	8.3%	5	51.6%	4	39.7%	3	$160,840	1	23
Design and Media	42.6%	2	16.6%	7	1.8%	6	6.0%	6	34.6%	6	8.5%	2	$93,204	4	33
Food and Beverage	35.9%	3	32.2%	2	3.9%	1	17.4%	1	97.5%	1	86.8%	7	$61,614	7	22
Metals	18.4%	7	24.9%	4	2.1%	4	10.9%	2	79.2%	2	68.8%	6	$87,275	6	31
Software	33.2%	4	22.2%	6	1.6%	7	5.0%	7	18.7%	7	1.5%	1	$137,883	2	34

Source: EMSI 2019.4 dataset.

Portland Cluster Ranking Chart: Resilience

	Firm Distribution Employees (0-9) (2019)		Firm Distribution Employees (10-49) (2019)		Firm Distribution Employees (50-99) (2019)		Firm Distribution Employees (100-249) (2019)		Firm Distribution Employees (More than 250) (2019)		Number of Industries (3-digit) (2019)		Share of Female Employees (2019)		Share of Non-White Employees (2019)	
Computer and Electronics	33.3%	2	49.5%	2	4.8%	2	7.0%	1	5.4%	7	3	6	27.8%	6	38.4%	1
Software	51.1%	4	44.2%	4	2.2%	7	1.9%	6	0.6%	3	5	5	33.2%	4	22.2%	6
Clean Tech	54.3%	5	39.8%	5	2.7%	4	2.4%	4	0.8%	4	9	2	29.1%	5	23.7%	5
Metals	24.5%	1	62.6%	1	7.9%	1	3.8%	2	1.2%	6	5	4	18.4%	7	24.9%	4
Design and Media	63.3%	6	32.6%	6	2.7%	5	1.0%	7	0.5%	1	2	7	42.6%	2	16.6%	7
Apparel and Outdoor	64.1%	7	29.3%	7	4.0%	3	2.0%	5	0.6%	2	9	1	44.4%	1	28.4%	3
Food and Beverage	40.7%	3	52.6%	3	2.5%	6	3.1%	3	1.0%	5	5	3	35.9%	3	32.2%	2

	Graduate Degreee Employees (%) (2019)*		Bachelor Degree Employees (%) (2019)*		Associates Degree or Certificate (%) (2019)*		High School Diploma (%) (2019)*		No Training (%) (2019)*		Level of Innovation		Cluster Connections		Resilience Score (Rank Summary)
Computer and Electronics	0.0%	7	48.4%	3	9.3%	3	42.3%	4	0.0%	2	High	1	Yes	1	1
Software	0.0%	7	81.3%	1	9.8%	2	8.9%	1	0.0%	1	High	1	Yes	1	2
Clean Tech	6.0%	1	46.1%	4	8.7%	4	23.8%	3	15.4%	6	High	1	No	7	3
Metals	0.0%	7	20.7%	6	1.8%	7	75.6%	7	1.9%	3	Medium	4	Yes	1	4
Design and Media	0.0%	7	65.4%	2	10.8%	1	20.1%	2	3.7%	5	Low	7	Yes	1	5
Apparel and Outdoor	0.0%	7	25.1%	5	3.2%	6	50.1%	5	21.6%	7	High	1	No	7	6
Food and Beverage	0.0%	7	2.5%	7	4.8%	5	57.7%	6	35.0%	9	Medium	4	No	7	7

Source: EMSI 2019.4 dataset.

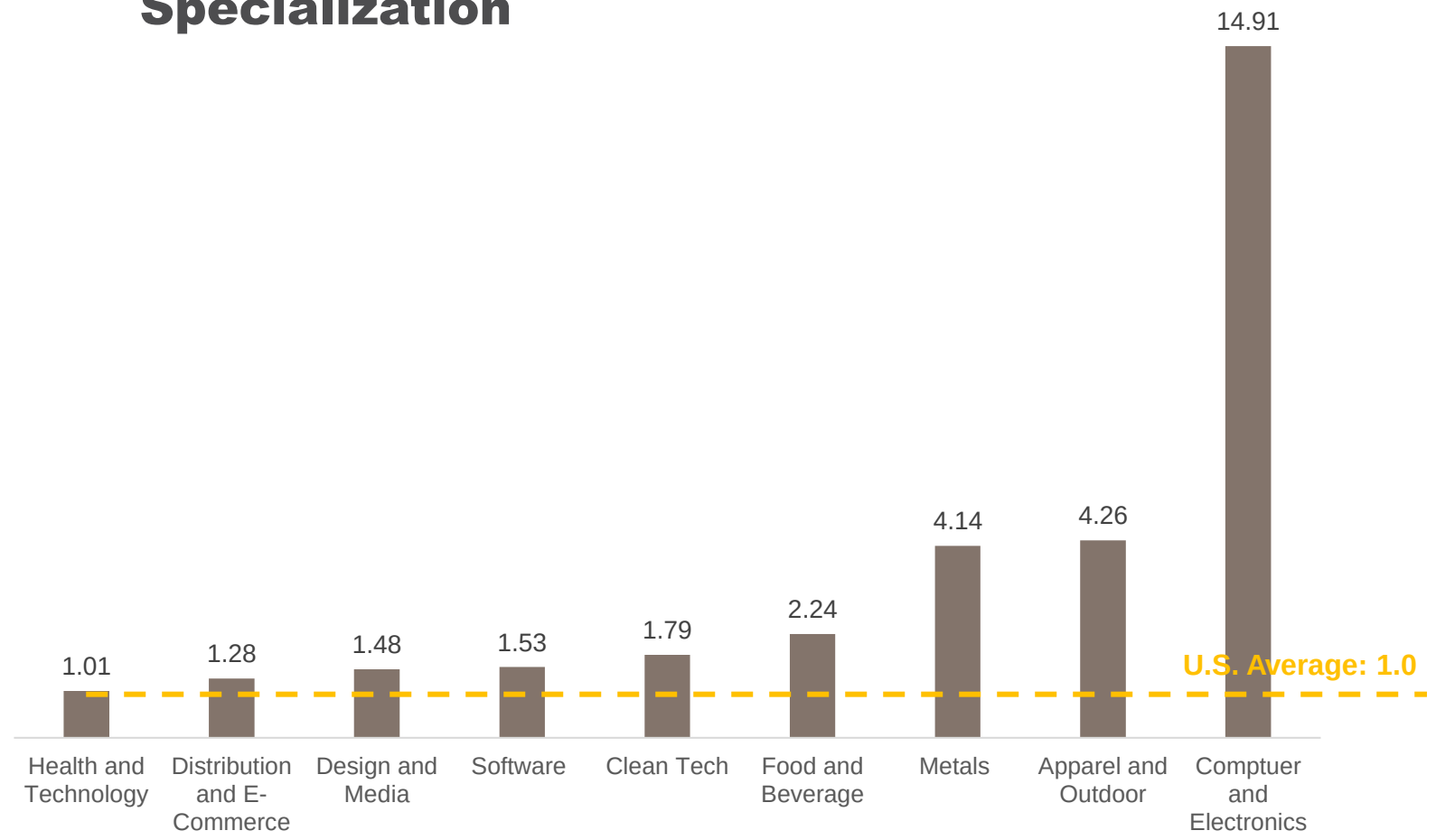
Traded Sector Overview

Portland's Traded Sector Cluster Profile

Sector	Location Quotient 2019	2019 Jobs	5-Year Growth, 2014-2019	New Jobs Jobs 2014-2019	GRP 2019 (In Billions)	Share of Region's GDP	Earnings Per Worker	Businesses	Employ Per Biz
Computer and Electronics	14.91	41,045	9.5%	3,566	$11.9	7.2%	$161,480	359	114
Apparel and Outdoor	4.26	8,101	18.5%	1,320	$1.5	0.9%	$93,113	518	16
Metals	4.14	22,266	-0.9%	(204)	$3.3	2.0%	$87,865	574	39
Food and Beverage	2.24	18,538	24.5%	3,650	$2.4	1.5%	$61,614	832	22
Clean Tech	1.79	14,174	10.5%	1,382	$2.0	1.2%	$100,674	843	17
Software	1.53	32,169	29.3%	7,290	$8.8	5.3%	$137,883	4,282	8
Design and Media	1.48	25,282	22.7%	4,672	$4.2	2.6%	$93,204	2,531	10
Distribution and E-Commerce	1.28	59,360	16.1%	8,262	$11.9	7.2%	$85,792	6,110	10
Health and Technology	1.01	4,466	2.3%	99	$1.0	0.6%	$88,428	208	21

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline

Portland's Traded Sector Cluster: Specialization



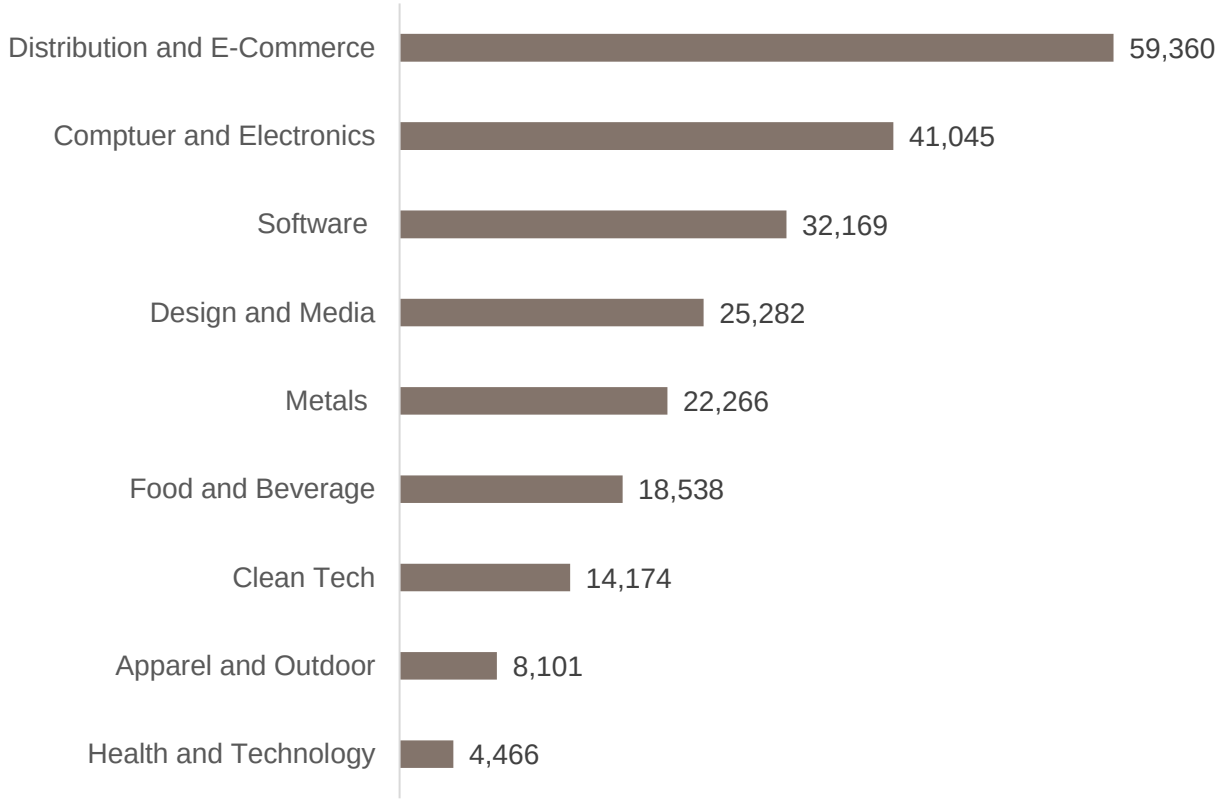
Source: EMSI 2019.4 dataset.

Portland's Traded Sector Cluster Profile

Sector	2019 Jobs	5-Year Growth, 2014-2019	New Jobs Jobs, 2014-2019
Distribution and E-Commerce	59,360	16.1%	8,262
Computer and Electronics	41,045	9.5%	3,566
Software	32,169	29.3%	7,290
Design and Media	25,282	22.7%	4,672
Metals	22,266	-0.9%	-204
Food and Beverage	18,538	24.5%	3,650
Clean Tech	14,174	10.5%	1,382
Apparel and Outdoor	8,101	18.5%	1,320
Health and Technology	4,466	2.3%	99

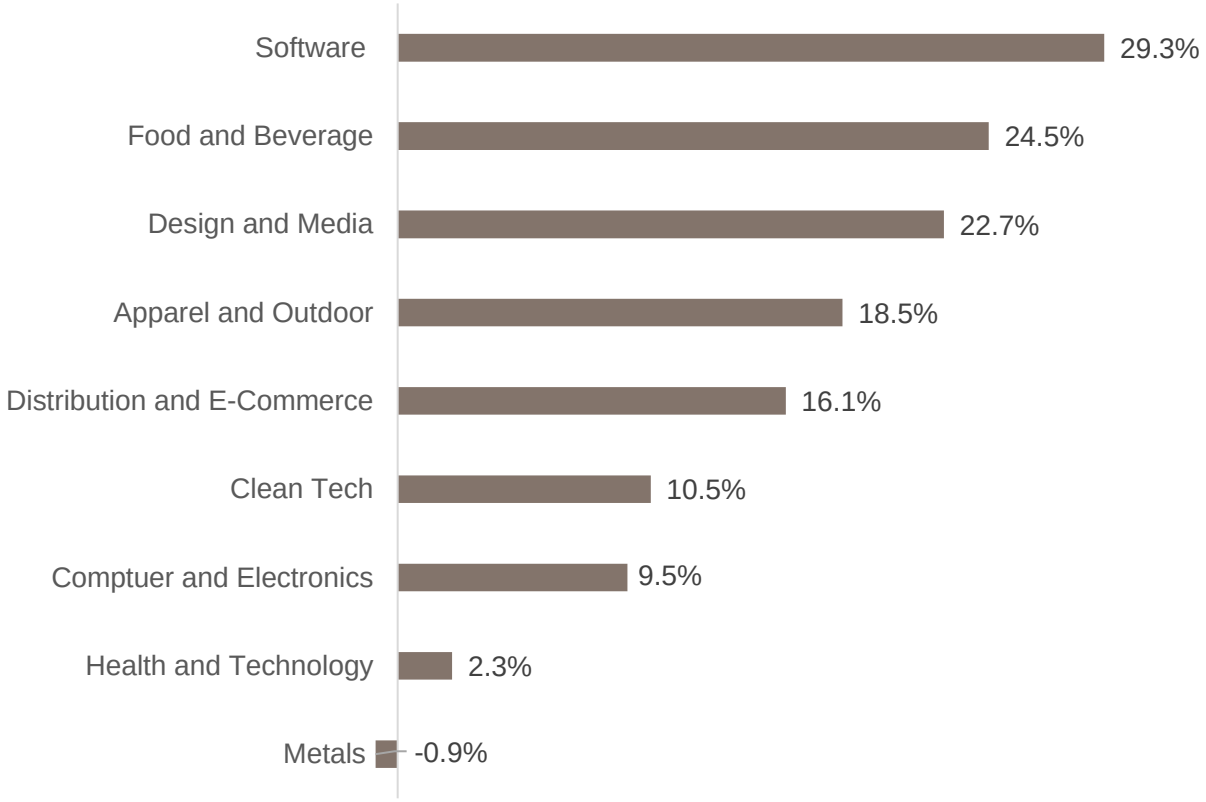
Source: EMSI 2019.4 dataset.
Note: Orange shading represents an employment decline

Portland's Traded Sector Cluster: Employment



Source: EMSI 2019.4 dataset.

Portland's Traded Sector Cluster: 5-Year Employment Growth, 2014-2019



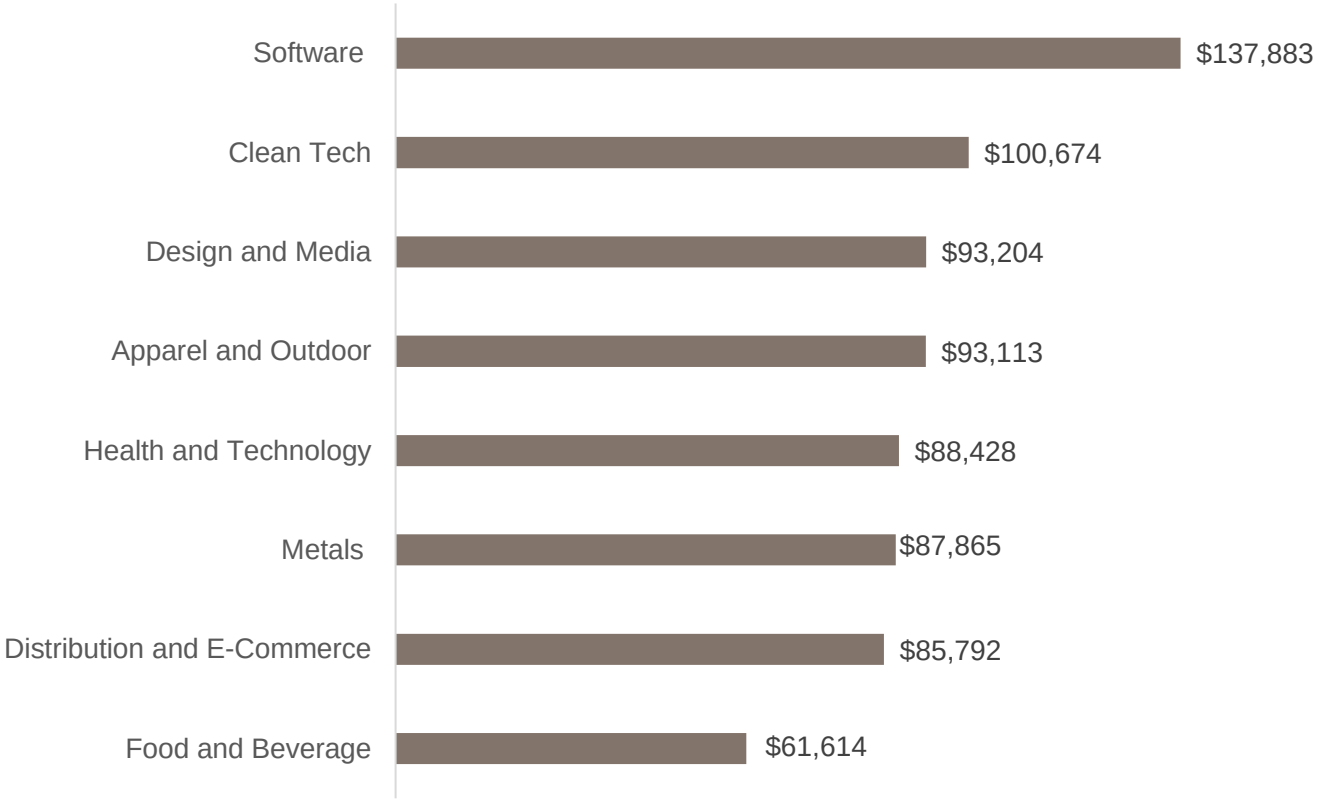
Source: EMSI 2019.4 dataset.

Portland's Traded Sector Cluster: Gross Regional Product, 2019

Sector	GRP 2019 (In Billions)	Share of Region's GDP
Computer and Electronics	$11.9	7.2%
Distribution and E-Commerce	$11.9	7.2%
Software	$8.8	5.3%
Design and Media	$4.2	2.6%
Metals	$3.3	2.0%
Food and Beverage	$2.4	1.5%
Clean Tech	$2.0	1.2%
Apparel and Outdoor	$1.5	0.9%
Health and Technology	$1.0	0.6%

Source: EMSI 2019.4 dataset.

Portland's Traded Sector Cluster: Earnings Per Worker, 2019



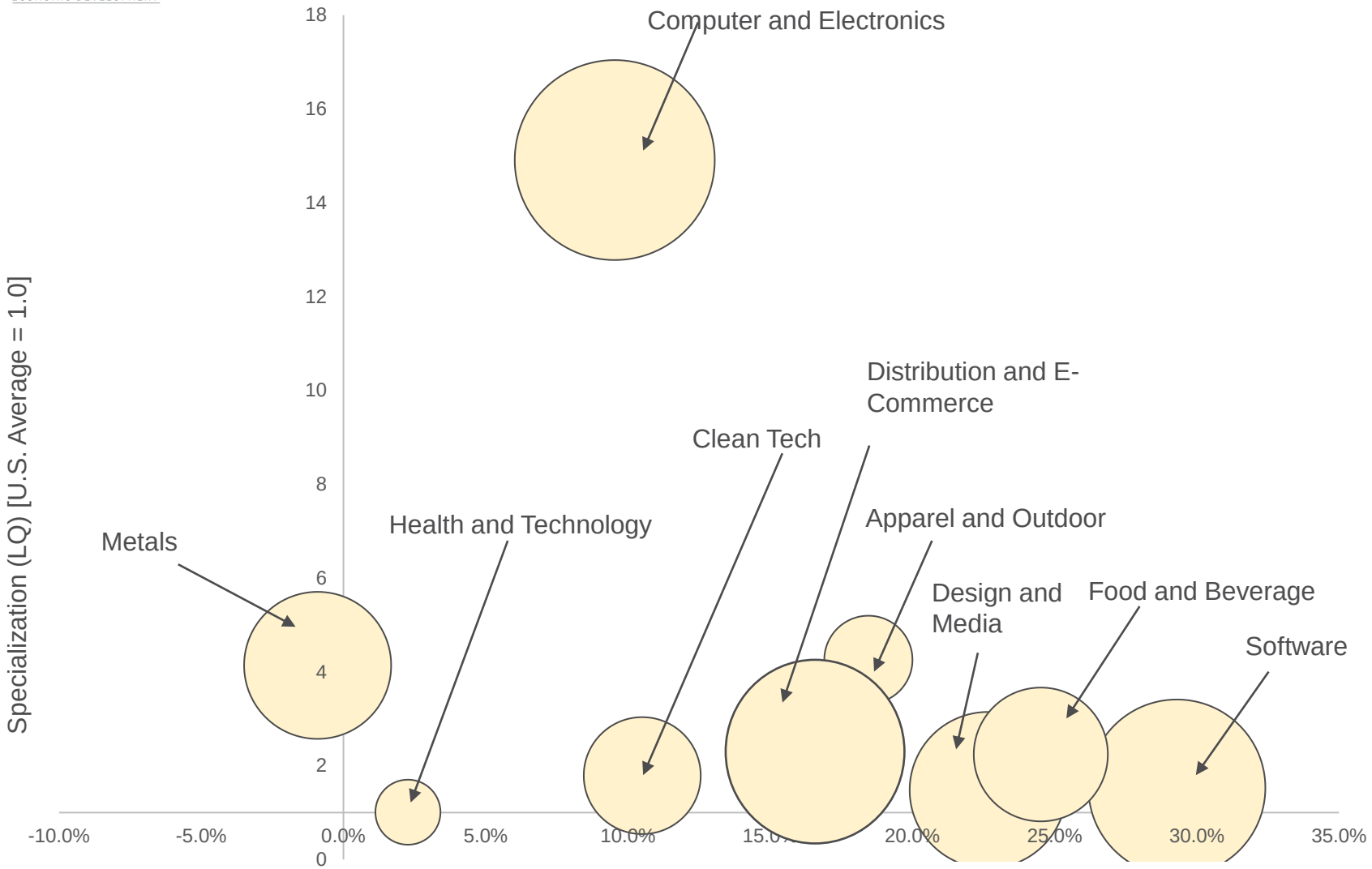
Source: EMSI 2019.4 dataset.

Portland's Traded Sector Cluster: Establishments, 2019

Sector	Establishments	Average Employees Per Establishments
Software	4,282	8
Distribution and E-Commerce	6,110	10
Design and Media	2,531	10
Clean Tech	843	17
Food and Beverage	832	22
Metals	574	39
Apparel and Outdoor	518	16
Computer and Electronics	359	114
Health and Technology	208	21

Source: EMSI 2019.4 dataset.

Size of Bubble: Total Employment



Source: EMSI 2019.4 dataset.

5-Year Employment, 2014-2019

Traded Sector Profiles

Computer and Electronics

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
	Computer and Electronics	**14.91**	**41,045**		**3,566**	**$11.9 billion**	**$161,480**	**359**	**114**
334413	Semiconductor and Related Device Manufacturing	19.36	27,818	67.8%	2,681	$9,032,140,195	$182,080	65	428
333242	Semiconductor Machinery Manufacturing	16.75	2,965	7.2%	1,405	$649,596,752	$145,713	11	270
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	4.99	1,489	3.6%	(23)	$368,002,824	$139,132	19	78
334412	Bare Printed Circuit Board Manufacturing	3.54	764	1.9%	(164)	$61,245,528	$57,707	12	64
334516	Analytical Laboratory Instrument Manufacturing	3.24	974	2.4%	279	$356,206,470	$116,915	12	81
334118	Computer Terminal and Other Computer Peripheral Equipment Manufacturing	2.78	772	1.9%	(418)	$120,954,935	$81,505	13	59
334310	Audio and Video Equipment Manufacturing	2.63	418	1.0%	32	$50,679,152	$86,663	15	28
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing	2.27	1,061	2.6%	245	$207,048,788	$71,092	18	59
334416	Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing	2.05	275	0.7%	(126)	$28,934,072	$79,128	3	92
334419	Other Electronic Component Manufacturing	1.40	667	1.6%	(52)	$74,668,822	$79,374	21	32

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Computer and Electronics (Continued)

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	1.31	648	1.6%	(79)	$63,387,420	$81,511	20	32
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	1.05	1,078	2.6%	230	$351,738,475	$137,194	10	108
334514	Totalizing Fluid Meter and Counting Device Manufacturing	0.84	63	0.2%	(65)	$25,288,115	$59,634	5	13
334290	Other Communications Equipment Manufacturing	0.84	121	0.3%	(62)	$16,718,786	$87,630	6	20
423430	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers	0.82	1,414	3.4%	(25)	$417,787,121	$173,006	99	14
334111	Electronic Computer Manufacturing	0.44	368	0.9%	(168)	$51,547,113	$124,765	5	74
334417	Electronic Connector Manufacturing	0.42	73	0.2%	(88)	$6,441,633	$64,884	4	18
334614	Software and Other Prerecorded Compact Disc, Tape, and Record Reproducing	0.34	22	0.1%	(3)	$6,400,257	$81,053	11	2
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use	0.26	29	0.1%	20	$3,010,207	$83,131	3	10
334519	Other Measuring and Controlling Device Manufacturing	0.09	25	0.1%	(53)	$8,345,000	$73,656	9	3

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Apparel and Outdoor

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
	Apparel and Outdoor	**4.26**	**8,101**		**1,320**	**$1.5 billion**	**$93,113**	**518**	**16**
332215	Metal Kitchen Cookware, Utensil, Cutlery, and Flatware (except Precious) Manufacturing	12.23	888	11.0%	276	$98,831,970	$69,633	11	81
424340	Footwear Merchant Wholesalers	6.79	1,237	15.3%	605	$567,595,078	$207,822	24	52
332216	Saw Blade and Handtool Manufacturing	5.83	1,275	15.7%	(234)	$185,449,610	$91,251	9	142
424320	Men's and Boys' Clothing and Furnishings Merchant Wholesalers	2.83	644	8.0%	211	$93,831,416	$61,607	17	38
316210	Footwear Manufacturing	2.59	255	3.1%	(17)	$20,812,145	$61,985	7	36
336991	Motorcycle, Bicycle, and Parts Manufacturing	2.20	168	2.1%	(52)	$53,614,631	$63,134	15	11
423910	Sporting and Recreational Goods and Supplies Merchant Wholesalers	1.84	792	9.8%	102	$145,790,443	$86,622	60	13
541420	Industrial Design Services	1.78	265	3.3%	(16)	$45,488,101	$95,335	33	8
541490	Other Specialized Design Services	1.76	226	2.8%	73	$46,644,533	$93,898	59	4
316998	All Other Leather Good and Allied Product Manufacturing	1.66	128	1.6%	52	$6,704,928	$36,447	15	9
541410	Interior Design Services	1.47	545	6.7%	191	$86,520,114	$62,961	117	5
313210	Broadwoven Fabric Mills	1.42	272	3.4%	96	$26,775,956	$54,687	1	272
316992	Women's Handbag and Purse Manufacturing	1.32	12	0.2%	3	$1,292,164	$52,043	3	4

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Apparel and Outdoor (Continued)

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
315220	Men's and Boys' Cut and Sew Apparel Manufacturing	1.23	225	2.8%	11	$13,682,108	$56,361	11	20
339920	Sporting and Athletic Goods Manufacturing	1.21	402	5.0%	48	$49,668,137	$72,575	28	14
315240	Women's, Girls', and Infants' Cut and Sew Apparel Manufacturing	1.12	174	2.1%	(10)	$14,425,694	$61,440	8	22
315990	Apparel Accessories and Other Apparel Manufacturing	0.75	72	0.9%	54	$7,427,755	$38,256	9	8
314999	All Other Miscellaneous Textile Product Mills	0.60	149	1.8%	(57)	$9,222,005	$42,059	19	8
314910	Textile Bag and Canvas Mills	0.41	81	1.0%	(3)	$5,873,647	$51,029	14	6
315280	Other Cut and Sew Apparel Manufacturing	0.36	35	0.4%	(5)	$3,098,642	$43,992	5	7
313230	Nonwoven Fabric Mills	0.32	37	0.5%	8	$5,405,578	$85,699	2	19
315210	Cut and Sew Apparel Contractors	0.24	59	0.7%	0	$8,873,348	$60,403	11	5
313310	Textile and Fabric Finishing Mills	0.21	35	0.4%	0	$2,277,119	$47,079	5	7
424330	Women's, Children's, and Infants' Clothing and Accessories Merchant Wholesalers	0.18	103	1.3%	(26)	$43,269,683	$67,521	30	3
332994	Small Arms, Ordnance, and Ordnance Accessories Manufacturing	0.13	21	0.3%	12	$3,407,789	$62,471	6	4

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Metals

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
	Metals	**4.14**	**22,266**		**(204)**	**$3.3 billion**	**$87,865**	**574**	**39**
331512	Steel Investment Foundries	17.93	1,829	8.2%	29	$319,430,127	$96,058	3	610
331529	Other Nonferrous Metal Foundries (except Die-Casting)	11.42	1,221	5.5%	385	$141,180,300	$84,363	6	204
331513	Steel Foundries (except Investment)	9.44	1,009	4.5%	(715)	$173,742,354	$108,945	6	168
333314	Optical Instrument and Lens Manufacturing	7.03	1,129	5.1%	358	$105,228,332	$87,121	7	161
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing	3.15	372	1.7%	(20)	$51,101,839	$69,034	7	53
333914	Measuring, Dispensing, and Other Pumping Equipment Manufacturing	3.10	709	3.2%	21	$148,969,541	$96,287	9	79
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing	2.51	2,216	10.0%	(17)	$595,732,630	$125,063	8	277
336120	Heavy Duty Truck Manufacturing	2.35	656	2.9%	48	$113,115,185	$58,159	2	328
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing	2.24	266	1.2%	(15)	$33,228,174	$73,060	4	67
333413	Industrial and Commercial Fan and Blower and Air Purification Equipment Manufacturing	1.94	458	2.1%	(64)	$45,352,576	$71,257	6	76
332312	Fabricated Structural Metal Manufacturing	1.90	1,353	6.1%	337	$170,251,990	$90,398	28	48
332996	Fabricated Pipe and Pipe Fitting Manufacturing	1.77	451	2.0%	(30)	$52,913,893	$72,380	10	45
331318	Other Aluminum Rolling, Drawing, and Extruding	1.72	388	1.7%	0	$39,076,857	$58,794	4	97
327910	Abrasive Product Manufacturing	1.69	141	0.6%	17	$77,927,494	$103,437	4	35
336611	Ship Building and Repairing	1.43	1,085	4.9%	(138)	$160,292,821	$120,369	14	78
332613	Spring Manufacturing	1.39	193	0.9%	86	$17,624,880	$68,134	8	24
332710	Machine Shops	1.38	3,055	13.7%	523	$255,587,985	$69,894	179	17
333249	Other Industrial Machinery Manufacturing	1.38	616	2.8%	(2)	$69,871,174	$78,399	20	31
333924	Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing	1.34	288	1.3%	(178)	$67,517,970	$119,348	5	58
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing	1.27	821	3.7%	(238)	$76,745,919	$63,296	51	16
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	1.21	569	2.6%	110	$55,122,924	$55,612	39	15
332313	Plate Work Manufacturing	1.13	423	1.9%	(140)	$49,719,606	$84,903	10	42

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Metals (Continued)

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
331523	Nonferrous Metal Die-Casting Foundries	1.10	213	1.0%	(49)	$16,118,716	$55,201	4	53
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	1.01	476	2.1%	(36)	$49,348,461	$60,846	26	18
333922	Conveyor and Conveying Equipment Manufacturing	1.01	266	1.2%	(37)	$46,891,245	$88,826	7	38
332618	Other Fabricated Wire Product Manufacturing	0.97	192	0.9%	(67)	$19,662,339	$77,006	9	21
333511	Industrial Mold Manufacturing	0.96	280	1.3%	26	$20,935,720	$61,067	13	22
332114	Custom Roll Forming	0.93	47	0.2%	16	$19,385,184	$66,794	4	12
331110	Iron and Steel Mills and Ferroalloy Manufacturing	0.83	552	2.5%	8	$168,362,218	$118,980	6	92
333316	Photographic and Photocopying Equipment Manufacturing	0.75	38	0.2%	26	$5,182,365	$102,716	3	13
333613	Mechanical Power Transmission Equipment Manufacturing	0.74	80	0.4%	14	$11,579,953	$75,860	2	40
333612	Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing	0.60	58	0.3%	29	$10,048,196	$85,860	3	19
333318	Other Commercial and Service Industry Machinery Manufacturing	0.41	208	0.9%	(221)	$42,545,406	$125,578	13	16
332111	Iron and Steel Forging	0.32	58	0.3%	(26)	$5,605,829	$59,888	5	12
333515	Cutting Tool and Machine Tool Accessory Manufacturing	0.31	60	0.3%	36	$5,891,233	$66,467	5	12
333131	Mining Machinery and Equipment Manufacturing	0.30	24	0.1%	0	$3,983,593	$124,682	1	24
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing	0.26	124	0.6%	28	$12,801,481	$70,397	14	9
333517	Machine Tool Manufacturing	0.22	73	0.3%	3	$8,773,564	$83,003	10	7
333120	Construction Machinery Manufacturing	0.20	112	0.5%	(125)	$19,601,280	$86,917	6	19
333111	Farm Machinery and Equipment Manufacturing	0.12	56	0.3%	(37)	$16,297,687	$122,044	5	11
332119	Metal Crown, Closure, and Other Metal Stamping (except Automotive)	0.12	49	0.2%	(37)	$4,756,173	$63,505	4	12
333611	Turbine and Turbine Generator Set Units Manufacturing	0.10	19	0.1%	(24)	$3,190,006	$88,160	3	6
333618	Other Engine Equipment Manufacturing	0.07	28	0.1%	(32)	$6,284,892	$111,616	2	14

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Food and Beverage

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
	Food and Beverage	**2.24**	**18,538**		**3,650**	**$2.4 billion**	**$61,614**	**832**	**22**
311213	Malt Manufacturing	16.21	158	0.9%	34	$32,849,338	$85,824	2	79
311422	Specialty Canning	4.80	409	2.2%	388	$60,585,934	$84,873	6	68
311991	Perishable Prepared Food Manufacturing	4.55	1,984	10.7%	342	$145,660,237	$45,967	47	42
311211	Flour Milling	3.99	422	2.3%	157	$92,873,792	$85,332	4	106
311920	Coffee and Tea Manufacturing	3.87	754	4.1%	30	$132,193,480	$55,496	51	15
311821	Cookie and Cracker Manufacturing	2.70	722	3.9%	119	$105,863,970	$74,584	12	60
311812	Commercial Bakeries	2.28	2,434	13.1%	(13)	$177,518,992	$58,797	70	35
424480	Fresh Fruit and Vegetable Merchant Wholesalers	2.24	1,746	9.4%	351	$188,627,912	$64,969	35	50
424460	Fish and Seafood Merchant Wholesalers	2.20	479	2.6%	124	$67,096,576	$82,247	20	24
311412	Frozen Specialty Food Manufacturing	2.04	964	5.2%	464	$87,703,364	$50,686	8	121
327213	Glass Container Manufacturing	1.88	192	1.0%	19	$40,649,477	$99,264	3	64
312120	Breweries	1.63	1,067	5.8%	606	$307,805,918	$54,624	87	12
311511	Fluid Milk Manufacturing	1.47	616	3.3%	(550)	$93,035,147	$75,698	7	88
311421	Fruit and Vegetable Canning	1.39	621	3.4%	161	$45,129,357	$41,520	20	31

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Food and Beverage (Continued)

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
311941	Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing	1.28	183	1.0%	15	$22,031,785	$47,822	9	20
311919	Other Snack Food Manufacturing	1.21	399	2.2%	(11)	$121,123,367	$109,048	6	67
424470	Meat and Meat Product Merchant Wholesalers	1.19	441	2.4%	90	$48,159,970	$62,484	30	15
311411	Frozen Fruit, Juice, and Vegetable Manufacturing	1.10	264	1.4%	209	$24,893,344	$52,396	8	33
311225	Fats and Oils Refining and Blending	1.09	58	0.3%	(30)	$19,697,267	$66,983	2	29
312130	Wineries	1.06	574	3.1%	272	$72,163,226	$44,204	88	7
424430	Dairy Product (except Dried or Canned) Merchant Wholesalers	1.01	292	1.6%	90	$60,135,765	$121,732	22	13
311520	Ice Cream and Frozen Dessert Manufacturing	0.99	168	0.9%	58	$14,082,633	$56,302	4	42
311352	Confectionery Manufacturing from Purchased Chocolate	0.86	220	1.2%	97	$20,009,130	$44,349	25	9
311824	Dry Pasta, Dough, and Flour Mixes Manufacturing from Purchased Flour	0.84	138	0.7%	41	$14,789,727	$47,851	8	17
311811	Retail Bakeries	0.82	563	3.0%	39	$21,916,119	$28,044	58	10
424820	Wine and Distilled Alcoholic Beverage Merchant Wholesalers	0.81	564	3.0%	270	$114,291,082	$81,341	54	10
333241	Food Product Machinery Manufacturing	0.81	122	0.7%	(30)	$13,771,305	$71,375	11	11
311512	Creamery Butter Manufacturing	0.77	18	0.1%	9	$3,782,774	$99,458	1	18
311423	Dried and Dehydrated Food Manufacturing	0.74	74	0.4%	45	$11,061,443	$80,327	7	11
311612	Meat Processed from Carcasses	0.73	752	4.1%	141	$85,079,905	$62,361	16	47
311710	Seafood Product Preparation and Packaging	0.72	197	1.1%	81	$12,452,217	$48,147	5	39
312112	Bottled Water Manufacturing	0.71	92	0.5%	19	$10,140,096	$63,593	6	15

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Food and Beverage (Continued)

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
312140	Distilleries	0.68	91	0.5%	13	$57,490,355	$47,997	13	7
311340	Nonchocolate Confectionery Manufacturing	0.60	99	0.5%	64	$9,313,221	$36,532	15	7
311930	Flavoring Syrup and Concentrate Manufacturing	0.60	41	0.2%	(7)	$8,084,893	$88,208	4	10
311942	Spice and Extract Manufacturing	0.42	80	0.4%	49	$11,164,953	$54,834	5	16
311999	All Other Miscellaneous Food Manufacturing	0.40	108	0.6%	37	$15,404,747	$66,870	17	6
311830	Tortilla Manufacturing	0.39	58	0.3%	44	$3,970,212	$33,918	2	29
311351	Chocolate and Confectionery Manufacturing from Cacao Beans	0.36	27	0.1%	11	$1,819,263	$23,062	7	4
311230	Breakfast Cereal Manufacturing	0.31	31	0.2%	31	$5,056,165	$71,075	2	16
311119	Other Animal Food Manufacturing	0.28	78	0.4%	1	$15,105,118	$64,634	7	11
311911	Roasted Nuts and Peanut Butter Manufacturing	0.19	13	0.1%	4	$6,417,815	$66,708	6	2
312111	Soft Drink Manufacturing	0.18	111	0.6%	(11)	$18,198,595	$89,306	6	19
311111	Dog and Cat Food Manufacturing	0.18	40	0.2%	23	$10,778,761	$63,878	7	6
311513	Cheese Manufacturing	0.05	21	0.1%	(42)	$3,467,922	$74,739	5	4
311611	Animal (except Poultry) Slaughtering	0.02	20	0.1%	(3)	$2,683,065	$63,055	4	5

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Clean Tech Cluster

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
	Clean Tech	**1.79**	**14,174**		**1,382**	**$2.0 billion**	**$100,674**	**843**	**17**
335121	Residential Electric Lighting Fixture Manufacturing	6.42	438	3.1%	351	$46,865,142	$68,132	3	146
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	4.99	1,489	10.5%	(23)	$368,002,824	$139,132	19	78
334516	Analytical Laboratory Instrument Manufacturing	3.24	974	6.9%	279	$356,206,470	$116,915	12	81
221115	Wind Electric Power Generation	2.52	130	0.9%	48	$89,500,745	$155,570	5	26
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing	2.24	266	1.9%	(15)	$33,228,174	$73,060	4	67
541620	Environmental Consulting Services	1.75	1,223	8.6%	38	$146,985,915	$91,859	134	9
326212	Tire Retreading	1.73	87	0.6%	(28)	$6,591,981	$51,151	4	22
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing	1.45	251	1.8%	96	$42,924,205	$112,516	10	25
562111	Solid Waste Collection	1.29	1,624	11.5%	35	$204,568,879	$71,359	73	22
335911	Storage Battery Manufacturing	1.08	234	1.7%	2	$65,416,582	$113,952	2	117
562910	Remediation Services	1.04	732	5.2%	161	$97,636,024	$70,616	61	12
541350	Building Inspection Services	0.99	180	1.3%	60	$20,987,044	$61,065	55	3
562920	Materials Recovery Facilities	0.95	146	1.0%	26	$14,581,709	$56,405	6	24
321911	Wood Window and Door Manufacturing	0.91	369	2.6%	93	$41,633,700	$64,494	14	26
541380	Testing Laboratories	0.90	1,226	8.6%	39	$111,108,197	$76,295	93	13
562991	Septic Tank and Related Services	0.89	198	1.4%	48	$22,643,032	$59,244	23	9

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Clean Tech (Continued)

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	0.79	2,626	18.5%	(65)	$460,238,047	$141,163	215	12
237130	Power and Communication Line and Related Structures Construction	0.73	1,189	8.4%	139	$164,564,836	$103,291	58	21
321219	Reconstituted Wood Product Manufacturing	0.68	76	0.5%	8	$13,132,454	$80,233	4	19
562998	All Other Miscellaneous Waste Management Services	0.49	76	0.5%	(37)	$9,094,119	$64,861	12	6
333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	0.44	312	2.2%	182	$42,865,917	$63,278	5	62
332321	Metal Window and Door Manufacturing	0.38	191	1.3%	29	$17,457,853	$67,762	10	19
335311	Power, Distribution, and Specialty Transformer Manufacturing	0.16	33	0.2%	33	$6,428,468	$148,898	4	8
334519	Other Measuring and Controlling Device Manufacturing	0.09	25	0.2%	(53)	$8,345,000	$73,656	9	3
335312	Motor and Generator Manufacturing	0.05	16	0.1%	0	$3,261,271	$70,731	4	4

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Software

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
	Software	**1.53**	**32,169**		**7,290**	**$8.8 billion**	**$137,883**	**4,282**	**8**
511210	Software Publishers	2.60	8,956	27.8%	2,017	$3,289,910,251	$148,210	1,317	7
541513	Computer Facilities Management Services	2.21	1,313	4.1%	(138)	$225,206,739	$122,846	44	30
518210	Data Processing, Hosting, and Related Services	1.77	4,671	14.5%	1,861	$1,701,557,066	$139,992	275	17
512110	Motion Picture and Video Production	1.03	1,876	5.8%	188	$449,499,728	$66,608	206	9
541512	Computer Systems Design Services	0.88	7,095	22.1%	568	$1,383,337,448	$146,264	893	8
541511	Custom Computer Programming Services	0.85	6,451	20.1%	2,569	$1,222,304,866	$144,471	1,056	6
512240	Sound Recording Studios	0.69	25	0.1%	(1)	$23,918,963	$57,377	11	2
541519	Other Computer Related Services	0.61	558	1.7%	(158)	$114,944,621	$120,526	149	4
519130	Internet Publishing and Broadcasting and Web Search Portals	0.58	1,192	3.7%	373	$407,552,764	$105,956	321	4
512191	Teleproduction and Other Postproduction Services	0.23	30	0.1%	9	$11,518,467	$104,167	10	3

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Design and Media

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
	Design and Media	**1.48**	**25,282**		**4,672**	**$4.2 billion**	**$93,204**	**2,531**	**10**
541930	Translation and Interpretation Services	3.38	1,115	4.4%	258	$120,867,047	$56,126	61	18
541430	Graphic Design Services	2.41	1,158	4.6%	155	$228,377,885	$82,322	224	5
541840	Media Representatives	1.89	311	1.2%	(65)	$57,305,527	$100,653	34	9
541310	Architectural Services	1.82	2,740	10.8%	669	$363,418,744	$99,481	265	10
541810	Advertising Agencies	1.81	3,014	11.9%	972	$608,545,033	$109,744	265	11
541340	Drafting Services	1.74	127	0.5%	(21)	$22,258,346	$75,782	35	4
541860	Direct Mail Advertising	1.52	526	2.1%	(29)	$60,185,599	$59,853	25	21
541320	Landscape Architectural Services	1.48	391	1.5%	119	$53,680,667	$86,188	54	7
541890	Other Services Related to Advertising	1.36	1,107	4.4%	168	$92,503,817	$38,886	60	18
541910	Marketing Research and Public Opinion Polling	1.26	883	3.5%	0	$127,034,307	$97,751	80	11
541820	Public Relations Agencies	1.23	595	2.4%	(226)	$152,908,217	$101,190	109	5
541360	Geophysical Surveying and Mapping Services	1.19	143	0.6%	126	$15,183,678	$82,599	4	36
541330	Engineering Services	1.17	9,098	36.0%	2,110	$1,221,338,011	$107,820	717	13
541990	All Other Professional, Scientific, and Technical Services	1.09	1,487	5.9%	335	$563,482,424	$89,815	289	5
512110	Motion Picture and Video Production	1.03	1,876	7.4%	188	$449,499,728	$66,608	206	9
541870	Advertising Material Distribution Services	0.91	98	0.4%	55	$5,737,217	$26,284	11	9
541370	Surveying and Mapping (except Geophysical) Services	0.83	335	1.3%	77	$30,877,293	$72,674	50	7
512240	Sound Recording Studios	0.69	25	0.1%	(1)	$23,918,963	$57,377	11	2
541850	Outdoor Advertising	0.69	210	0.8%	(217)	$31,622,145	$70,597	10	21
512191	Teleproduction and Other Postproduction Services	0.23	30	0.1%	9	$11,518,467	$104,167	10	3
541830	Media Buying Agencies	0.09	12	0.0%	(14)	$8,276,341	$149,312	12	1

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Distribution and E-Commerce

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
	Distribution and E-Commerce	**1.28**	**59,360**		**8,262**	**$11.9 billion**	**$85,792**	**6,110**	**10**
424340	Footwear Merchant Wholesalers	6.79	1,237	2.1%	605	$567,595,078	$207,822	24	52
424320	Men's and Boys' Clothing and Furnishings Merchant Wholesalers	2.83	644	1.1%	211	$93,831,416	$61,607	17	38
424110	Printing and Writing Paper Merchant Wholesalers	2.66	276	0.5%	(5)	$61,457,064	$90,880	21	13
481219	Other Nonscheduled Air Transportation	2.60	122	0.2%	109	$74,127,562	$96,875	6	20
424480	Fresh Fruit and Vegetable Merchant Wholesalers	2.24	1,746	2.9%	351	$188,627,912	$64,969	35	50
423840	Industrial Supplies Merchant Wholesalers	2.04	1,529	2.6%	524	$322,847,351	$115,509	126	12
423910	Sporting and Recreational Goods and Supplies Merchant Wholesalers	1.84	792	1.3%	102	$145,790,443	$86,622	60	13
488490	Other Support Activities for Road Transportation	1.83	545	0.9%	(14)	$29,559,358	$42,673	30	18
424940	Tobacco and Tobacco Product Merchant Wholesalers	1.83	350	0.6%	116	$55,077,837	$60,404	9	39
424930	Flower, Nursery Stock, and Florists' Supplies Merchant Wholesalers	1.73	609	1.0%	(19)	$65,416,273	$40,475	33	18
423420	Office Equipment Merchant Wholesalers	1.71	1,062	1.8%	44	$163,572,604	$85,439	76	14
493190	Other Warehousing and Storage	1.62	632	1.1%	173	$55,824,954	$69,994	38	17
425120	Wholesale Trade Agents and Brokers	1.49	5,812	9.8%	(4,114)	$811,452,423	$104,363	2,201	3
488119	Other Airport Operations	1.47	1,208	2.0%	485	$50,589,350	$34,285	14	86
423490	Other Professional Equipment and Supplies Merchant Wholesalers	1.38	357	0.6%	113	$55,174,146	$89,095	41	9
423510	Metal Service Centers and Other Metal Merchant Wholesalers	1.27	1,318	2.2%	104	$203,288,079	$84,036	101	13
423690	Other Electronic Parts and Equipment Merchant Wholesalers	1.26	1,412	2.4%	283	$652,697,388	$172,827	141	10
423810	Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers	1.26	913	1.5%	61	$143,843,333	$86,381	51	18

Source: EMSI 2019.4 dataset.
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Distribution and E-Commerce (Continued)

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
424710	Petroleum Bulk Stations and Terminals	1.23	324	0.5%	32	$658,690,704	$117,978	16	20
423440	Other Commercial Equipment Merchant Wholesalers	1.20	528	0.9%	39	$64,453,386	$76,306	52	10
488510	Freight Transportation Arrangement	1.14	2,092	3.5%	362	$207,492,969	$75,952	217	10
423620	Household Appliances, Electric Housewares, and Consumer Electronics Merchant Wholesalers	1.13	286	0.5%	119	$67,222,118	$88,056	39	7
424210	Drugs and Druggists' Sundries Merchant Wholesalers	1.12	2,051	3.5%	941	$1,027,008,188	$126,136	159	13
488991	Packing and Crating	1.12	175	0.3%	47	$14,022,356	$63,037	10	18
454110	Electronic Shopping and Mail-Order Houses	1.11	3,452	5.8%	713	$877,038,178	$75,655	385	9
423830	Industrial Machinery and Equipment Merchant Wholesalers	1.10	2,845	4.8%	(11)	$521,811,763	$97,267	289	10
481111	Scheduled Passenger Air Transportation	1.09	3,786	6.4%	767	$853,803,797	$91,030	17	223
423220	Home Furnishing Merchant Wholesalers	1.08	545	0.9%	86	$98,903,610	$97,943	42	13
423920	Toy and Hobby Goods and Supplies Merchant Wholesalers	1.06	169	0.3%	24	$23,638,409	$49,281	19	9
424590	Other Farm Product Raw Material Merchant Wholesalers	1.02	74	0.1%	55	$8,815,218	$48,433	13	6
424310	Piece Goods, Notions, and Other Dry Goods Merchant Wholesalers	1.00	197	0.3%	52	$33,300,991	$67,298	19	10
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	0.99	1,382	2.3%	432	$384,993,367	$91,526	131	11
491110	Postal Service	0.92	53	0.1%	18	($799,665)	$44,165	4	13
424610	Plastics Materials and Basic Forms and Shapes Merchant Wholesalers	0.91	205	0.3%	63	$49,994,651	$84,964	50	4
493110	General Warehousing and Storage	0.86	7,247	12.2%	4,543	$383,105,840	$46,382	116	62
481112	Scheduled Freight Air Transportation	0.85	75	0.1%	4	$19,142,681	$85,753	6	13
532420	Office Machinery and Equipment Rental and Leasing	0.83	63	0.1%	6	$18,414,169	$98,356	8	8
424690	Other Chemical and Allied Products Merchant Wholesalers	0.80	740	1.2%	186	$203,725,749	$104,106	77	10

Source: EMSI 2019.4 dataset.
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Distribution and E-Commerce (Continued)

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
424950	Paint, Varnish, and Supplies Merchant Wholesalers	0.80	140	0.2%	8	$41,069,748	$79,457	24	6
484121	General Freight Trucking, Long-Distance, Truckload	0.80	3,245	5.5%	(7)	$552,754,588	$74,157	414	8
424990	Other Miscellaneous Nondurable Goods Merchant Wholesalers	0.79	509	0.9%	124	$124,494,641	$71,292	83	6
482110	Rail transportation	0.75	1,306	2.2%	(38)	$242,946,617	$91,240	1	1306
484230	Specialized Freight (except Used Goods) Trucking, Long-Distance	0.75	805	1.4%	79	$84,882,308	$84,171	45	18
424130	Industrial and Personal Service Paper Merchant Wholesalers	0.73	372	0.6%	(88)	$73,415,799	$79,893	46	8
423850	Service Establishment Equipment and Supplies Merchant Wholesalers	0.73	320	0.5%	4	$38,589,552	$55,747	52	6
532411	Commercial Air, Rail, and Water Transportation Equipment Rental and Leasing	0.72	30	0.1%	19	$45,010,270	$237,071	5	6
532490	Other Commercial and Industrial Machinery and Equipment Rental and Leasing	0.69	383	0.6%	79	$91,069,659	$71,818	49	8
423860	Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers	0.68	181	0.3%	29	$28,209,622	$82,131	23	8
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	0.66	1,295	2.2%	452	$388,128,417	$127,870	191	7
488210	Support Activities for Rail Transportation	0.65	183	0.3%	(26)	$13,746,114	$57,403	9	20
532412	Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing	0.62	393	0.7%	81	$105,691,658	$85,394	41	10
488190	Other Support Activities for Air Transportation	0.56	529	0.9%	(6)	$43,046,131	$64,570	33	16
424920	Book, Periodical, and Newspaper Merchant Wholesalers	0.54	149	0.3%	3	$34,423,989	$63,824	22	7
485510	Charter Bus Industry	0.54	117	0.2%	(59)	$8,179,198	$55,046	8	15
493130	Farm Product Warehousing and Storage	0.47	40	0.1%	25	$3,764,803	$72,457	3	13
424910	Farm Supplies Merchant Wholesalers	0.46	420	0.7%	(6)	$56,566,751	$57,955	55	8
423820	Farm and Garden Machinery and Equipment Merchant Wholesalers	0.46	366	0.6%	95	$50,308,084	$74,748	45	8
561910	Packaging and Labeling Services	0.46	218	0.4%	92	$16,779,160	$62,502	18	12

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Distribution and E-Commerce (Continued)

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
424120	Stationery and Office Supplies Merchant Wholesalers	0.45	173	0.3%	(98)	$40,676,089	$71,554	22	8
493120	Refrigerated Warehousing and Storage	0.44	223	0.4%	30	$19,593,005	$68,495	8	28
561499	All Other Business Support Services	0.42	264	0.4%	(105)	$38,250,438	$59,346	57	5
481211	Nonscheduled Chartered Passenger Air Transportation	0.42	99	0.2%	1	$46,054,590	$129,503	11	9
424720	Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)	0.41	223	0.4%	40	$370,373,877	$93,137	27	8
423210	Furniture Merchant Wholesalers	0.36	143	0.2%	13	$23,634,731	$73,586	28	5
423410	Photographic Equipment and Supplies Merchant Wholesalers	0.35	38	0.1%	11	$7,056,575	$98,716	15	3
423460	Ophthalmic Goods Merchant Wholesalers	0.33	59	0.1%	50	$10,027,764	$103,203	20	3
425110	Business to Business Electronic Markets	0.27	65	0.1%	(3)	$15,040,064	$79,376	17	4
424440	Poultry and Poultry Product Merchant Wholesalers	0.25	23	0.0%	(52)	$4,190,803	$94,988	1	23
485210	Interurban and Rural Bus Transportation	0.18	27	0.0%	(38)	$2,703,152	$60,579	1	27
423940	Jewelry, Watch, Precious Stone, and Precious Metal Merchant Wholesalers	0.18	54	0.1%	(41)	$19,480,993	$50,489	14	4
424330	Women's, Children's, and Infants' Clothing and Accessories Merchant Wholesalers	0.18	103	0.2%	(26)	$43,269,683	$67,521	30	3

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Health and Technology

NAICS	Sector	Location Quotient 2019	Employment 2019	% of Cluster Employment 2019	New Jobs, 2014-2019	GRP 2019	Avg. Earnings Per Worker 2019	Businesses 2019	Employ Per Biz 2019
	Health and Technology	**1.01**	**4,466**		**99**	**$1.0 billion**	**$88,428**	**208**	**21**
339113	Surgical Appliance and Supplies Manufacturing	1.56	1,255	28.1%	(29)	$257,197,967	$91,014	43	29
325120	Industrial Gas Manufacturing	1.29	189	4.2%	80	$33,008,735	$135,593	9	21
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	1.22	671	15.0%	(60)	$192,433,766	$76,079	17	39
339114	Dental Equipment and Supplies Manufacturing	1.18	146	3.3%	31	$19,195,413	$69,796	6	24
339115	Ophthalmic Goods Manufacturing	1.15	224	5.0%	(114)	$35,720,551	$70,397	10	22
311225	Fats and Oils Refining and Blending	1.09	58	1.3%	(30)	$19,697,267	$66,983	2	29
325180	Other Basic Inorganic Chemical Manufacturing	0.85	265	5.9%	128	$109,753,907	$111,144	7	38
325411	Medicinal and Botanical Manufacturing	0.76	183	4.1%	(148)	$26,348,761	$56,010	7	26
325412	Pharmaceutical Preparation Manufacturing	0.60	962	21.5%	143	$202,345,387	$72,005	31	31
325199	All Other Basic Organic Chemical Manufacturing	0.26	82	1.8%	73	$52,865,694	$82,504	2	41
541714	Research and Development in Biotechnology (except Nanobiotechnology)	0.21	340	7.6%	186	$60,423,954	$143,502	54	6
325413	In-Vitro Diagnostic Substance Manufacturing	0.18	40	0.9%	(71)	$11,144,233	$93,267	4	10

Source: EMSI 2019.4 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Occupational Cluster Profile

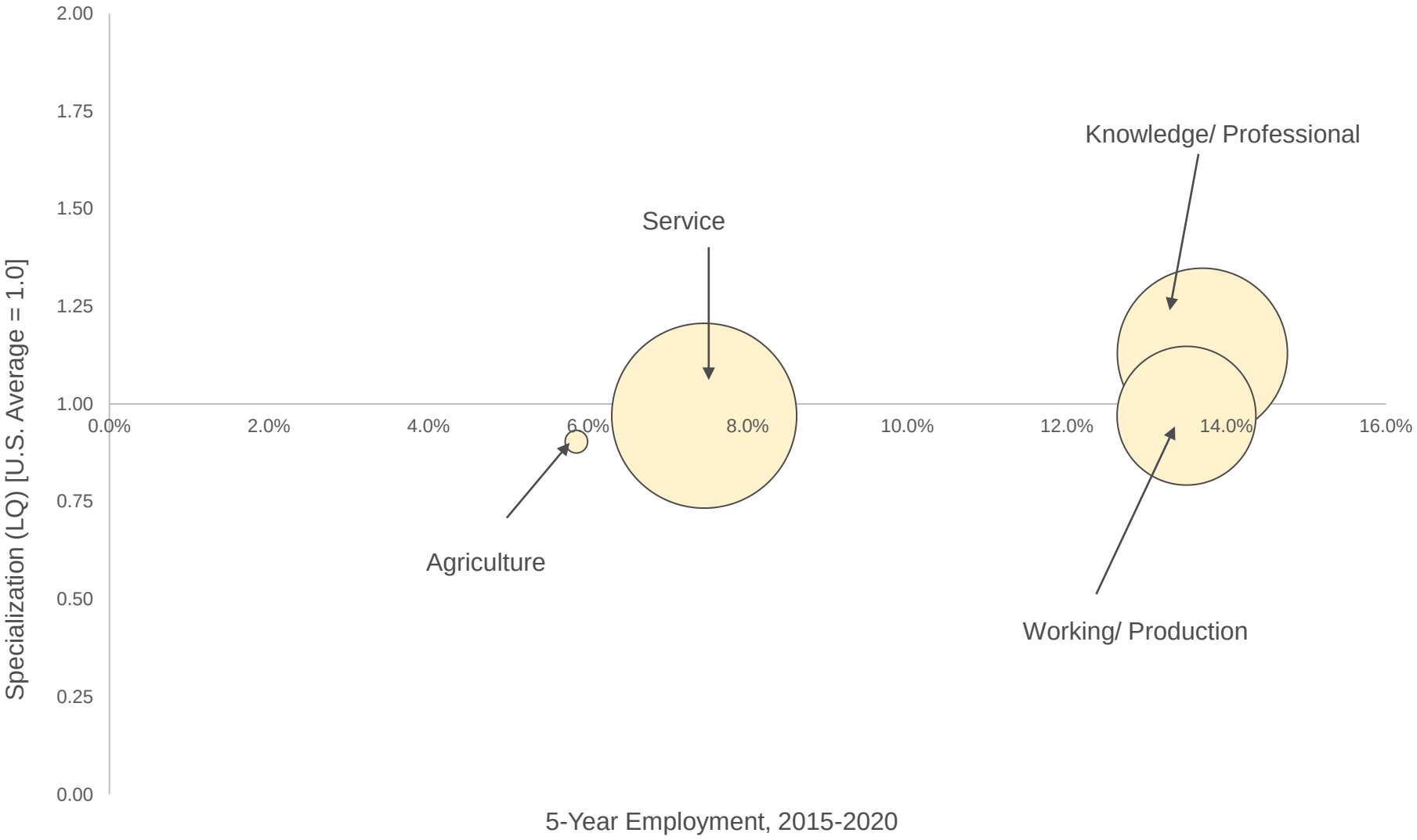
Portland's Occupational Profile

Occupational Cluster	Location Quotient 2020	2020 Jobs	5-Year Growth, 2015-2020	New Jobs Jobs 2015-2020	Median Annual Salary	Men (%)	Women (%)
Knowledge/ Professional	1.13	426,663	13.7%	51,560	$68,612	49.3%	50.7%
Service	0.97	502,880	7.5%	34,891	$33,933	37.0%	63.0%
Working/ Production	0.97	283,975	13.5%	33,805	$41,617	81.8%	18.2%
Agriculture	0.90	8,121	5.9%	449	$28,843	64.4%	35.6%
Total		1,221,639	11.0%	120,705	$50,083	52.0%	48.0%

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Size of Bubble: Total Employment

Portland's Occupational Profile



Source: EMSI 2020.1 dataset.

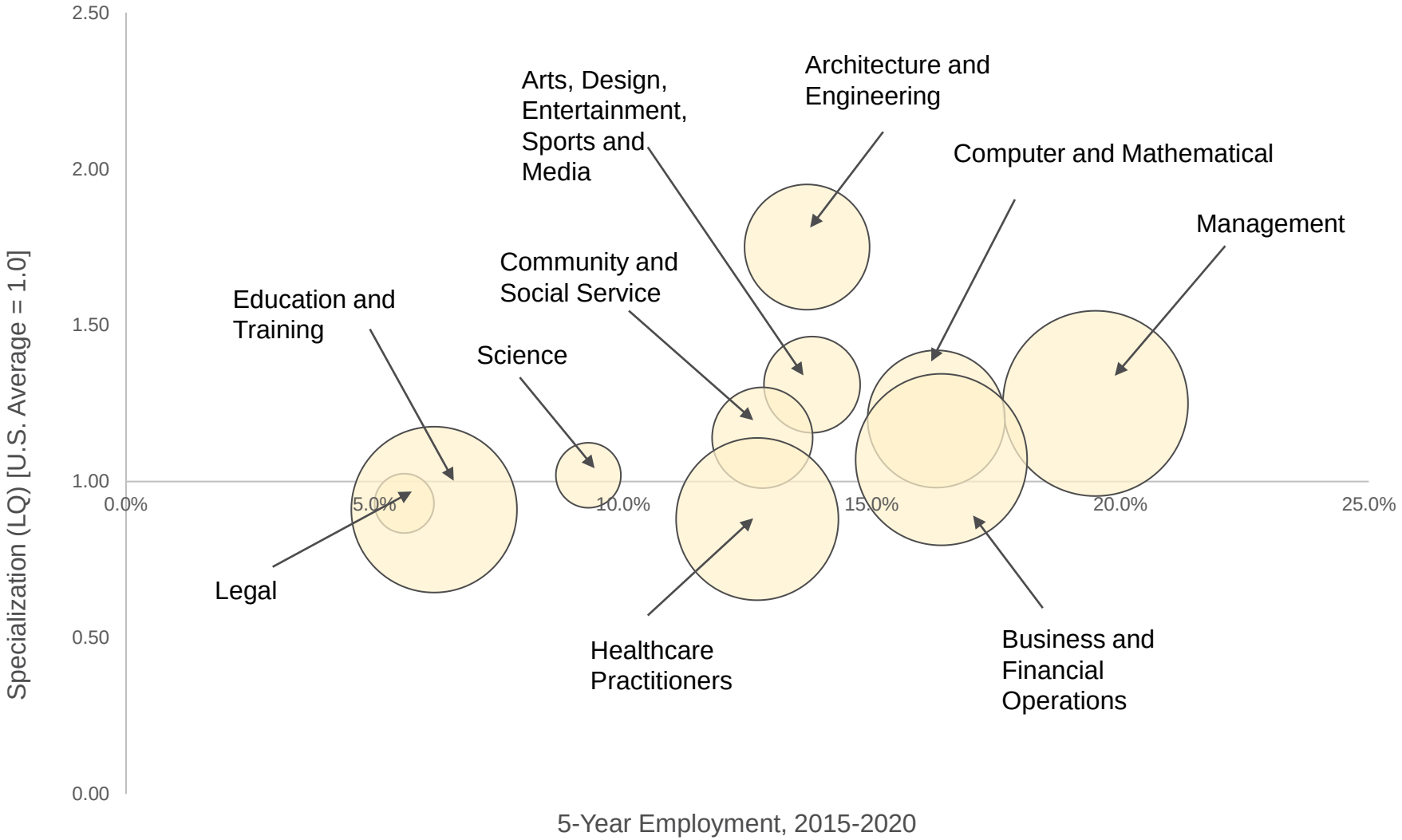
Portland Knowledge/ Professional Occupations

Occupational Cluster	Location Quotient 2020	2020 Jobs	5-Year Growth, 2015-2020	New Jobs Jobs 2015-2020	Median Annual Salary	Men (%)	Women (%)
Knowledge/ Professional	**1.13**	**426,663**	**13.7%**	**51,560**	**$68,612**	**49.3%**	**50.7%**
Architecture and Engineering	1.75	37,355	13.7%	4,498	$78,546	84.8%	15.2%
Arts, Design, Entertainment, Sports, and Media	1.31	22,238	13.8%	2,701	$51,485	52.1%	47.9%
Management	1.25	81,367	19.5%	13,293	$99,665	62.3%	37.7%
Computer and Mathematical	1.20	44,886	16.3%	6,288	$86,476	74.5%	25.5%
Community and Social Service	1.14	24,274	12.8%	2,746	$49,495	33.7%	66.3%
Business and Financial Operations	1.07	69,862	16.4%	9,825	$68,551	45.6%	54.4%
Science	1.02	10,259	9.3%	870	$65,472	55.3%	44.7%
Legal	0.93	8,581	5.6%	455	$81,263	43.0%	57.0%
Education and Training	0.91	65,230	6.2%	3,815	$52,527	25.2%	74.8%
Healthcare Practitioners	0.88	62,609	12.7%	7,069	$85,488	27.5%	72.5%

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Size of Bubble: Total Employment

Portland Knowledge/ Professional Occupations



Source: EMSI 2020.1 dataset.

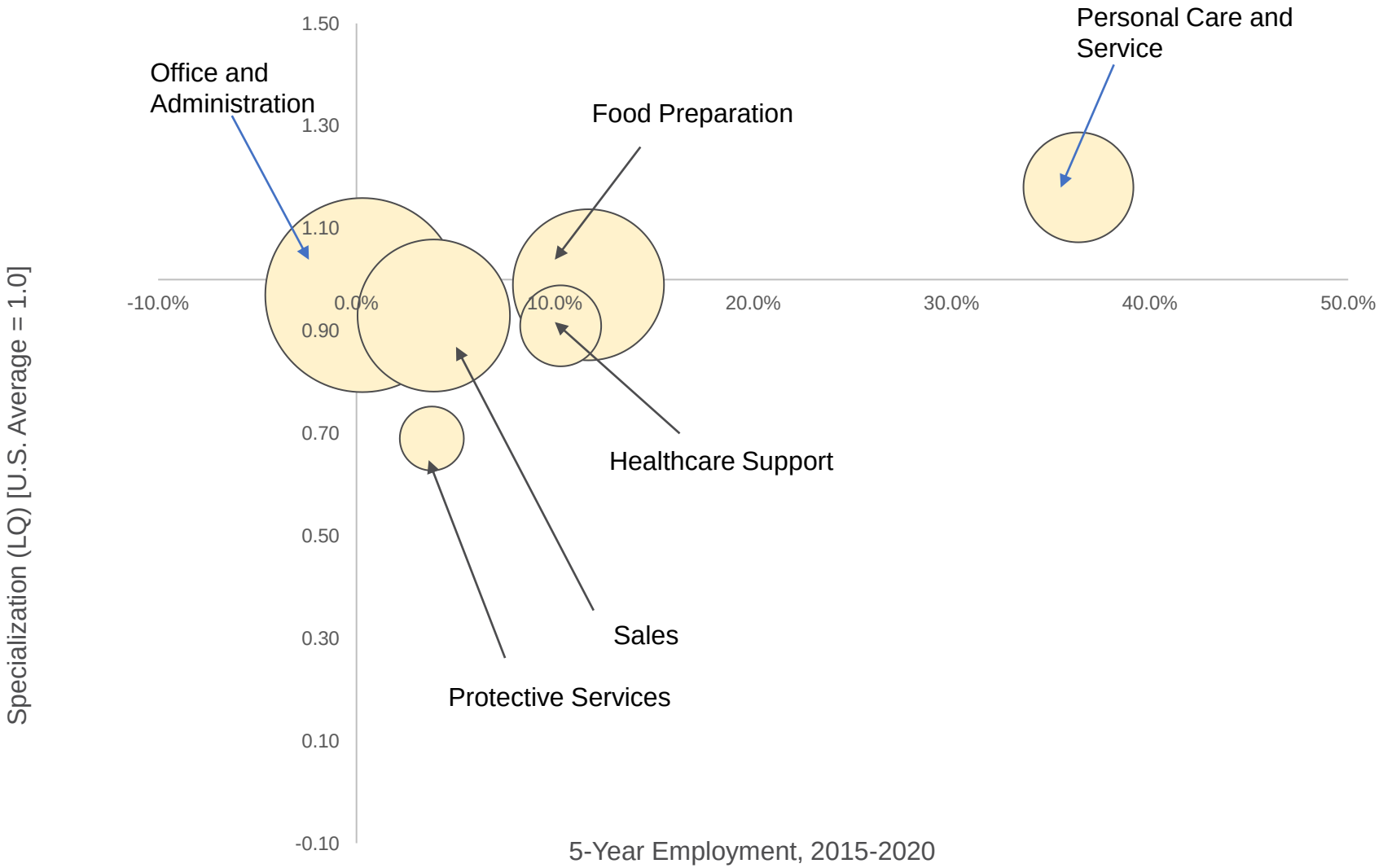
Portland Service Occupations

Occupational Cluster	Location Quotient 2020	2020 Jobs	5-Year Growth, 2015-2020	New Jobs 2015-2020	Median Annual Salary	Men (%)	Women (%)
Service	**0.97**	**502,880**	**7.5%**	**34,891**	**$33,933**	**37.0%**	**63.0%**
Personal Care and Service	1.18	57,334	36.4%	15,289	$28,118	27.3%	72.7%
Food Preparation	0.99	107,866	11.7%	11,314	$26,190	45.1%	54.9%
Office and Administrative Support	0.97	177,199	0.3%	495	$39,117	27.0%	73.0%
Sales	0.93	109,304	3.9%	4,147	$33,344	50.1%	49.9%
Healthcare Support	0.91	31,335	10.3%	2,923	$36,492	14.3%	85.7%
Protective Service	0.69	19,842	3.8%	723	$45,735	74.5%	25.5%

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Size of Bubble: Total Employment

Portland Service Occupations



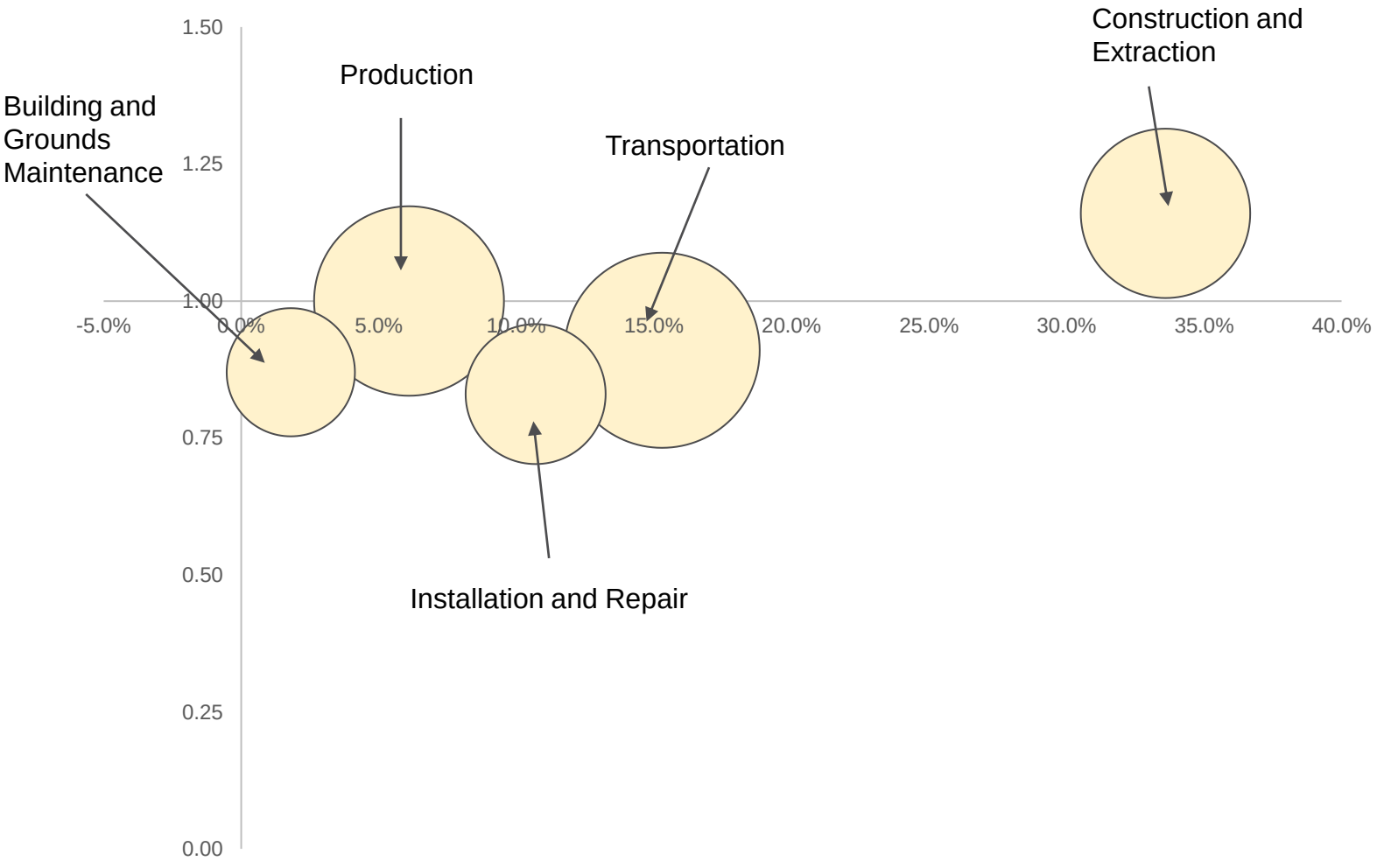
Source: EMSI 2020.1 dataset.

Portland Working/ Production Occupations

Occupational Cluster	Location Quotient 2020	2020 Jobs	5-Year Growth, 2015-2020	New Jobs 2015-2020	Median Annual Salary	Men (%)	Women (%)
Working/ Production	**0.97**	**283,975**	**13.5%**	**33,805**	**$41,617**	**81.8%**	**18.2%**
Construction and Extraction	1.16	58,724	33.6%	14,765	$54,329	95.7%	4.3%
Production	1.00	73,553	6.1%	4,214	$38,247	71.8%	28.2%
Transportation and Material Moving	0.91	77,707	15.3%	10,330	$36,717	82.6%	17.4%
Building and Grounds Cleaning and Maintenance	0.87	33,745	1.8%	601	$29,602	60.1%	39.9%
Installation, Maintenance, and Repair	0.83	40,244	10.7%	3,895	$48,763	96.3%	3.7%

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Portland Working/ Production Occupations



Skill Profiles

Portland Skill Clusters

Skill Cluster	Location Quotient 2020	2020 Jobs	5-Year Growth, 2015-2020	New Jobs 2015-2020
Electronics	3.71	26,768	10.6%	2,559
Personal Services	2.66	61,848	32.3%	15,096
Engineering	2.29	30,234	15.9%	4,148
Architecture	2.13	8,358	17.6%	1,250
Entertainment	2.07	8,905	7.4%	5,105
Arts	1.75	3,695	7.3%	251
Design	1.57	6,186	18.8%	981
Social Services	1.43	27,294	14.9%	3,540
Real Estate	1.43	5,112	22.7%	946
Computer Software	1.43	31,396	13.4%	3,715
Advertising and Marketing	1.41	28,968	25.2%	5,836
Research and Science	1.39	8,604	14.7%	1,102
Construction	1.36	62,567	34.6%	16,085
Manufacturing	1.33	63,840	5.7%	3,438
IT Services	1.19	17,718	16.1%	2,460
Enviromental Services	1.18	3,068	0.9%	28

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Portland Skill Clusters (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	5-Year Growth, 2015-2020	New Jobs 2015-2020
Human Resources	1.15	40,043	18.5%	6,245
Clerical and Office	1.06	169,538	0.5%	760
Restuarants and Food Service	1.05	115,340	11.8%	12,135
Education	1.04	69,409	6.7%	4,386
Business and Financial Services	1.02	38,546	14.0%	4,744
Medical Services	1.01	49,766	11.1%	4,970
Agriculture	1.01	9,354	5.0%	444
Media	1.00	6,869	10.0%	2,030
Retail and Sales	1.00	110,209	3.7%	3,881
Transportation	0.99	79,225	15.6%	10,685
Medical Professionals	0.96	48,128	13.3%	5,668
Legal	0.93	10,389	3.5%	351
Insurance	0.92	10,460	3.4%	346
General Repairs	0.90	27,298	1.2%	313
Mechanics	0.89	15,036	10.3%	1,406
Municipal and Government Services	0.89	25,629	3.4%	835

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Advertising and Marketing

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Advertising and Marketing	**1.41**	**28,968**	**5,836**	**$73,382**	
Meeting, Convention, and Event Planners	1.12	1,068	295	$45,248	Bachelors
Survey Researchers	1.19	116	(35)	$62,735	Masters
Public Relations Specialists	1.20	2,393	314	$62,226	Bachelors
Market Research Analysts and Marketing Specialists	1.24	6,749	1,850	$65,015	Bachelors
Advertising and Promotions Managers	1.25	250	(14)	$105,052	Bachelors
Business Operations Specialists, All Other	1.44	12,711	2,277	$69,374	Bachelors
Public Relations and Fundraising Managers	1.59	984	226	$91,853	Bachelors
Marketing Managers	1.91	3,807	961	$116,602	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Agriculture

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Agriculture	**1.01**	**9,354**	**444**	**$31,542**	
Logging Workers, All Other	3.67	113	69	$43,951	High School Diploma or GED
Fallers	2.58	96	(4)	$65,823	High School Diploma or GED
Graders and Sorters, Agricultural Products	1.63	733	109	$27,774	No Formal Education Credential
Forest and Conservation Workers	1.59	199	27	$23,286	High School Diploma or GED
First-Line Supervisors of Farming, Fishing, and Forestry Workers	1.24	568	110	$46,012	High School Diploma or GED
Agricultural Workers, All Other	1.05	588	113	$29,832	No Formal Education Credential
Farmers, Ranchers, and Other Agricultural Managers	1.04	1,272	15	$38,292	High School Diploma or GED
Log Graders and Scalers	0.97	28	13	$44,573	High School Diploma or GED
Farmworkers, Farm, Ranch, and Aquacultural Animals	0.89	1,046	(65)	$24,234	No Formal Education Credential
Farmworkers and Laborers, Crop, Nursery, and Greenhouse	0.79	4,096	49	$28,601	No Formal Education Credential
Logging Equipment Operators	0.76	153	20	$47,242	High School Diploma or GED
Agricultural Inspectors	0.72	87	(7)	$40,380	Bachelors
Agricultural Equipment Operators	0.67	374	(5)	$31,633	No Formal Education Credential

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Architecture

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Architecture	**2.13**	**8,358**	**1,250**	**$90,723**	
Drafters, All Other	5.15	605	99	$56,553	Associates
Cartographers and Photogrammetrists	2.65	282	21	$65,568	Bachelors
Architectural and Engineering Managers	2.11	3,266	339	$133,871	Bachelors
Architects, Except Landscape and Naval	2.08	1,813	420	$74,280	Bachelors
Architectural and Civil Drafters	1.52	1,209	205	$54,103	Associates
Surveyors	1.37	514	95	$65,531	Bachelors
Surveying and Mapping Technicians	1.20	523	73	$52,758	High School Diploma or GED
Landscape Architects	0.94	147	(2)	$47,844	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Arts

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Arts	**1.75**	**3,695**	**251**	**$65,333**	
Art Directors	2.56	826	185	$100,695	Bachelors
Multimedia Artists and Animators	2.41	572	88	$64,950	Bachelors
Choreographers	2.36	100	3	$120,537	High School Diploma or GED
Craft Artists	1.91	60	(1)	$41,871	No Formal Education Credential
Music Directors and Composers	1.68	626	(154)	$46,059	Bachelors
Artists and Related Workers, All Other	1.51	89	(13)	$37,539	No Formal Education Credential
Fine Artists, Including Painters, Sculptors, and Illustrators	1.51	137	29	$50,774	Bachelors
Dancers	1.32	109	17	$26,535	No Formal Education Credential
Musicians and Singers	1.02	972	104	$52,145	No Formal Education Credential
Entertainers and Performers, Sports and Related Workers, All Other	0.78	106	12	$107,783	No Formal Education Credential
Actors	0.26	100	(19)	$25,089	Some College, No Degree

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Business and Financial Services

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Business and Financial Services	**1.02**	**38,546**	**4,744**	**$79,208**	
Financial Specialists, All Other	1.54	1,637	167	$71,140	Bachelors
Financial Examiners	1.35	671	166	$60,885	Bachelors
Loan Officers	1.23	2,956	40	$67,740	Bachelors
Financial Managers	1.17	6,044	1,124	$116,977	Bachelors
Cost Estimators	1.14	2,005	256	$72,797	Bachelors
Logisticians	1.07	2,089	685	$70,516	Bachelors
Personal Financial Advisors	1.01	1,675	129	$82,985	Bachelors
Credit Analysts	1.01	603	45	$73,273	Bachelors
Fundraisers	0.95	847	90	$48,947	Bachelors
Financial Analysts	0.94	2,400	425	$83,020	Bachelors
Tax Preparers	0.93	537	(42)	$61,002	High School Diploma or GED
Accountants and Auditors	0.90	9,523	712	$66,843	Bachelors
Management Analysts	0.87	4,989	636	$83,920	Bachelors
Credit Counselors	0.81	238	29	$48,035	Bachelors
Agents and Business Managers of Artists, Performers, and Athletes	0.75	97	20	$66,378	Bachelors
Budget Analysts	0.71	325	(10)	$78,483	Bachelors
Compliance Officers	0.71	1,759	324	$73,390	Bachelors
Tax Examiners and Collectors, and Revenue Agents	0.34	152	(52)	$72,912	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Clerical and Office

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Clerical and Office	**1.06**	**169,538**	**760**	**$40,280**	
Information and Record Clerks, All Other	3.16	4,465	(211)	$37,564	High School Diploma or GED
Desktop Publishers	2.39	188	(63)	$46,647	Associates
Office and Administrative Support Workers, All Other	2.24	4,617	(111)	$37,102	High School Diploma or GED
Office Machine Operators, Except Computer	1.64	638	(228)	$34,655	High School Diploma or GED
Cargo and Freight Agents	1.46	1,164	181	$49,941	High School Diploma or GED
Medical Secretaries	1.41	6,988	969	$42,266	High School Diploma or GED
Interviewers, Except Eligibility and Loan	1.27	2,241	(43)	$41,763	High School Diploma or GED
Credit Authorizers, Checkers, and Clerks	1.27	295	(74)	$43,612	High School Diploma or GED
New Accounts Clerks	1.23	399	(22)	$37,600	High School Diploma or GED
Financial Clerks, All Other	1.15	326	(43)	$40,786	High School Diploma or GED
Payroll and Timekeeping Clerks	1.08	1,272	(151)	$49,766	High School Diploma or GED
Bookkeeping, Accounting, and Auditing Clerks	1.08	14,070	82	$41,961	Some College, No Degree
Order Clerks	1.07	1,363	(188)	$40,108	High School Diploma or GED
Stock Clerks and Order Fillers	1.07	17,432	1,558	$31,080	No Formal Education Credential
Receptionists and Information Clerks	1.04	9,165	942	$32,523	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Clerical and Office (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Administrative Services Managers	1.03	2,438	224	$92,499	Bachelors
Loan Interviewers and Clerks	1.03	1,802	65	$46,701	High School Diploma or GED
Library Assistants, Clerical	1.01	881	(155)	$38,767	High School Diploma or GED
Shipping, Receiving, and Traffic Clerks	1.00	5,330	257	$37,199	High School Diploma or GED
Gaming Cage Workers	0.99	146	(11)	$24,140	High School Diploma or GED
Correspondence Clerks	0.99	42	(22)	$40,220	High School Diploma or GED
Switchboard Operators, Including Answering Service	0.99	540	(211)	$39,326	High School Diploma or GED
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	0.96	19,135	(1,675)	$41,361	High School Diploma or GED
Mail Clerks and Mail Machine Operators, Except Postal Service	0.94	693	(149)	$32,463	High School Diploma or GED
File Clerks	0.94	870	(214)	$36,474	High School Diploma or GED
Production, Planning, and Expediting Clerks	0.94	2,740	431	$50,686	High School Diploma or GED
Procurement Clerks	0.92	498	(15)	$42,364	High School Diploma or GED
Data Entry Keyers	0.91	1,244	(234)	$32,080	High School Diploma or GED
Human Resources Assistants, Except Payroll and Timekeeping	0.90	954	(108)	$44,185	Associates
Office Clerks, General	0.88	23,669	(543)	$34,909	High School Diploma or GED
Weighers, Measurers, Checkers, and Samplers, Recordkeeping	0.87	477	24	$35,253	High School Diploma or GED
Customer Service Representatives	0.85	19,488	1,611	$38,815	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Clerical and Office (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Reservation and Transportation Ticket Agents and Travel Clerks	0.84	928	28	$36,059	High School Diploma or GED
Executive Secretaries and Executive Administrative Assistants	0.80	3,606	(719)	$59,393	High School Diploma or GED
First-Line Supervisors of Office and Administrative Support Workers	0.78	9,322	516	$59,899	High School Diploma or GED
Couriers and Messengers	0.77	508	66	$38,716	High School Diploma or GED
Brokerage Clerks	0.74	332	7	$50,796	High School Diploma or GED
Bill and Account Collectors	0.74	1,444	(543)	$37,015	High School Diploma or GED
Billing and Posting Clerks	0.73	2,850	(47)	$39,610	High School Diploma or GED
Tellers	0.71	2,576	(312)	$29,472	High School Diploma or GED
Proofreaders and Copy Markers	0.67	53	(14)	$46,188	Bachelors
Hotel, Motel, and Resort Desk Clerks	0.62	1,276	167	$27,243	High School Diploma or GED
Eligibility Interviewers, Government Programs	0.60	669	(44)	$43,983	High School Diploma or GED
Telephone Operators	0.55	24	(49)	$38,255	High School Diploma or GED
Computer Operators	0.55	152	(66)	$29,943	High School Diploma or GED
Statistical Assistants	0.48	47	(19)	$50,552	Bachelors
Communications Equipment Operators, All Other	0.39	31	11	$39,175	High School Diploma or GED
Word Processors and Typists	0.31	150	(95)	$42,412	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Computer Software

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Computer Software	**1.43**	**31,396**	**3,715**	**$103,324**	
Computer Hardware Engineers	2.62	1,359	(564)	$108,754	Bachelors
Software Developers, Applications	1.68	13,173	3,095	$105,098	Bachelors
Web Developers	1.63	1,724	153	$67,099	Associates
Computer and Information Systems Managers	1.39	4,576	764	$129,480	Bachelors
Computer Programmers	1.13	2,065	(551)	$85,071	Bachelors
Computer Systems Analysts	1.00	4,872	390	$90,441	Bachelors
Information Security Analysts	0.86	819	246	$98,291	Bachelors
Computer and Information Research Scientists	0.84	230	26	$121,755	Doctoral or Professional Degree
Software Developers, Systems Software	0.75	2,579	156	$108,119	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Construction

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Construction	**1.36**	**62,567**	**16,085**	**$59,645**	
Floor Sanders and Finishers	2.67	103	(2)	$33,901	No Formal Education Credential
Tapers	2.55	409	80	$71,461	No Formal Education Credential
Carpet Installers	2.12	451	10	$45,991	No Formal Education Credential
Roofers	2.05	2,236	478	$44,672	No Formal Education Credential
Sheet Metal Workers	1.82	2,028	260	$55,044	High School Diploma or GED
Construction Managers	1.76	4,171	1,338	$100,040	Bachelors
Carpenters	1.70	10,311	2,926	$49,018	High School Diploma or GED
Painters, Construction and Maintenance	1.70	3,290	557	$36,084	No Formal Education Credential
Pile-Driver Operators	1.67	51	17	$72,038	High School Diploma or GED
Structural Iron and Steel Workers	1.62	1,064	316	$71,777	High School Diploma or GED
Tile and Marble Setters	1.49	511	84	$53,212	No Formal Education Credential
Helpers--Carpenters	1.44	410	37	$33,133	No Formal Education Credential
Drywall and Ceiling Tile Installers	1.44	1,249	368	$56,401	No Formal Education Credential
Plumbers, Pipefitters, and Steamfitters	1.37	5,122	1,478	$75,983	High School Diploma or GED
Electricians	1.30	7,365	2,424	$72,603	High School Diploma or GED
Insulation Workers, Floor, Ceiling, and Wall	1.30	350	135	$39,443	No Formal Education Credential
Floor Layers, Except Carpet, Wood, and Hard Tiles	1.24	149	56	$32,263	No Formal Education Credential
Construction and Building Inspectors	1.19	1,009	236	$73,631	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Construction (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters	1.13	225	66	$40,605	No Formal Education Credential
Septic Tank Servicers and Sewer Pipe Cleaners	1.11	284	38	$51,734	No Formal Education Credential
Paving, Surfacing, and Tamping Equipment Operators	1.09	433	8	$73,571	High School Diploma or GED
Hazardous Materials Removal Workers	1.05	409	64	$39,792	High School Diploma or GED
Construction Laborers	1.03	8,738	2,380	$41,142	No Formal Education Credential
Manufactured Building and Mobile Home Installers	1.03	26	6	$40,881	High School Diploma or GED
Cement Masons and Concrete Finishers	1.03	1,599	463	$51,500	No Formal Education Credential
First-Line Supervisors of Construction Trades and Extraction Workers	0.99	5,018	1,469	$75,779	High School Diploma or GED
Boilermakers	0.84	104	1	$60,198	High School Diploma or GED
Glaziers	0.80	343	55	$58,136	High School Diploma or GED
Insulation Workers, Mechanical	0.80	171	18	$89,109	High School Diploma or GED
Pipelayers	0.76	262	6	$63,786	No Formal Education Credential
Operating Engineers and Other Construction Equipment Operators	0.72	2,307	469	$62,419	High School Diploma or GED
Elevator Installers and Repairers	0.71	167	31	$105,167	High School Diploma or GED
Helpers, Construction Trades, All Other	0.70	165	59	$38,810	No Formal Education Credential
Miscellaneous Construction and Related Workers	0.64	192	13	$42,452	High School Diploma or GED
Stonemasons	0.63	67	1	$23,932	High School Diploma or GED
Rail-Track Laying and Maintenance Equipment Operators	0.59	75	(10)	$64,892	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Construction (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Paperhangers	0.56	14	(2)	$36,414	No Formal Education Credential
Highway Maintenance Workers	0.55	648	19	$51,743	High School Diploma or GED
Plasterers and Stucco Masons	0.55	119	30	$51,973	No Formal Education Credential
Reinforcing Iron and Rebar Workers	0.51	82	2	$86,366	High School Diploma or GED
Brickmasons and Blockmasons	0.49	254	33	$59,661	High School Diploma or GED
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	0.45	214	21	$28,864	High School Diploma or GED
Helpers--Electricians	0.45	289	45	$34,902	High School Diploma or GED
Fence Erectors	0.33	66	8	$33,265	No Formal Education Credential
Helpers--Painters, Paperhangers, Plasterers, and Stucco Masons	0.20	19	(6)	$33,539	No Formal Education Credential

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Design

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Design	**1.57**	**6,186**	**981**	**$53,617**	
Fashion Designers	2.78	460	127	$65,448	Bachelors
Designers, All Other	2.09	134	58	$45,263	Bachelors
Commercial and Industrial Designers	2.06	567	130	$80,067	Bachelors
Floral Designers	1.79	569	4	$26,481	High School Diploma or GED
Graphic Designers	1.44	2,513	290	$59,272	Bachelors
Models	1.41	55	(32)	$35,767	No Formal Education Credential
Set and Exhibit Designers	1.32	114	(19)	$69,677	Bachelors
Interior Designers	1.23	584	90	$53,644	Bachelors
Merchandise Displayers and Window Trimmers	1.17	1,189	333	$37,679	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Education

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Education	**1.04**	**69,409**	**4,386**	**$56,166**	
Education, Training, and Library Workers, All Other	2.66	2,343	503	$38,469	Bachelors
Education Administrators, Preschool and Childcare Center/Program	2.50	1,252	320	$43,272	Bachelors
Special Education Teachers, Preschool	1.69	359	(45)	$81,210	Bachelors
Preschool Teachers, Except Special Education	1.57	6,468	1,521	$32,055	Associates
Special Education Teachers, All Other	1.41	470	35	$90,758	Bachelors
Library Technicians	1.19	1,081	(119)	$43,695	Postsecondary Nondegree
Adult Basic and Secondary Education and Literacy Teachers and Instructors	1.13	556	(118)	$54,610	Bachelors
Postsecondary Teachers	1.05	12,441	(63)	$69,682	Doctoral or Professional Degree
Teacher Assistants	1.04	11,442	840	$36,137	Some College, No Degree
Kindergarten Teachers, Except Special Education	1.01	1,068	(169)	$74,858	Bachelors
Self-Enrichment Education Teachers	0.97	2,308	307	$46,788	High School Diploma or GED
Audio-Visual and Multimedia Collections Specialists	0.93	77	(13)	$51,560	Bachelors
Farm and Home Management Advisors	0.88	68	3	$97,631	Masters
Education Administrators, All Other	0.86	310	77	$53,346	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Education (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Education Administrators, Elementary and Secondary School	0.85	1,783	182	$116,670	Masters
Librarians	0.80	791	30	$68,873	Masters
Archivists	0.77	46	(1)	$51,707	Masters
Substitute Teachers	0.76	3,502	(7)	$44,651	Bachelors
Education Administrators, Postsecondary	0.75	834	(7)	$90,112	Masters
Elementary School Teachers, Except Special Education	0.75	8,272	293	$68,651	Bachelors
Secondary School Teachers, Except Special and Career/Technical Education	0.73	6,040	518	$79,547	Bachelors
Special Education Teachers, Kindergarten and Elementary School	0.65	923	(60)	$80,955	Bachelors
Teachers and Instructors, All Other	0.65	1,791	296	$43,089	Bachelors
Middle School Teachers, Except Special and Career/Technical Education	0.63	3,015	(80)	$80,527	Bachelors
Special Education Teachers, Secondary School	0.60	656	59	$85,079	Bachelors
Curators	0.57	58	1	$55,902	Masters
Museum Technicians and Conservators	0.57	66	11	$38,686	Bachelors
Special Education Teachers, Middle School	0.56	376	(17)	$85,861	Bachelors
Instructional Coordinators	0.53	702	75	$76,605	Masters
Career/Technical Education Teachers, Middle School	0.48	49	(3)	$73,636	Bachelors
Career/Technical Education Teachers, Secondary School	0.44	262	17	$70,588	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Electronics

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Electronics	**3.71**	**26,768**	**2,559**	**$48,046**	
Semiconductor Processors	19.42	4,066	289	$38,403	Associates
Electronic Home Entertainment Equipment Installers and Repairers	2.19	482	102	$25,656	Postsecondary Nondegree
Home Appliance Repairers	2.19	534	(86)	$34,728	High School Diploma or GED
Precision Instrument and Equipment Repairers, All Other	2.02	201	49	$56,499	High School Diploma or GED
Electrical and Electronics Repairers, Commercial and Industrial Equipment	1.37	760	(41)	$55,212	Postsecondary Nondegree
Control and Valve Installers and Repairers, Except Mechanical Door	1.30	549	151	$58,439	High School Diploma or GED
Medical Equipment Repairers	1.07	413	120	$57,780	Associates
Radio, Cellular, and Tower Equipment Installers and Repairs	1.06	139	12	$74,048	Associates
Electronic Equipment Installers and Repairers, Motor Vehicles	1.03	92	(18)	$28,881	Postsecondary Nondegree
Computer, Automated Teller, and Office Machine Repairers	0.98	823	94	$37,541	Some College, No Degree
Security and Fire Alarm Systems Installers	0.86	515	23	$54,368	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Electronics (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Maintenance and Repair Workers, General	0.82	10,180	903	$40,475	High School Diploma or GED
First-Line Supervisors of Mechanics, Installers, and Repairers	0.78	3,099	372	$67,517	High School Diploma or GED
Telecommunications Equipment Installers and Repairers, Except Line Installers	0.77	1,390	(4)	$63,675	Postsecondary Nondegree
Wind Turbine Service Technicians	0.75	44	21	$54,847	Some College, No Degree
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	0.73	149	12	$89,248	Postsecondary Nondegree
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	0.71	1,967	520	$47,737	Postsecondary Nondegree
Avionics Technicians	0.64	174	19	$66,940	Associates
Electric Motor, Power Tool, and Related Repairers	0.61	105	(3)	$47,598	Postsecondary Nondegree
Coin, Vending, and Amusement Machine Servicers and Repairers	0.52	140	(3)	$39,808	High School Diploma or GED
Electrical Power-Line Installers and Repairers	0.50	479	51	$98,348	High School Diploma or GED
Telecommunications Line Installers and Repairers	0.44	419	3	$59,784	High School Diploma or GED
Electrical and Electronics Installers and Repairers, Transportation Equipment	0.42	46	(27)	$88,210	Postsecondary Nondegree

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Engineering

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Engineering	**2.29**	**30,234**	**4,148**	**$81,795**	
Electronics Engineers, Except Computer	4.88	5,392	1,237	$84,172	Bachelors
Electrical and Electronics Engineering Technicians	3.01	3,176	(306)	$61,724	Associates
Nuclear Engineers	2.70	409	35	$149,762	Bachelors
Materials Engineers	2.27	510	(85)	$90,940	Bachelors
Industrial Engineering Technicians	2.11	1,158	107	$58,055	Associates
Engineers, All Other	1.79	2,214	373	$90,552	Bachelors
Electrical and Electronics Drafters	1.78	366	(3)	$63,589	Associates
Electrical Engineers	1.68	2,579	146	$91,130	Bachelors
Industrial Engineers	1.53	3,538	690	$89,883	Bachelors
Engineering Technicians, Except Drafters, All Other	1.50	1,060	257	$54,371	Associates
Mechanical Engineering Technicians	1.46	502	2	$48,005	Associates
Mechanical Engineers	1.46	3,640	813	$84,920	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Engineering (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Civil Engineers	1.39	3,541	784	$89,274	Bachelors
Environmental Engineering Technicians	1.32	197	20	$63,017	Associates
Biomedical Engineers	1.08	179	(1)	$83,633	Bachelors
Civil Engineering Technicians	0.96	581	21	$62,512	Associates
Mechanical Drafters	0.90	400	(15)	$59,071	Associates
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	0.84	176	27	$80,142	Bachelors
Chemical Engineers	0.83	227	40	$92,519	Bachelors
Electro-Mechanical Technicians	0.79	94	(14)	$58,830	Associates
Aerospace Engineering and Operations Technicians	0.45	42	(8)	$36,870	Associates
Marine Engineers and Naval Architects	0.40	47	16	$86,416	Bachelors
Petroleum Engineers	0.28	84	25	$198,224	Bachelors
Aerospace Engineers	0.21	121	(13)	$117,338	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Entertainment

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Entertainment	**2.07**	**8,905**	**5,105**	**$30,804**	
Entertainment Attendants and Related Workers, All Other	3.87	185	90	$24,546	High School Diploma or GED
Lodging Managers	1.56	469	55	$46,566	High School Diploma or GED
Coaches and Scouts	1.54	3,003	472	$35,322	Bachelors
Motion Picture Projectionists	1.49	58	(7)	$24,530	No Formal Education Credential
Amusement and Recreation Attendants	0.90	2,460	552	$24,734	No Formal Education Credential
Costume Attendants	0.82	48	0	$38,102	High School Diploma or GED
Tour and Travel Guides	0.80	345	97	$33,397	High School Diploma or GED
Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	0.70	886	38	$25,423	No Formal Education Credential
Gaming and Sports Book Writers and Runners	0.67	68	(13)	$24,267	High School Diploma or GED
Umpires, Referees, and Other Sports Officials	0.67	112	5	$24,514	High School Diploma or GED
Ushers, Lobby Attendants, and Ticket Takers	0.66	774	82	$24,014	No Formal Education Credential
First-Line Supervisors of Gaming Workers	0.63	165	(4)	$41,135	High School Diploma or GED
Gaming Managers	0.49	20	1	$40,880	High School Diploma or GED
Gaming Service Workers, All Other	0.44	39	(29)	$24,414	High School Diploma or GED
Athletes and Sports Competitors	0.35	32	1	$163,335	No Formal Education Credential
Gaming Dealers	0.31	242	(59)	$28,812	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Environmental Services

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Environmental Services	**1.18**	**3,068**	**28**	**$77,355**	
Hydrologists	1.93	110	(3)	$89,507	Bachelors
Zoologists and Wildlife Biologists	1.59	248	(24)	$71,025	Bachelors
Environmental Engineers	1.48	654	1	$92,563	Bachelors
Conservation Scientists	1.32	254	15	$83,800	Bachelors
Soil and Plant Scientists	1.23	163	15	$69,266	Bachelors
Environmental Scientists and Specialists, Including Health	1.08	723	(63)	$79,338	Bachelors
Foresters	0.96	73	(8)	$69,260	Bachelors
Geoscientists, Except Hydrologists and Geographers	0.92	227	16	$74,759	Bachelors
Environmental Science and Protection Technicians, Including Health	0.90	246	28	$55,919	Associates
Forest and Conservation Technicians	0.69	187	(6)	$42,943	Associates
Biological Scientists, All Other	0.49	181	57	$85,344	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Extraction

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Extraction	**0.62**	**1,597**	**228**	**$60,598**	
Plant and System Operators, All Other	1.44	153	53	$61,324	High School Diploma or GED
Chemical Plant and System Operators	0.60	145	43	$58,555	High School Diploma or GED
Gas Plant Operators	0.58	74	(1)	$74,571	High School Diploma or GED
Earth Drillers, Except Oil and Gas	0.53	85	16	$55,042	High School Diploma or GED
Extraction Workers, All Other	0.48	26	10	$37,138	High School Diploma or GED
Water and Wastewater Treatment Plant and System Operators	0.43	415	41	$61,949	High School Diploma or GED
Stationary Engineers and Boiler Operators	0.42	125	(33)	$65,527	High School Diploma or GED
Rock Splitters, Quarry	0.40	16	3	$24,846	No Formal Education Credential
Power Plant Operators	0.38	108	6	$62,112	High School Diploma or GED
Petroleum Pump System Operators, Refinery Operators, and Gaugers	0.35	115	45	$74,226	High School Diploma or GED
Explosives Workers, Ordnance Handling Experts, and Blasters	0.32	58	(1)	$44,682	High School Diploma or GED
Helpers--Extraction Workers	0.20	27	2	$47,266	High School Diploma or GED
Continuous Mining Machine Operators	0.14	17	3	$62,238	No Formal Education Credential
Roustabouts, Oil and Gas	0.10	51	(4)	$61,920	No Formal Education Credential
Service Unit Operators, Oil, Gas, and Mining	0.06	25	6	$101,166	No Formal Education Credential

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

General Repairs

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
General Repairs	**0.90**	**27,298**	**313**	**$32,237**	
Building Cleaning Workers, All Other	3.24	398	(37)	$27,416	No Formal Education Credential
Installation, Maintenance, and Repair Workers, All Other	1.23	1,686	317	$45,134	High School Diploma or GED
Landscaping and Groundskeeping Workers	0.91	7,035	390	$34,301	No Formal Education Credential
Locksmiths and Safe Repairers	0.86	120	(41)	$35,616	High School Diploma or GED
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	0.84	16,096	(357)	$28,855	No Formal Education Credential
Grounds Maintenance Workers, All Other	0.77	104	(23)	$32,005	No Formal Education Credential
Helpers--Installation, Maintenance, and Repair Workers	0.72	631	(57)	$34,289	High School Diploma or GED
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	0.64	517	7	$55,806	High School Diploma or GED
Pesticide Handlers, Sprayers, and Applicators, Vegetation	0.62	131	11	$48,101	High School Diploma or GED
Commercial Divers	0.61	19	(2)	$51,879	Postsecondary Nondegree
Tree Trimmers and Pruners	0.59	205	17	$37,951	High School Diploma or GED
Pest Control Workers	0.56	356	88	$39,643	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Human Resources

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Human Resources	**1.15**	**40,043**	**6,245**	**$77,388**	
Managers, All Other	1.45	6,023	1,458	$94,827	Bachelors
Human Resources Managers	1.33	1,767	358	$101,746	Bachelors
Labor Relations Specialists	1.25	758	32	$92,129	Bachelors
Compensation and Benefits Managers	1.19	143	8	$106,704	Bachelors
General and Operations Managers	1.12	21,302	2,888	$94,389	Bachelors
Compensation, Benefits, and Job Analysis Specialists	1.11	754	71	$66,802	Bachelors
Training and Development Specialists	1.05	2,540	424	$64,721	Bachelors
Human Resources Specialists	1.04	5,333	1,180	$59,699	Bachelors
Training and Development Managers	0.90	341	29	$108,175	Bachelors
Chief Executives	0.68	1,082	(203)	$234,052	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Insurance

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Insurance	**0.92**	**10,460**	**346**	**$56,961**	
Insurance Claims and Policy Processing Clerks	1.12	2,485	(24)	$41,814	High School Diploma or GED
Claims Adjusters, Examiners, and Investigators	1.01	2,321	(82)	$70,498	High School Diploma or GED
Insurance Sales Agents	0.80	4,913	453	$55,785	High School Diploma or GED
Insurance Underwriters	0.80	666	4	$73,102	Bachelors
Insurance Appraisers, Auto Damage	0.58	75	(5)	$73,307	Postsecondary Nondegree

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

IT Services

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
IT Services	**1.19**	**17,718**	**2,460**	**$72,163**	
Computer Occupations, All Other	1.48	4,903	1,851	$83,540	Bachelors
Database Administrators	1.25	1,126	73	$96,220	Bachelors
Computer User Support Specialists	1.21	6,951	445	$52,278	Some College, No Degree
Network and Computer Systems Administrators	0.91	2,732	48	$83,020	Bachelors
Computer Network Architects	0.75	933	109	$114,071	Bachelors
Computer Network Support Specialists	0.68	1,072	(66)	$59,668	Associates

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Legal

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Legal	**0.93**	**10,389**	**351**	**$81,875**	
Administrative Law Judges, Adjudicators, and Hearing Officers	1.31	160	(26)	$82,951	Doctoral or Professional Degree
Paralegals and Legal Assistants	1.18	2,982	416	$59,381	Associates
Title Examiners, Abstractors, and Searchers	1.09	457	(50)	$63,535	High School Diploma or GED
Legal Support Workers, All Other	0.96	359	(32)	$61,054	High School Diploma or GED
Court, Municipal, and License Clerks	0.88	987	92	$46,990	High School Diploma or GED
Arbitrators, Mediators, and Conciliators	0.83	43	0	$84,355	Bachelors
Lawyers	0.82	4,309	226	$113,459	Doctoral or Professional Degree
Court Reporters	0.82	100	(39)	$68,500	Postsecondary Nondegree
Judges, Magistrate Judges, and Magistrates	0.63	148	(36)	$127,953	Doctoral or Professional Degree
Legal Secretaries	0.61	821	(197)	$53,569	High School Diploma or GED
Judicial Law Clerks	0.16	23	(3)	$26,254	Doctoral or Professional Degree

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Manufacturing

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Manufacturing	**1.33**	**63,840**	**3,438**	**$41,489**	
Layout Workers, Metal and Plastic	12.40	982	(71)	$45,494	High School Diploma or GED
Shoe Machine Operators and Tenders	6.30	178	29	$37,734	High School Diploma or GED
Woodworkers, All Other	3.50	199	(13)	$30,896	High School Diploma or GED
Metal Workers and Plastic Workers, All Other	2.72	588	43	$32,364	High School Diploma or GED
Foundry Mold and Coremakers	2.62	331	53	$47,668	High School Diploma or GED
Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	2.13	1,252	76	$41,762	High School Diploma or GED
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	2.10	446	49	$60,608	High School Diploma or GED
Tool Grinders, Filers, and Sharpeners	2.06	128	(61)	$39,287	High School Diploma or GED
Sewers, Hand	2.01	91	22	$42,669	No Formal Education Credential
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	1.99	4,516	530	$36,404	High School Diploma or GED
Production Workers, All Other	1.84	3,591	151	$33,120	High School Diploma or GED
Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	1.82	469	76	$39,902	High School Diploma or GED
Etchers and Engravers	1.75	133	43	$38,636	High School Diploma or GED
Structural Metal Fabricators and Fitters	1.71	1,064	106	$46,403	High School Diploma or GED
Cabinetmakers and Bench Carpenters	1.51	1,213	326	$37,921	High School Diploma or GED
Coil Winders, Tapers, and Finishers	1.51	168	(76)	$35,433	High School Diploma or GED
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	1.46	615	100	$39,607	High School Diploma or GED
Computer-Controlled Machine Tool Operators, Metal and Plastic	1.46	1,754	77	$43,230	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Manufacturing (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Painters, Transportation Equipment	1.45	664	61	$46,171	High School Diploma or GED
Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	1.43	462	37	$35,980	High School Diploma or GED
Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	1.43	250	1	$24,824	High School Diploma or GED
Tailors, Dressmakers, and Custom Sewers	1.42	240	65	$30,341	No Formal Education Credential
Metal-Refining Furnace Operators and Tenders	1.36	207	(24)	$58,218	High School Diploma or GED
Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	1.35	139	(19)	$40,294	High School Diploma or GED
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	1.28	1,431	409	$29,401	High School Diploma or GED
Upholsterers	1.25	333	38	$31,783	High School Diploma or GED
Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	1.20	857	60	$37,142	High School Diploma or GED
Industrial Production Managers	1.17	1,703	206	$97,385	Bachelors
Prepress Technicians and Workers	1.12	252	(92)	$44,754	Postsecondary Nondegree
Jewelers and Precious Stone and Metal Workers	1.08	214	22	$42,086	High School Diploma or GED
Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	1.08	176	(13)	$44,704	High School Diploma or GED
Cutting and Slicing Machine Setters, Operators, and Tenders	1.08	529	7	$39,015	High School Diploma or GED
Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	1.04	149	(19)	$39,383	High School Diploma or GED
Pourers and Casters, Metal	1.04	68	(25)	$42,413	High School Diploma or GED
Fiberglass Laminators and Fabricators	1.02	194	(2)	$34,601	High School Diploma or GED
Forging Machine Setters, Operators, and Tenders, Metal and Plastic	0.98	160	(12)	$35,013	High School Diploma or GED
Welders, Cutters, Solderers, and Brazers	0.97	3,101	299	$44,312	High School Diploma or GED
Sawing Machine Setters, Operators, and Tenders, Wood	0.96	403	60	$31,112	High School Diploma or GED
Painting, Coating, and Decorating Workers	0.95	95	(30)	$36,139	No Formal Education Credential

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Manufacturing (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Printing Press Operators	0.95	1,248	(112)	$38,572	High School Diploma or GED
Paper Goods Machine Setters, Operators, and Tenders	0.92	703	(71)	$42,750	High School Diploma or GED
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.91	1,177	284	$30,891	High School Diploma or GED
First-Line Supervisors of Production and Operating Workers	0.90	4,528	330	$61,251	High School Diploma or GED
Photographic Process Workers and Processing Machine Operators	0.89	116	(58)	$45,567	High School Diploma or GED
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	0.88	522	51	$44,480	High School Diploma or GED
Inspectors, Testers, Sorters, Samplers, and Weighers	0.86	3,759	309	$45,253	High School Diploma or GED
Sewing Machine Operators	0.86	898	76	$28,815	No Formal Education Credential
Helpers--Production Workers	0.83	2,381	(470)	$32,663	No Formal Education Credential
Engine and Other Machine Assemblers	0.81	332	(1)	$42,329	High School Diploma or GED
Textile Cutting Machine Setters, Operators, and Tenders	0.81	89	1	$28,744	High School Diploma or GED
Cutters and Trimmers, Hand	0.81	67	(32)	$31,899	No Formal Education Credential
Machinists	0.79	2,480	203	$46,978	High School Diploma or GED
Print Binding and Finishing Workers	0.79	272	(103)	$32,979	High School Diploma or GED
Model Makers, Metal and Plastic	0.78	35	(3)	$32,144	High School Diploma or GED
Textile, Apparel, and Furnishings Workers, All Other	0.77	97	(32)	$30,662	High School Diploma or GED
Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	0.76	119	33	$25,695	No Formal Education Credential
Woodworking Machine Setters, Operators, and Tenders, Except Sawing	0.76	483	38	$36,776	High School Diploma or GED
Packaging and Filling Machine Operators and Tenders	0.76	2,450	355	$31,562	High School Diploma or GED
Molders, Shapers, and Casters, Except Metal and Plastic	0.74	253	23	$33,363	High School Diploma or GED
Pressers, Textile, Garment, and Related Materials	0.72	210	(20)	$27,367	No Formal Education Credential

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Manufacturing (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Assemblers and Fabricators, All Other, Including Team Assemblers	0.71	7,481	58	$35,777	High School Diploma or GED
Mixing and Blending Machine Setters, Operators, and Tenders	0.70	734	113	$39,060	High School Diploma or GED
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	0.70	211	(109)	$40,150	High School Diploma or GED
Tool and Die Makers	0.69	405	20	$62,341	High School Diploma or GED
Shoe and Leather Workers and Repairers	0.68	50	9	$30,549	High School Diploma or GED
Fabric and Apparel Patternmakers	0.67	29	8	$41,444	High School Diploma or GED
Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	0.64	147	(44)	$40,752	High School Diploma or GED
Laundry and Dry-Cleaning Workers	0.63	1,055	111	$29,818	No Formal Education Credential
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	0.62	923	(66)	$34,152	High School Diploma or GED
Adhesive Bonding Machine Operators and Tenders	0.58	85	(1)	$30,215	High School Diploma or GED
Textile Bleaching and Dyeing Machine Operators and Tenders	0.58	43	(11)	$51,950	High School Diploma or GED
Grinding and Polishing Workers, Hand	0.52	122	(36)	$37,701	No Formal Education Credential
Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers	0.50	81	14	$33,152	High School Diploma or GED
Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	0.48	173	87	$63,091	High School Diploma or GED
Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.43	111	(36)	$54,648	High School Diploma or GED
Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	0.41	250	20	$28,357	High School Diploma or GED
Chemical Equipment Operators and Tenders	0.40	264	13	$38,771	High School Diploma or GED
Textile Knitting and Weaving Machine Setters, Operators, and Tenders	0.22	36	(9)	$34,701	High School Diploma or GED
Cooling and Freezing Equipment Operators and Tenders	0.20	16	4	$43,347	High School Diploma or GED
Furniture Finishers	0.18	25	(3)	$32,914	High School Diploma or GED
Textile Winding, Twisting, and Drawing Out Machine Setters, Operators, and Tenders	0.14	35	6	$46,354	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Mechanics

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Mechanics	**0.89**	**15,036**	**1,406**	**$51,626**	
Automotive Glass Installers and Repairers	1.80	279	76	$31,607	High School Diploma or GED
Millwrights	1.23	461	100	$61,854	High School Diploma or GED
Tire Repairers and Changers	1.19	1,061	66	$33,040	High School Diploma or GED
Bicycle Repairers	1.13	108	7	$26,858	High School Diploma or GED
Bus and Truck Mechanics and Diesel Engine Specialists	0.97	2,180	172	$55,003	High School Diploma or GED
Automotive Body and Related Repairers	0.93	1,058	47	$41,123	High School Diploma or GED
Mobile Heavy Equipment Mechanics, Except Engines	0.93	1,146	256	$56,308	High School Diploma or GED
Industrial Machinery Mechanics	0.91	2,736	428	$57,161	High School Diploma or GED
Rail Car Repairers	0.88	190	9	$60,483	High School Diploma or GED
Riggers	0.84	160	40	$68,340	High School Diploma or GED
Automotive Service Technicians and Mechanics	0.77	4,000	91	$50,169	Postsecondary Nondegree
Outdoor Power Equipment and Other Small Engine Mechanics	0.65	170	2	$40,484	High School Diploma or GED
Signal and Track Switch Repairers	0.62	44	(10)	$72,387	High School Diploma or GED
Aircraft Mechanics and Service Technicians	0.52	806	116	$66,110	Postsecondary Nondegree
Maintenance Workers, Machinery	0.51	341	(13)	$46,902	High School Diploma or GED
Motorboat Mechanics and Service Technicians	0.49	91	12	$43,115	High School Diploma or GED
Mechanical Door Repairers	0.35	68	18	$54,780	High School Diploma or GED
Farm Equipment Mechanics and Service Technicians	0.34	100	(12)	$50,948	High School Diploma or GED
Recreational Vehicle Service Technicians	0.17	23	2	$38,051	High School Diploma or GED
Motorcycle Mechanics	0.14	17	(1)	$41,108	Postsecondary Nondegree

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Media

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Media	**1.00**	**6,869**	**2,030**	**$51,201**	
Sound Engineering Technicians	2.22	274	44	$39,539	Postsecondary Nondegree
Interpreters and Translators	1.80	944	200	$46,305	Bachelors
Media and Communication Workers, All Other	1.74	385	17	$47,655	High School Diploma or GED
Technical Writers	1.64	667	53	$68,741	Bachelors
Media and Communication Equipment Workers, All Other	1.44	283	28	$51,095	High School Diploma or GED
Writers and Authors	1.43	533	65	$65,091	Bachelors
Camera Operators, Television, Video, and Motion Picture	1.30	218	24	$74,644	Bachelors
Public Address System and Other Announcers	1.30	84	(1)	$22,366	High School Diploma or GED
Photographers	1.18	431	(20)	$30,979	High School Diploma or GED
Audio and Video Equipment Technicians	1.01	779	101	$41,875	Postsecondary Nondegree
Producers and Directors	0.93	902	163	$60,441	Bachelors
Editors	0.93	706	(1)	$54,116	Bachelors
Film and Video Editors	0.81	184	18	$44,819	Bachelors
Reporters and Correspondents	0.65	178	(28)	$36,141	Bachelors
Radio and Television Announcers	0.64	133	(32)	$42,624	Bachelors
Broadcast News Analysts	0.55	25	5	$30,626	Bachelors
Broadcast Technicians	0.54	142	13	$40,841	Associates

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Medical Professionals

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Medical Professionals	**0.96**	**48,128**	**5,668**	**$108,902**	
Nurse Midwives	2.77	153	(18)	$114,650	Masters
Therapists, All Other	2.06	255	82	$44,258	Bachelors
Chiropractors	2.01	567	102	$61,670	Doctoral or Professional Degree
Pediatricians, General	1.59	373	13	$176,917	Doctoral or Professional Degree
Health Diagnosing and Treating Practitioners, All Other	1.51	484	50	$67,337	Masters
Veterinarians	1.49	896	140	$102,811	Doctoral or Professional Degree
Obstetricians and Gynecologists	1.18	180	(8)	$205,504	Doctoral or Professional Degree
Dentists, General	1.17	1,084	152	$169,553	Doctoral or Professional Degree
Optometrists	1.16	359	43	$94,832	Doctoral or Professional Degree
Physicians and Surgeons, All Other	1.13	3,641	755	$163,757	Doctoral or Professional Degree
Pharmacists	1.13	2,720	(19)	$136,768	Doctoral or Professional Degree
Nuclear Medicine Technologists	1.13	176	0	$90,319	Associates
Oral and Maxillofacial Surgeons	1.07	44	(2)	$600,736	Doctoral or Professional Degree
Diagnostic Medical Sonographers	1.04	614	118	$87,499	Associates
Anesthesiologists	1.02	256	29	$307,438	Doctoral or Professional Degree
Psychologists, All Other	0.95	117	24	$83,805	Masters
Orthodontists	0.91	42	0	$371,864	Doctoral or Professional Degree
Registered Nurses	0.90	21,800	2,486	$92,315	Bachelors
Physical Therapists	0.87	1,661	178	$85,079	Doctoral or Professional Degree

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Medical Professionals (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Medical and Health Services Managers	0.86	2,688	577	$113,775	Bachelors
Internists, General	0.83	267	(85)	$267,716	Doctoral or Professional Degree
Exercise Physiologists	0.82	48	(9)	$53,454	Bachelors
Physician Assistants	0.82	797	148	$119,217	Masters
Cardiovascular Technologists and Technicians	0.81	371	54	$70,322	Associates
Occupational Therapists	0.80	843	94	$92,526	Masters
Nurse Practitioners	0.79	1,196	362	$111,327	Masters
Orthotists and Prosthetists	0.79	62	15	$70,270	Masters
Clinical Laboratory Technologists and Technicians	0.79	2,084	60	$63,621	Bachelors
Clinical, Counseling, and School Psychologists	0.76	695	84	$93,155	Doctoral or Professional Degree
Audiologists	0.74	84	9	$95,937	Doctoral or Professional Degree
Dietitians and Nutritionists	0.73	388	54	$69,823	Bachelors
Speech-Language Pathologists	0.69	844	125	$86,169	Masters
Nurse Anesthetists	0.69	251	43	$189,317	Masters
Family and General Practitioners	0.67	631	(55)	$240,103	Doctoral or Professional Degree
Podiatrists	0.64	50	(4)	$89,161	Doctoral or Professional Degree
Radiologic Technologists	0.61	1,016	72	$77,003	Associates
Psychiatrists	0.59	134	30	$281,463	Doctoral or Professional Degree
Dentists, All Other Specialists	0.54	24	(3)	$124,265	Doctoral or Professional Degree
Recreational Therapists	0.54	85	2	$67,236	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Medical Services

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Medical Services	**1.01**	**49,766**	**4,970**	**$44,519**	
Massage Therapists	2.31	2,087	520	$63,960	Postsecondary Nondegree
Medical Transcriptionists	1.55	656	(14)	$36,440	Postsecondary Nondegree
Veterinary Assistants and Laboratory Animal Caretakers	1.45	1,171	267	$31,455	High School Diploma or GED
Dental Hygienists	1.45	2,528	236	$88,874	Associates
Healthcare Practitioners and Technical Workers, All Other	1.40	404	(69)	$47,644	Postsecondary Nondegree
Hearing Aid Specialists	1.37	94	21	$52,501	High School Diploma or GED
Veterinary Technologists and Technicians	1.30	1,177	204	$34,614	Associates
Medical Assistants	1.28	7,426	1,338	$39,630	Postsecondary Nondegree
Healthcare Support Workers, All Other	1.27	961	(6)	$42,984	High School Diploma or GED
Medical Equipment Preparers	1.25	580	87	$43,434	High School Diploma or GED
Medical Records and Health Information Technicians	1.17	2,032	350	$48,790	Postsecondary Nondegree
Opticians, Dispensing	1.13	659	(7)	$43,611	High School Diploma or GED
Dental Assistants	1.08	3,078	201	$44,677	Postsecondary Nondegree
Health Technologists and Technicians, All Other	1.08	1,154	221	$51,235	High School Diploma or GED
Phlebotomists	1.05	1,106	141	$39,348	Postsecondary Nondegree
Occupational Health and Safety Specialists	0.99	707	238	$75,919	Bachelors
Pharmacy Technicians	0.89	2,929	145	$39,399	High School Diploma or GED
Radiation Therapists	0.88	134	13	$109,164	Associates

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Medical Services

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Occupational Health and Safety Technicians	0.87	129	28	$62,508	High School Diploma or GED
Surgical Technologists	0.79	714	71	$54,565	Postsecondary Nondegree
Dental Laboratory Technicians	0.74	217	(36)	$36,990	High School Diploma or GED
Ophthalmic Laboratory Technicians	0.72	174	(3)	$36,500	High School Diploma or GED
Psychiatric Aides	0.72	357	(6)	$39,127	High School Diploma or GED
Occupational Therapy Aides	0.71	50	5	$23,921	High School Diploma or GED
Physical Therapist Aides	0.70	286	4	$25,723	High School Diploma or GED
Ophthalmic Medical Technicians	0.69	313	100	$47,175	Postsecondary Nondegree
Nursing Assistants	0.69	8,041	580	$33,636	Postsecondary Nondegree
Respiratory Therapists	0.67	721	65	$71,144	Associates
Home Health Aides	0.66	4,567	(295)	$25,760	No Formal Education Credential
Occupational Therapy Assistants	0.65	239	57	$59,554	Associates
Magnetic Resonance Imaging Technologists	0.64	201	31	$87,769	Associates
Emergency Medical Technicians and Paramedics	0.62	1,328	229	$49,799	Postsecondary Nondegree
Physical Therapist Assistants	0.58	458	84	$57,371	Associates
Athletic Trainers	0.56	130	24	$49,765	Bachelors
Medical Appliance Technicians	0.51	64	(1)	$29,943	High School Diploma or GED
Genetic Counselors	0.50	12	1	$81,631	Masters
Orderlies	0.48	205	(22)	$32,688	High School Diploma or GED
Licensed Practical and Licensed Vocational Nurses	0.40	2,339	122	$54,847	Postsecondary Nondegree
Dietetic Technicians	0.36	111	20	$45,507	Associates
Pharmacy Aides	0.24	67	(18)	$37,213	High School Diploma or GED
Psychiatric Technicians	0.23	147	47	$30,269	Postsecondary Nondegree
Respiratory Therapy Technicians	0.20	14	(3)	$31,331	Associates

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Municipal and Government Services

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Municipal and Government Services	**0.89**	**25,629**	**835**	**$53,317**	
Crossing Guards	2.55	1,683	412	$34,795	No Formal Education Credential
Urban and Regional Planners	1.75	539	78	$88,329	Masters
Parking Enforcement Workers	1.27	101	(17)	$52,469	High School Diploma or GED
First-Line Supervisors of Protective Service Workers, All Other	1.22	783	161	$41,995	High School Diploma or GED
Postal Service Mail Sorters, Processors, and Processing Machine Operators	1.20	897	(99)	$58,602	High School Diploma or GED
Dispatchers, Except Police, Fire, and Ambulance	1.14	1,845	88	$44,003	High School Diploma or GED
Transportation Security Screeners	1.06	431	49	$39,700	High School Diploma or GED
Fire Inspectors and Investigators	0.94	100	4	$92,167	Postsecondary Nondegree
First-Line Supervisors of Fire Fighting and Prevention Workers	0.87	456	74	$105,053	Postsecondary Nondegree
Postal Service Mail Carriers	0.83	2,058	85	$49,632	High School Diploma or GED
Economists	0.76	127	(4)	$95,799	Masters
First-Line Supervisors of Police and Detectives	0.73	714	139	$106,909	High School Diploma or GED
Security Guards	0.72	6,817	379	$27,279	High School Diploma or GED
Protective Service Workers, All Other	0.72	822	113	$42,479	High School Diploma or GED
Meter Readers, Utilities	0.70	192	44	$51,286	High School Diploma or GED
Postal Service Clerks	0.65	367	(16)	$57,890	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Municipal and Government Services (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Private Detectives and Investigators	0.64	168	20	$53,102	High School Diploma or GED
Transit and Railroad Police	0.61	30	5	$79,256	High School Diploma or GED
Firefighters	0.60	1,559	63	$83,409	Postsecondary Nondegree
Postmasters and Mail Superintendents	0.58	57	(8)	$75,530	High School Diploma or GED
Police, Fire, and Ambulance Dispatchers	0.57	448	(18)	$60,640	High School Diploma or GED
Emergency Management Directors	0.55	57	5	$89,127	Bachelors
Detectives and Criminal Investigators	0.54	472	(62)	$89,199	High School Diploma or GED
Police and Sheriff's Patrol Officers	0.51	2,951	(108)	$77,760	High School Diploma or GED
Animal Control Workers	0.49	47	(5)	$52,727	High School Diploma or GED
Correctional Officers and Jailers	0.48	1,563	(470)	$62,784	High School Diploma or GED
First-Line Supervisors of Correctional Officers	0.46	158	(56)	$92,339	High School Diploma or GED
Gaming Surveillance Officers and Gaming Investigators	0.41	39	3	$35,184	High School Diploma or GED
Bailiffs	0.30	49	(11)	$51,825	High School Diploma or GED
Legislators	0.21	99	(13)	$29,506	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Personal Services

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Personal Services	**2.66**	**61,848**	**15,096**	**$29,156**	
Personal Care and Service Workers	13.44	7,712	195	$29,867	High School Diploma or GED
Barbers	2.29	381	135	$44,984	Postsecondary Nondegree
Manicurists and Pedicurists	2.18	1,988	647	$26,123	Postsecondary Nondegree
Skincare Specialists	2.04	877	265	$30,124	Postsecondary Nondegree
Childcare Workers	1.37	8,073	1,000	$26,609	High School Diploma or GED
Fitness Trainers and Aerobics Instructors	1.22	3,242	1,034	$40,191	High School Diploma or GED
Personal Care Aides	1.10	21,734	9,782	$27,698	No Formal Education Credential
Maids and Housekeeping Cleaners	0.99	8,160	555	$26,418	No Formal Education Credential
Recreation Workers	0.88	2,608	353	$31,326	High School Diploma or GED
Nonfarm Animal Caretakers	0.83	1,443	372	$26,110	High School Diploma or GED
Animal Trainers	0.81	129	41	$27,158	High School Diploma or GED
First-Line Supervisors of Personal Service Workers	0.80	1,524	409	$36,781	High School Diploma or GED
Residential Advisors	0.70	770	18	$33,901	High School Diploma or GED
Locker Room, Coatroom, and Dressing Room Attendants	0.68	109	7	$27,556	High School Diploma or GED
Concierges	0.61	201	47	$32,246	High School Diploma or GED
First-Line Supervisors of Housekeeping and Janitorial Workers	0.60	744	(49)	$46,546	High School Diploma or GED
Hairdressers, Hairstylists, and Cosmetologists	0.58	1,762	272	$29,356	Postsecondary Nondegree
Morticians, Undertakers, and Funeral Directors	0.58	117	10	$55,718	Associates
Baggage Porters and Bellhops	0.49	177	(4)	$24,878	High School Diploma or GED
Funeral Attendants	0.36	99	7	$30,697	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Real Estate

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Real Estate	**1.43**	**5,112**	**946**	**$55,720**	
Real Estate Brokers	2.70	1,137	211	$61,132	High School Diploma or GED
Property, Real Estate, and Community Association Managers	1.12	1,889	452	$63,254	High School Diploma or GED
Real Estate Sales Agents	1.05	1,658	277	$39,174	High School Diploma or GED
Appraisers and Assessors of Real Estate	0.92	428	6	$72,207	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Research and Science

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Research and Science	**1.39**	**8,604**	**1,102**	**$69,944**	
Miscellaneous Mathematical Science Occupations	2.60	48	(4)	$75,227	Bachelors
Biological Technicians	2.36	1,544	263	$41,704	Bachelors
Anthropologists and Archaeologists	1.67	93	(36)	$58,653	Masters
Medical Scientists, Except Epidemiologists	1.53	1,577	324	$71,514	Doctoral or Professional Degree
Life, Physical, and Social Science Technicians, All Other	1.47	776	34	$57,041	Associates
Life Scientists, All Other	1.38	84	(25)	$43,755	Bachelors
Natural Sciences Managers	1.30	672	90	$119,206	Bachelors
Materials Scientists	1.27	84	45	$106,407	Bachelors
Physical Scientists, All Other	1.27	198	0	$87,380	Bachelors
Operations Research Analysts	1.20	1,082	177	$83,700	Bachelors
Food Scientists and Technologists	1.18	137	0	$59,479	Bachelors
Statisticians	1.08	389	141	$81,613	Masters
Agricultural and Food Science Technicians	1.03	215	17	$38,264	Associates
Atmospheric and Space Scientists	0.92	96	9	$101,326	Bachelors
Actuaries	0.87	179	6	$96,901	Bachelors

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Research and Science (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Social Scientists and Related Workers, All Other	0.85	265	30	$77,074	Bachelors
Epidemiologists	0.82	51	4	$71,077	Masters
Animal Scientists	0.72	18	1	$24,930	Bachelors
Forensic Science Technicians	0.72	104	26	$68,867	Bachelors
Microbiologists	0.65	110	(13)	$57,856	Bachelors
Chemists	0.53	372	27	$71,563	Bachelors
Biochemists and Biophysicists	0.46	114	(17)	$63,987	Doctoral or Professional Degree
Historians	0.45	13	(2)	$66,852	Masters
Political Scientists	0.41	24	12	$119,315	Masters
Chemical Technicians	0.36	190	(9)	$43,619	Associates
Physicists	0.34	53	(4)	$96,133	Doctoral or Professional Degree
Social Science Research Assistants	0.28	83	(11)	$53,051	Bachelors
Geological and Petroleum Technicians	0.23	31	17	$61,581	Associates

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Restaurants and Food Service

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Restaurants and Food Service	**1.05**	**115,340**	**12,135**	**$27,673**	
Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	1.60	6,185	253	$25,604	No Formal Education Credential
Food Batchmakers	1.52	2,009	528	$29,543	High School Diploma or GED
Food Preparation and Serving Related Workers, All Other	1.43	723	100	$25,575	No Formal Education Credential
Food Preparation Workers	1.31	8,692	(9)	$26,749	No Formal Education Credential
Cooks, Restaurant	1.27	14,019	2,674	$30,155	No Formal Education Credential
Food Servers, Nonrestaurant	1.24	2,714	320	$26,420	No Formal Education Credential
Food Processing Workers, All Other	1.21	444	(2)	$29,103	No Formal Education Credential
Chefs and Head Cooks	1.18	1,266	86	$46,412	High School Diploma or GED
Bartenders	1.14	5,805	721	$25,222	No Formal Education Credential
Bakers	1.10	1,575	60	$30,656	No Formal Education Credential
Dishwashers	1.07	4,311	127	$25,499	No Formal Education Credential
Food Service Managers	1.06	1,889	256	$50,062	High School Diploma or GED
Cooks, Institution and Cafeteria	1.06	3,626	236	$33,158	No Formal Education Credential
Butchers and Meat Cutters	0.99	1,043	(16)	$38,034	No Formal Education Credential
First-Line Supervisors of Food Preparation and Serving Workers	0.99	7,682	1,088	$32,679	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Restaurants and Food Service (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Waiters and Waitresses	0.95	19,585	980	$25,018	No Formal Education Credential
Cooks, All Other	0.94	177	53	$29,739	No Formal Education Credential
Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop	0.86	2,869	212	$25,017	No Formal Education Credential
Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders	0.82	160	12	$42,595	No Formal Education Credential
Dining Room and Cafeteria Attendants and Bartender Helpers	0.82	3,061	342	$24,902	No Formal Education Credential
Cooks, Fast Food	0.78	2,995	(123)	$27,204	No Formal Education Credential
Cooks, Short Order	0.77	975	(171)	$25,843	No Formal Education Credential
Combined Food Preparation and Serving Workers, Including Fast Food	0.77	23,171	4,423	$24,980	No Formal Education Credential
Cooks, Private Household	0.73	11	1	$34,636	Postsecondary Nondegree
Slaughterers and Meat Packers	0.37	222	24	$29,972	No Formal Education Credential
Food Cooking Machine Operators and Tenders	0.24	67	(22)	$38,317	High School Diploma or GED
Meat, Poultry, and Fish Cutters and Trimmers	0.05	65	(18)	$26,451	No Formal Education Credential

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Retail and Sales

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Retail and Sales	**1.00**	**110,209**	**3,881**	**$42,696**	
Demonstrators and Product Promoters	2.15	1,574	44	$27,208	High School Diploma or GED
Sales and Related Workers, All Other	2.06	1,634	310	$35,627	High School Diploma or GED
Purchasing Managers	1.83	1,067	50	$103,954	Bachelors
Sales Managers	1.48	4,538	399	$116,767	Bachelors
Buyers and Purchasing Agents	1.22	3,954	156	$60,814	Bachelors
Sales Engineers	1.18	686	(24)	$99,896	Bachelors
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	1.17	12,813	(13)	$59,730	High School Diploma or GED
Door-to-Door Sales Workers, News and Street Vendors, and Related Workers	1.09	88	26	$32,183	No Formal Education Credential
Parts Salespersons	1.09	2,201	172	$33,763	No Formal Education Credential
First-Line Supervisors of Non-Retail Sales Workers	0.99	1,930	2	$65,938	High School Diploma or GED
First-Line Supervisors of Retail Sales Workers	0.98	8,847	180	$38,714	High School Diploma or GED
Counter and Rental Clerks	0.97	3,348	118	$32,891	No Formal Education Credential
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	0.91	2,444	(105)	$78,823	Bachelors
Sales Representatives, Services, All Other	0.91	8,232	1,448	$54,047	High School Diploma or GED
Retail Salespersons	0.90	30,446	(75)	$27,475	No Formal Education Credential
Securities, Commodities, and Financial Services Sales Agents	0.82	2,805	749	$48,408	Bachelors
Cashiers	0.79	22,151	1,007	$26,087	No Formal Education Credential
Telemarketers	0.75	982	(519)	$29,211	No Formal Education Credential
Travel Agents	0.70	384	(30)	$34,339	High School Diploma or GED
Gaming Change Persons and Booth Cashiers	0.42	85	(14)	$30,878	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Social Services

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Social Services	**1.43**	**27,294**	**3,540**	**$51,850**	
Social Workers, All Other	3.65	2,238	203	$53,118	Bachelors
Social and Community Service Managers	2.21	3,019	793	$60,531	Bachelors
Health Educators	1.72	834	50	$50,759	Bachelors
Substance Abuse, Behavioral Disorder, and Mental Health Counselors	1.39	3,242	885	$57,694	Masters
Counselors, All Other	1.27	340	62	$60,282	Masters
Clergy	1.23	2,313	(105)	$56,062	Bachelors
Social and Human Service Assistants	1.13	3,828	673	$37,310	High School Diploma or GED
Community and Social Service Specialists, All Other	1.09	932	56	$44,057	Masters
Mental Health and Substance Abuse Social Workers	1.08	1,077	152	$45,105	Bachelors
Directors, Religious Activities and Education	1.05	1,296	69	$34,313	Bachelors
Community Health Workers	1.01	500	105	$45,122	High School Diploma or GED
Probation Officers and Correctional Treatment Specialists	0.98	680	(164)	$64,825	Bachelors
Educational, Guidance, School, and Vocational Counselors	0.92	2,097	311	$61,370	Masters
Healthcare Social Workers	0.90	1,264	176	$71,187	Masters
Child, Family, and School Social Workers	0.84	2,193	174	$51,937	Bachelors
Religious Workers, All Other	0.82	394	18	$29,846	Bachelors
Rehabilitation Counselors	0.81	713	(44)	$40,984	Masters
Marriage and Family Therapists	0.73	335	126	$50,584	Masters

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Transportation

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Transportation	**0.99**	**79,225**	**10,685**	**$41,415**	
Hoist and Winch Operators	2.80	71	26	$38,770	No Formal Education Credential
Automotive and Watercraft Service Attendants	2.54	2,369	222	$26,208	No Formal Education Credential
Motor Vehicle Operators, All Other	1.87	931	148	$31,479	No Formal Education Credential
Crane and Tower Operators	1.72	655	63	$69,672	High School Diploma or GED
Bus Drivers, Transit and Intercity	1.48	2,176	131	$55,432	High School Diploma or GED
Transportation, Storage, and Distribution Managers	1.46	1,557	343	$86,140	High School Diploma or GED
Aircraft Cargo Handling Supervisors	1.41	109	41	$41,899	High School Diploma or GED
Refuse and Recyclable Material Collectors	1.33	1,315	148	$49,764	No Formal Education Credential
Driver/Sales Workers	1.24	4,130	177	$32,533	High School Diploma or GED
Cleaners of Vehicles and Equipment	1.09	3,340	522	$27,355	No Formal Education Credential
Transportation Workers, All Other	1.01	330	42	$43,263	High School Diploma or GED
Sailors and Marine Oilers	1.00	346	1	$50,623	No Formal Education Credential
Machine Feeders and Offbearers	1.00	580	(163)	$27,230	No Formal Education Credential
Flight Attendants	0.97	945	172	$75,161	High School Diploma or GED
Light Truck or Delivery Services Drivers	0.95	7,376	1,302	$35,654	High School Diploma or GED
Ship Engineers	0.94	106	(26)	$75,589	Postsecondary Nondegree

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Transportation (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
Industrial Truck and Tractor Operators	0.94	4,719	1,031	$37,348	No Formal Education Credential
First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	0.94	3,188	565	$54,864	High School Diploma or GED
Heavy and Tractor-Trailer Truck Drivers	0.90	13,581	1,633	$48,643	Postsecondary Nondegree
Excavating and Loading Machine and Dragline Operators	0.89	353	44	$53,715	High School Diploma or GED
Captains, Mates, and Pilots of Water Vessels	0.88	349	3	$87,065	Postsecondary Nondegree
Taxi Drivers and Chauffeurs	0.87	1,504	305	$29,061	No Formal Education Credential
Traffic Technicians	0.85	68	3	$71,784	High School Diploma or GED
Bus Drivers, School or Special Client	0.80	3,110	175	$38,397	High School Diploma or GED
Airline Pilots, Copilots, and Flight Engineers	0.79	779	82	$220,280	Bachelors
Transportation Inspectors	0.79	216	26	$80,416	High School Diploma or GED
Laborers and Freight, Stock, and Material Movers, Hand	0.78	18,700	3,825	$29,737	No Formal Education Credential
Railroad Brake, Signal, and Switch Operators	0.76	84	(48)	$65,058	High School Diploma or GED
Locomotive Engineers	0.73	197	(51)	$73,136	High School Diploma or GED
Packers and Packagers, Hand	0.73	3,912	(74)	$28,327	No Formal Education Credential
Commercial Pilots	0.70	303	45	$52,770	High School Diploma or GED
Parking Lot Attendants	0.68	857	13	$26,436	No Formal Education Credential
Railroad Conductors and Yardmasters	0.66	222	(40)	$72,753	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Transportation (Continued)

Skill Cluster	Location Quotient 2020	2020 Jobs	New Jobs 2015-2020	Median Annual Salary	Education
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First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	0.94	3,188	565	$54,864	High School Diploma or GED
Heavy and Tractor-Trailer Truck Drivers	0.90	13,581	1,633	$48,643	Postsecondary Nondegree
Excavating and Loading Machine and Dragline Operators	0.89	353	44	$53,715	High School Diploma or GED
Captains, Mates, and Pilots of Water Vessels	0.88	349	3	$87,065	Postsecondary Nondegree
Taxi Drivers and Chauffeurs	0.87	1,504	305	$29,061	No Formal Education Credential
Traffic Technicians	0.85	68	3	$71,784	High School Diploma or GED
Bus Drivers, School or Special Client	0.80	3,110	175	$38,397	High School Diploma or GED
Airline Pilots, Copilots, and Flight Engineers	0.79	779	82	$220,280	Bachelors
Transportation Inspectors	0.79	216	26	$80,416	High School Diploma or GED
Laborers and Freight, Stock, and Material Movers, Hand	0.78	18,700	3,825	$29,737	No Formal Education Credential
Railroad Brake, Signal, and Switch Operators	0.76	84	(48)	$65,058	High School Diploma or GED
Locomotive Engineers	0.73	197	(51)	$73,136	High School Diploma or GED
Packers and Packagers, Hand	0.73	3,912	(74)	$28,327	No Formal Education Credential
Commercial Pilots	0.70	303	45	$52,770	High School Diploma or GED
Parking Lot Attendants	0.68	857	13	$26,436	No Formal Education Credential
Railroad Conductors and Yardmasters	0.66	222	(40)	$72,753	High School Diploma or GED

Source: EMSI 2020.1 dataset.
Note: Blue shading represents clusters with LQ's greater than the U.S. average; orange shading represents an employment decline.

Prepared For: GREATER PORTLAND Metro

Prepared By: BRIDGE ECONOMIC DEVELOPMENT

APPENDIX C

ECONorthwest
ECONOMICS • FINANCE • PLANNING

DATE: September 17, 2020
TO: Greater Portland Inc, Metro
FROM: Tyler Bump, Matt Craigie, and Margaret Raimann, James Kim
SUBJECT: Economic Trends and Disruptions – Cover Memorandum

Purpose and Background

Greater Portland Inc (GPI) has teamed with Metro to update the Portland region's Comprehensive Economic Development Strategy (CEDS) and to evaluate economic factors that will impact the Portland region in the near to long term. ECONorthwest is working with the consultant team on subtasks for this project, the first of which is aimed at identifying and evaluating the economic trends and disruptions that are most likely to impact the region's economy going forward. This packet of memorandums is the synthesis of this task. The purpose of this work is to summarize for GPI and Metro:

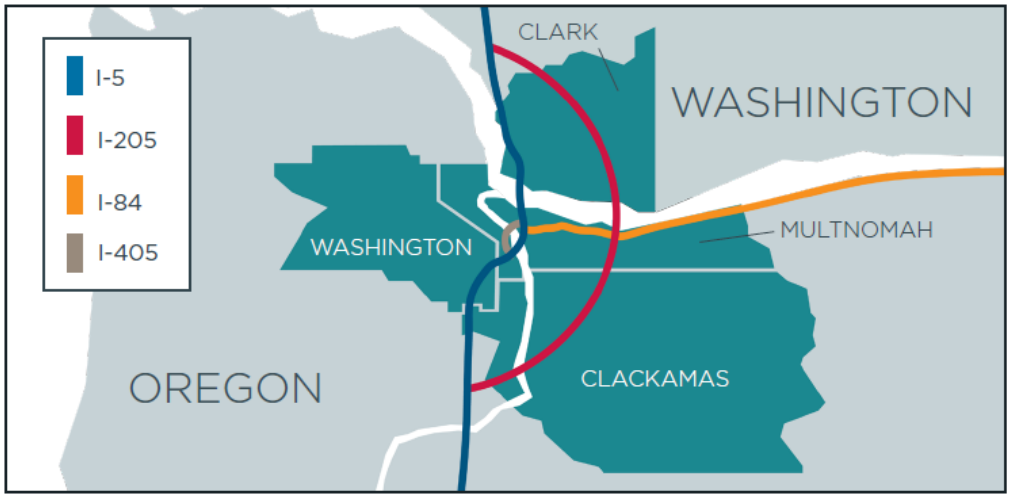
1. The trends and disruptions most likely to impact the Portland region's economy,
2. Identify the likely impacts of those trends and disruptions, and;
3. Present a survey of potential actions and policy responses to mitigate those impacts.

Of particular importance for this project is how these trends and disruptions are likely to impact historically marginalized populations. GPI and Metro are interested in these distributional impacts on the region's population so that the policy making process can be centered on proactive equity focused actions and policies.

The Portland Metropolitan Region

For this work, we define the Portland Metropolitan Region as the geography comprised of three counties in Oregon: Multnomah, Washington, and Clackamas; and, Clark County in Washington State.

Exhibit 1. The Portland Metropolitan Region
Source: Greater Portland Inc.



Organization of Memorandums

There are four memoranda that were drafted to complete this task. This memorandum serves as an introduction to the task and a summary of the work. It also summarizes key findings and recommended actions (See Appendix A), describes the methods by which the task was undertaken (See Appendix B), and provides an overview SWOT analysis for the Portland region's economy (See Appendix C). In essence, this document serves as the cover memorandum. The other three "discussion paper" memoranda describe the trends and disruptions by their grouped topics in more detail. These grouped topics are:

1. Automation/E-Commerce,
2. Gig-Sharing Economy, Remote Work and Co-Working; and,
3. Natural and Economic Disasters: Climate/Pandemic/Earthquake[1].

Economic Trends and Disruptions: Weighing Priorities and Actions

The three economic trends and disruptions memorandums describe a wide spectrum of external and internal forces that are, or in some cases *could* or *will*, cause changes in the Portland region's economy. These changes are not without precedent. Economies are constantly evolving. Technological advances change how work is completed. Natural disasters strike. Market preferences shift. But how do regional organizations like Metro and GPI prepare for these changes? With limited resources, how do these organizations (and their partners) prioritize actions or meaningful policy responses? As an initial starting point, the nature of the economic trend or disruptions should be considered. Some fundamental questions are:

- Is the trend/disruption likely to be a one-time shock to the economy? Or is it a trend that will incrementally drive long-term economic change?
- How vulnerable is the Portland region's economy to this trend/disruption? Due to the industry clusters present in our region and the composition of the region's workforce, is the region particularly vulnerable for a specific type of trend/disruption?

Exhibit 2 illustrates a rough approximation of our assessment of how the trends and disruptions examined in the memorandums stack up against these criteria—the vulnerability of the Portland region's economy and the temporal nature of the trend/disruption.

[1] There is a range of natural and economic disasters that could befall any region. To maintain focus on those that are most likely to affect the Portland region—and to consider the real-time impacts of the COVID-19 crisis—we will examine the natural and economic disasters category through the lens of impacts related to a pandemic and an earthquake.

Exhibit 2. Categorization of Portland Region Trends/Disruptions
Source: ECONorthwest

Portland Region's Economic Vulnerability	Trend	Shock
Low	• Automation • Coworking	• N/A
High	• Climate Change • E-Commerce • Gig-sharing Economy • Remote Work	• Earthquake • Pandemic

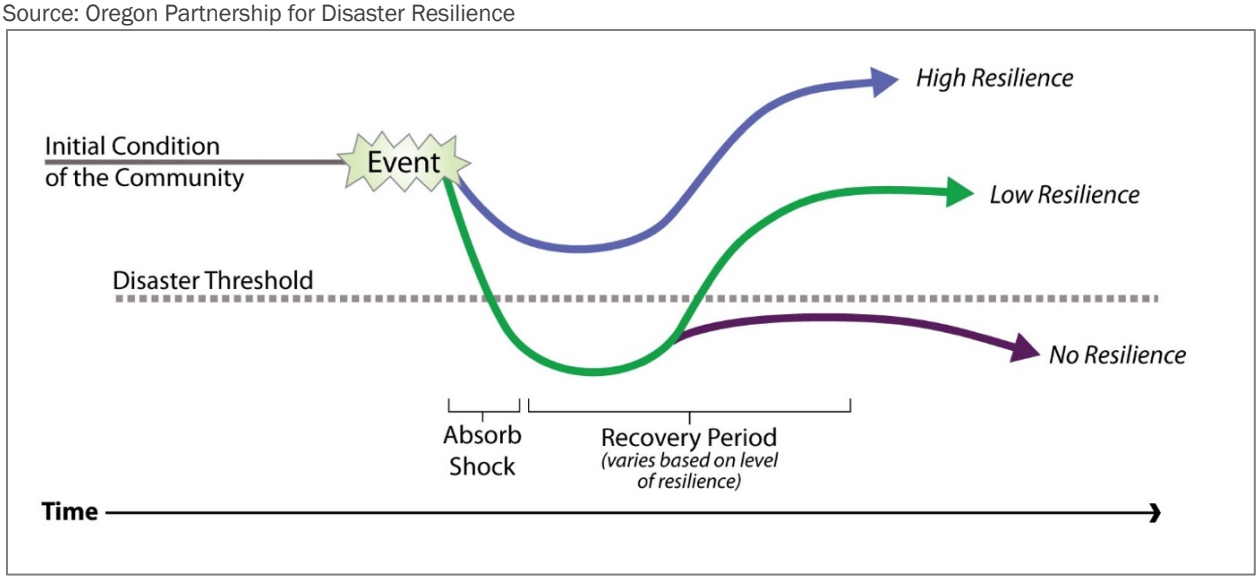
Where each trend/disruption falls on the matrix provides a data point for decision-makers to consider when attempting to prioritize which trend/disruptions are the most important to consider. However, this brief and high-level exercise is only a starting point. To build a meaningful framework around how GPI, Metro, and others in the Portland region might address each one of these trends/disruptions requires consideration of more difficult questions:

- How do you want the region to emerge from, mitigate, or adapt to the trend/disruption?
- What do ideal outcomes look like?
- What does your organization directly control and how can that power be used to respond to the trend/disruption?
- For regulatory or purse powers not controlled by your organization, how can your organization influence the regional discussion and actions related to the trend/disruption?
- Which actions or policy responses are likely to have the most impact?
- How will an equity framework inform the process and decision-making around actions and policy responses?
- Who can take on responsibility for coordinating this ongoing work?

As we are in the midst of the COVID-19 pandemic—one of the most impactful economic disruptions to occur in decades—this discussion is timely and arguably easier to conceptualize. We are currently living in a world that is already quite different than the "normal" of 2019. The pandemic elevates the need for our region to more fully adopt a long-term economic strategy rooted in economic resilience.

As described in a recent white paper by the University of Oregon's Institute for Policy Research (IPRE) and ECONorthwest[2], economic resilience is the process of reducing vulnerabilities and increasing adaptive capacities in an economy. Thoroughly integrating economic resilience planning into a regional economic strategy is intended to shorten the recovery period after an economic shock[3]. Successful economic resilience planning would mean that the economic recovery period is greatly shortened and quickly returns to its initial condition. In the best of cases, a highly resilient economy would be able to adapt and actually improve upon their initial position (Exhibit 3). The Framework white paper identifies six focus areas local economies should consider to foster economic resilience, which include economic diversity, business engagement, adaptive infrastructure, adaptive workforce and housing, resilient financing, and communication.

Exhibit 3. Resilience and Recovery Trajectories
Source: Oregon Partnership for Disaster Resilience



[2] Parker, Bruce, Bump, Craigie, et al; "Responding to the Economic Impacts of Coronavirus: A Proposed Oregon Economic Recovery and Resilience Framework" April 2020.

[3] While much of the research about economic resilience has been focused natural disaster response, which are predominately abrupt economic shocks (disruptions), many of the same preparatory measures that are deployed in an economic resilience framework will also serve to advance a resilient stance against longer term economic trends.

Next Steps

This analysis of economic trends and disruptions was intended to inform the process of creating the next Greater Portland Comprehensive Economic Development Strategy (CEDS). In doing so, we have identified many trends and disruptions that are, or could, impact the economy of the Portland region. Together, these trends and disruptions are expansive; no single organization is likely to have the resources, capacity, and leadership to successfully track and navigate the region's economy through each one. For this reason, and with our understanding of the interests and capacities of GPI and Metro, we recommend the following next steps.

- **Continue this regional conversation about each trend and disruption**. Through this process, we have only touched the surface of how each trend and disruption is or might impact our region. More work, ongoing work, is needed to keep focus on each one. A place to start would be to invite focus group members to participate in quarterly discussions about each trend/disruption. In this way, the momentum of this project would carry forward.
- **Identify champions to shepherd each trend/disruption regional discussion**. Each trend/disruption requires a champion that thoroughly understands the issues and has the leadership to mobilize, convene, and coordinate partners to advance actions and policy responses. Metro and GPI should work with the focus groups to identify individuals and organizations that can take on these roles.
- **Integrate this initial thinking about trends and disruptions into the Greater Portland CEDS.** The CEDS is the five-year playbook for the regional economy. It helps to set regional economic priorities and drive discussions about where regional and local organizations should deploy their resources. To maintain focus on the trends and disruptions, they should be integrated into the strategy.

Appendix A: Policies and Actions: Summary Assessment of Next Steps

Based on our research and input from stakeholders, we present key questions, potential policy examples and actions for Metro and GPI to consider for each of the trends and disruptions. This content can also be found in within each of the discussion papers.

Automation and E-commerce

What is Metro and GPI's role from a policy perspective to help support businesses shift to automated processes and mitigate for unintended consequences of automation? Are we planning for employment or economic productivity?

- Metro and GPI could identify a strategic policy direction related to the impacts of automation on access to employment, job densities, and economic productivity. Increased automation could have positive net benefits for the Portland region such as increased economic productivity, in the form of GDP, while also having negative impacts on employment and job density goals in the region. It is important for regional organizations to identify clear outcomes for the future of work and develop strategic policies to support those outcomes.

How do current trends in e-commerce impact local sector businesses and how can Metro and GPI best help support small local businesses adapt to changes in consumer behavior?

- Metro and GPI should work with local governments and regional service providers to develop training and assistance to help businesses better access e-commerce markets. This work would require training to understand the tools and operating procedures to access new markets, process payments, track orders, and efficiently deliver goods and services. This training program could also be one way of advancing racial equity goals and programs and services should be focused on BIPOC and women owned businesses.

How do current trends in ecommerce impact regional land capacity and how can Metro better understand the role of modern ecommerce distribution and fulfillment in the context of regional employment land use planning?

- E-commerce distribution and fulfillment centers are beginning to make site location decisions in ways that are very different than traditional warehousing and distribution users. Recent trends in distribution and fulfillment centers indicates that there is a broad size range of facilities and land needs that range from smaller urban context last mile facilitates to larger regional distribution facilities. Urban and suburban infill sites are likely to play a more important role for e-commerce fulfillment centers. Oftentimes, development standards and use allowances on large format retail infill and redevelopment sites prohibit small or medium fulfillment centers through use restrictions or development standards that do not match the needs of modern ecommerce.

Metro should identify clear policy parameters for allowing—or prohibiting—e-commerce fulfillment centers in general commercial land uses areas throughout the region that were previously identified for retail use. This is especially important in light of COVID-19 impacts on brick and mortar retailers and what is likely to be an increasingly large inventory of vacant retail sites in the region.

What impacts will an increase in e-commerce activity have on local government funding and the provision of local services?

- As a larger share of consumer expenditures shift to e-commerce purchases, local government should think about the impact that our current tax structure has on the ability of government to support needed services across our communities. As the nature of economic productivity, consumer expenditures, job types, and real estate demand shift in response to increases in automation and ecommerce, local governments should understand the fiscal impacts of these trends. While strict constitutional tax limitations in Oregon and Washington limit the ability of local governments to raise revenues, these governments could explore the political, legal, and fiscal impacts of something similar to a value-added tax in response to a growing trend of e-commerce (and automation) if traditional taxing mechanisms might become less effective for generating revenue.

Remote Work

- How do businesses that transition to higher rates of remote work provide support for workers to advance equitable outcomes?
  - Determine broadband "dead zones" across region and incentivize infrastructure investment to make sure all residents have access to good internet.
  - Develop programs that provide equipment to employees to work productively in a remote setting. Many workers lack the ability to maximize productivity when working from home because they are not provided the same level of work-place materials and dedicated workspace that they otherwise would be provided in a physical office space. In response to COVID-19 local governments and community organizations have stepped in to provide computers to workers that only previously had access to computers at their physical place of work.
  - Develop workforce training programs that provide skills to workers to navigate a remote working environment. The reliance on collaboration software and remote working technology can be a barrier to workers who have limited experience with web-based digital collaboration and communication tools.
  - Access to childcare can be a barrier to workers and lead to disproportionate gender, racial and social equity impacts. As workers might transition to more remote work or hybrid work scenarios, the location of childcare facilities and availability of affordable childcare could be a major barrier to caregivers who rely on childcare.
- How will land use and development patterns change as a result of more workers working remotely?

- Areas in the region that have services and amenities nearby residential locations where workers can work from home and access daily needs are poised to be more competitive if remote work continues to increase. Inner-ring suburbs and regional centers with existing and planned services to meet the needs of both residents and workers could capture a higher share of mobile workers who are making residential location decisions that are more flexible without a requirement to commute to a physical office as frequently as in the past.
- Cities throughout the region should re-evaluate residential use allowances and development standards that support work from home operations. Lower barrier opportunities for non-habitable accessory structures and home-based business regulations should be evaluated to support remote work options.
- More dedicated resources for businesses to make short-term changes to physical office space will be needed to respond to the COVID-19 pandemic and the likely increases proportion of remote workers in its aftermath.

Gig-Sharing Economy

- How can workers in the gig-sharing economy, especially necessity entrepreneurs—those that rely mostly on the gig-economy for income—build wealth and a better safety net? Example policies could include:
  - Encourage use of and educate gig-workers about opportunities for workers to save for retirement, specifically participation in the Oregon Saves program.[4]
  - Explore opportunities for gig-workers to access other benefits such as unemployment insurance, Supplemental Nutrition Assistance Program, and other government programs.
  - Advocate for protections for gig-workers including anti-harassment policies, occupation classification, and wage theft protection.
  - Permitting processes for business operations can be onerous and complicated, especially for immigrant communities and those with limited English proficiency.
  - In partnership with direct service providers and businesses, create a regional toolkit that local jurisdictions in the region can implement to remove barriers to business permitting and public health permitting requirements. [5]
  - Partner with and support existing organizations that provide training and resources to workers that rely on gig-economy work for the majority of their income such as Voz Portland.

[4] While initially not available to gig-workers, the Oregon Saves Program has expanded to the gig economy as of November 2018. https://www.oregon.gov/newsroom/Pages/NewsDetail.aspx?newsid=3063

[5] Emilia Istrate and Johnathan Harris. "The Future of Work: The Rise of the Gig Economy." November 2017 https://www.naco.org/featured-resources/future-work-rise-gig-economy

Co-Working

- What changes to the built environment will be needed to respond to workplace disruptions? Policy considerations may be similar to those for increases in remote work environments with changes to the way office space is used (e.g., more sub-leasing).
    - Coworking spaces have predominantly been located in high density employment areas as a function of market demand. Trends in increasing remote work activity could lead to a need for more dispersed coworking facilities throughout the region as workers might need scheduled meeting or office space. Evaluate development standards, use allowances, and change of use allowances to facilitate coworking spaces in areas throughout the region.
    - Identify opportunities to support renovation and occupancy of vacant retail spaces in regional centers with coworking spaces. Change of use requirements can be a major barrier to renovating previous retail spaces for office use.
    - Identify zoning barriers to allow more flexibility for non-traditional office uses like coworking spaces in commercial, and potentially even residential, zones throughout the region. Coworking spaces often operate in a grey area of use definition within zoning codes and clarity to allow for master and sub-lease agreements can be difficult to determine the use of final tenants when new development and tenant improvement permits are reviewed by current planning staff.

Natural Disasters

At this high-level scan, and informed by our engagement with local stakeholders, we see policy/actions responses for natural disasters falling into the following categories.

- **Communication**. Clear, consistent, and timely communication systems, including those for non-English speakers, are needed during and after a natural disaster to ensure that businesses understand an evolving regulatory environment and workers know where to find assistance. State, local governments, Metro, and GPI should build on regional coordination efforts from the COVID-19 pandemic and formalize ongoing communication with regional partners.
- **Capacity Building**. Local organizations with existing relationships with at-risk or vulnerable populations will need the capacity and tools to serve those communities in the time of crisis. Before a natural disaster strikes is the time to build and reinforce those relationships. Ongoing support of community-based organizations is needed to build long-term trust and build more recovery and resilience capacity.
- **Convening/Coordination**. It is the role of regional organizations to help bring together local partners—public sector, non-profits, service providers, and private business—to organize and prepare for natural disaster response. Metro should continue to coordinate with RDPO and other regional partners for disaster recovery planning efforts.
- **Capital**. New, responsive, and creative capital solutions are needed to respond to various types of natural disasters. Communities throughout the region who were able to

deploy capital in the immediate aftermath of COVID-19 shutdowns were able to support businesses and community members in very uncertain times. Regional organizations and local governments should continue to work with CDFIs and community-based organizations to create new funding sources and deploy resources directly after disasters occur.

- **Regional Infrastructure**. Many of the region's critical infrastructure assets are at risk of failure in the event of a major earthquake. Specifically, large regionally significant transportation infrastructure assets—most importantly the region's aging bridges—are at risk of failure from these disasters. For this reason, prioritization of their replacement or retrofits along with support for disaster recovery efforts are necessary. These infrastructure assets are critical to support response and longer-term economic recovery efforts. Moreover, the ability to retain functional river crossings over the Willamette and Columbia rivers may dramatically improve regional economic resiliency.

Appendix B: Analytical Framework and Methods

Analytical Framework

The framework for evaluating economic trends and disruptions is important for clearly describing the full range of potential impacts and policy responses. In the Scope of Work, GPI and Metro provided a preliminary list of trends and disruptions for the consultant team to consider[6]. Practical questions emerged: which do we study? Or are some similar enough that they can be placed into groups? The consultant team reviewed the list and came to the conclusion that there are many similarities between select topics. Therefore, we sought to categorize trends/disruptions into like groupings. Based on these discussions, we focused our efforts on three topically linked groups of trends and disruptions:

1. Automation/E-Commerce,
2. Gig-Sharing Economy, Remote Work and Co-Working; and,
3. Natural and Economic Disasters: Climate/Pandemic/Earthquake[7].

These groups reflect the broad categories of trends and disruptions that we see as most likely to affect the Portland region. Trends and disruptions that are not directly listed here are either able to fold into these categories or are related in some other way that can be addressed in our research.

To evaluate each group of economic trend and disruption requires identification of *what* they will be impacting. We used three dimensions to establish useful perspectives on the economic trends and disruptions. These dimensions are:

- **People**. This dimension explores the impacts on people, households, and workers. Key questions include:
  - What are the potential impacts on workers?
  - How do these impacts affect underrepresented workers and vulnerable populations?
  - How do these impacts exacerbate existing gender and race disparities?
  - How does access to opportunity shift during and after the disruption?
  - How might it change workforce policies?
  - Is it likely to cause an increase or decrease in demand for skilled workers?

[6] The list included: intensive demographic shifts, income polarization, automation, e-commerce, micro-scale manufacturing, new trade policy, gig-sharing economy, remote work and co-working, climate change, other key topics.

[7] There is a range of natural and economic disasters that could befall any region. To maintain focus on those that are most likely to affect the Portland region—and to consider the real-time impacts of the COVID-19 crisis—we will examine the natural and economic disasters category through the lens of impacts related to a pandemic and an earthquake.

    - What are regionally and culturally appropriate actions and policy interventions that could be deployed to support the workforce during and after the disruption?
- **Business**. The business dimension is focused on impacts on businesses and in particular on local, small businesses. Key questions include:
    - What industry sectors are likely to be impacted the most?
    - What are the opportunities and barriers for the Greater Portland region's predominate industry clusters?
    - What types of new businesses are likely to emerge from the trend/disruption?
    - How do existing businesses need to adapt?
    - For existing businesses that are able to weather the disruption, what type of support is needed to promote their long-term resilience and growth?
- **Land**. The land dimension considers impacts on land uses and development. Key questions include:
    - How is the disruption likely to influence the intensity of economic activity on regional employment lands?
    - Is it likely to cause a change in the types and densities of development?
    - How will infrastructure systems need to adapt in response to it?
    - How is it likely to affect other types of infrastructure (including housing, utilities, green infrastructure, and public services)?

Research Methods

To evaluate each of the three groups of trends or disruptions we conducted research and engaged with knowledgeable stakeholders. We compiled research on each topic, considering studies of these trends and disruptions at the global, national, and state level. We sought regional and local expertise through research and market studies (as available), as well as through stakeholder engagement efforts.

To engage with local stakeholders and considering new public health policies related to the COVID-19 pandemic, we held three (3) virtual discussions using video conference software—one for each of the three groups of topics. Each discussion started with a short presentation of preliminary findings based on initial research, followed by a facilitated discussion that sought participants' feedback. Generally, discussion questions sought to provide understanding about: (1) if the research resonates with the local context of the Greater Portland region, (2) if policy responses would fit with our region's culture, would be aligned with institutional powers and goals, and could be reasonably accommodated with the capacity and resources that our region is able to bring to bear. Feedback from these discussions was integrated with the research into the final discussion memoranda.

Below is a group by group list of the stakeholders that participated in the virtual discussions.

- **Automation/E-Commerce.**
  - Justin Gradek, Manufacturing Consultant, OMEP
  - Sean Colletta, Market Officer, Prologis
  - Graham Trainor, President, Oregon AFL-CIO
  - Robin Jones, CEO, Monsoon Inc.
- **Gig-Sharing Economy, Remote Work and Co-Working.**
  - Maria Caballero Rubio, Executive Director, Centro Cultural
  - Kayse Jamma, Executive Director, Unite Oregon
  - Andrew Kalloch, Global Public Policy, AirBnB
  - Sun Joo Kim, Design Manager, Gensler
  - Cassie Purdy, Campaign Field Organizer, Oregon AFL-CIO
  - Tom Brown, Principal, Nelson\Nygaard
  - Shelly Steward, Associate Director of Research, Aspen Institute Future of Work Initiative
- **Natural and Economic Disasters: Climate/Pandemic/Earthquake.**
  - Jay Wilson, RDPO
  - Dr. Yu Xiao, Associate Professor of Urban Studies and Planning, PSU
  - Jae Douglas, Environmental Health Director, Multnomah County Health Dept.
  - Aaron Lande, Senior Policy Analyst, City of Vancouver
  - Maggie Reilly, Business Lender, Craft3
  - Lloyd Purdy, Economic Development Manager, City of Tigard
  - Maria Caballero Rubio, Executive Director, Centro Cultural

Appendix C: SWOT Analysis Summary

By combining the findings from the research and stakeholder engagement we start to get a picture of the forces and factors that will influence the region's path to economic resilience and growth. A SWOT analysis is a useful framework for organizing these influencing factors. A SWOT—Strengths, Weaknesses, Opportunities, and Threats—is a structured method for examining positive and negative factors that arise both internally and externally. For this SWOT, the question is about the Portland region's economy. That is, in the face of economic trends and disruptions, how is the Portland region's economy positioned for long-term success and durability? In other words, the major SWOT elements include:

- Strengths – Greater Portland's competitive advantages
- Weaknesses – the region's internal competitive disadvantages
- Opportunities – chances or occasions for regional improvement
- Threats – the region's external competitive disadvantages

Exhibit 4. The Portland Region's Economy - SWOT

Strengths	Weaknesses
• The Portland region has a diversified regional economy. • Comparatively less congestion and better public transit than other west coast metro regions. • A well-connected regional transit network. • Highly skilled workforce and in-migration of talent. • Functioning local governments • Proximity to Puget Sound and Bay Area regions is still an advantage for technology industries. • Access to urban amenities in communities throughout the region and high quality of life and livability. • About a third of jobs in the Portland region can be done remotely. • Utilities, including comparatively low-cost power from non-carbon producing sources, and abundant clean water • High level of service at PDX International Airport • Bi-state cooperation and collaboration. • A number of higher education institutions including WSU-Vancouver and Portland State University • Geographic intersection of trade corridors: river, roads, rails • Proximity to trade markets in Asia • Global leaders in key industry clusters • Culture of entrepreneurship and innovation • The brand of our people (authentic, quirky and innovative) • History of growth management policy • Low crime and safe communities	• Few traded sector companies are headquartered in the Portland region. Small and medium-sized businesses are slower to adopt new technology or automation of processes. • Cost of living is now close to, or equivalent to, other west coast cities meaning that the region no longer has this advantage. • Employment areas are predominantly at their capacity. New development in these areas will require redevelopment of existing properties. • Regional coordination among cities, counties, and other organizations. • The region's comparatively large hospitality and tourism sector is particularly vulnerable to economics trends and disruptions. Many workers in these industries are low wage and/or gig-worker; occupations with few, if any benefits or supports. • Historical policies of exclusion have led to communities with little diversity and inclusion of some populations. Although work is underway to correct these policies, systemic bias continues to be a challenge. • Aging infrastructure. • Rising cost of housing and increased levels of homelessness. • Limited pathways to prosperity • Supply vs demand issues with workforce and education • No Tier 1 higher education institution main campus • Limited VC funding, R&D resources • Limited capital to invest in new businesses • Loss of corporate headquarters over last few decades • Over-reliance on a few enterprise companies • State tax base is insufficient to support investment

Opportunities	Threats
• Redevelopment of large format retail spaces for e-commerce-related uses. • Design and Media sector cluster could market to small businesses who move toward e-commerce (branding, social media marketing, etc.) • Communication and coordination of cities, counties, and community organizations for better disaster preparedness. • Resources (trainings, seed fund, etc.) for underrepresented business owners to enter into e-commerce. • Increasing economic connections to other regions across the West Coast. • Cost of living in Bay Area makes Portland a considered region for office expansion • Remote work opportunities broaden geographic options where employees can work • Potential federal stimulus funding for infrastructure • Knowledge-based economy demands creative and STEM based workforce – jobs that can't be easily automated	• Potential increase in remote work option at Portland-based businesses may lead to workers living outside the region. This may lead to lack of support for the local economy and loss of revenue source for transit systems. • Cascadia earthquake • Climate change • Global pandemic leading to economic recession • Racial wealth inequities. • National level trends of increased political polarization leading to legislative paralysis, Federal protectionist trade policies, and a general decline in federal funding. • Economic recession • Unemployment rate • K-12 education system provides uneven skills and education development • Job replacement (disruption from automation, AI, emerging tech) • Manufacturing supply chain shifting to Asia • Increasing political polarization • US protectionist trade policy

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DATE: September 17, 2020
TO: Alisa Pyszka, Bridge Economic Development
CC: Metro, GPI
FROM: Tyler Bump, Matt Craigie, and Margaret Raimann, ECONorthwest
SUBJECT: Automation and E-Commerce Disruptions

This report describes the challenges posed to the region's economy by the trends and economic disruptions associated with **automation and e-commerce.** What follows is a synthesis of our research into how these trends and disruptions impact local economies combined with input from our stakeholder engagement efforts. For a more detailed description of the purpose, background, and methods behind this work see the companion cover memorandum.

Automation and E-Commerce: The acceleration of two trends

Technological advances come with costs that are difficult to mitigate. Innovations help to spur overall economic productivity of cities and nations, but the new technologies can impact the livelihood of workers. Those workers who are unprepared or unable to handle the cost of economic transitions are often challenged to maintain their previous standard of living.

Automation is the substitution of tasks done through human labor with machines to increase productivity and lower unit costs. In general, it complements other human labor and frees up workers' capacity to pursue other tasks.

E-commerce is the online sale of goods and services.

In recent decades, automation and e-commerce have increasingly impacted economies across the globe. The disruptions in the labor market created by the growing proliferation of automation and e-commerce activities have uneven consequences across sectors and communities. Businesses and occupations at higher risk of displacement tend to employ people who are in the process of acquiring higher skills or are limited from accessing higher education or retraining. Furthermore, lack of educational and economic opportunities in communities of color result in disparate effects.

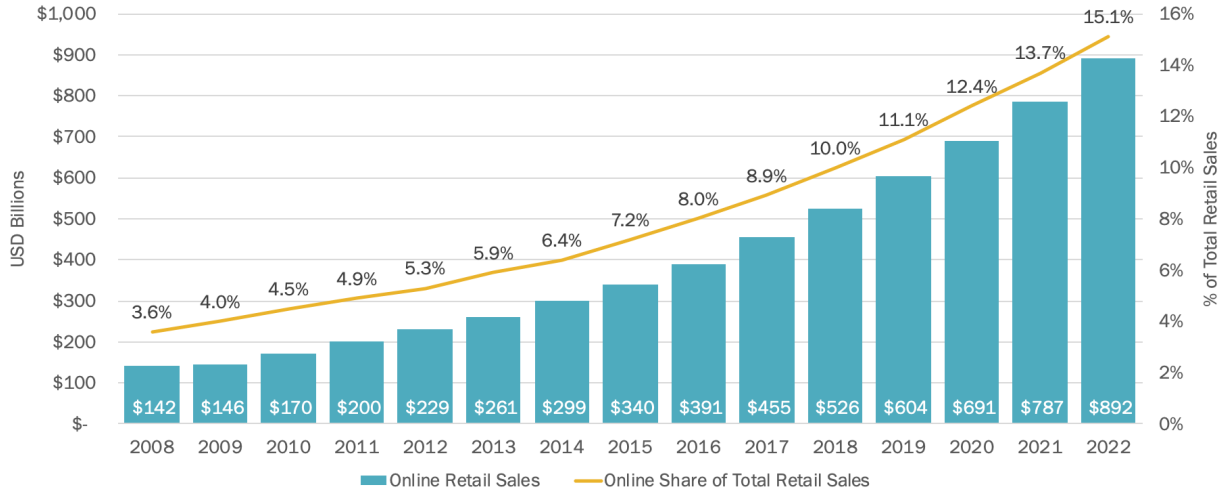
Automation is the substitution of tasks previously completed with human labor with machines or automated programs. The primary goal of automation is to increase productivity and lower unit costs. Automation can, and often does, complement other human labor, freeing up workers' capacity for other tasks. Current research on automation indicates that it is not likely to replace occupations entirely. In most current examples, automation either through machines, artificial intelligence, or more basic scripts of computer code replaces redundant and laborious tasks. According to a study by McKinsey, only 5% of *occupations* are susceptible to be

completely automated. But, the study concludes, 30% of *tasks* can be automated in 60% of occupations.[1] The study showed that, in Portland, 45% of tasks are vulnerable to automation.

Automation affects various job sectors differently. The types of work that are at high risk of automation are routine tasks typically done by middle-wage workers in industries such as manufacturing, construction, and office and administrative support. High-wage, high-skill occupations, such as those in medical research, technology, and law, are less likely to be deeply impacted by automation because their tasks are difficult to automate. Some low-wage occupations, while having routine tasks that could be automated, may not be as impacted as those middle-wage occupations; the reason being that the costs may outweigh the financial benefits to employers of investing in automation to replace low-wage workers.[2]

Like automation, the emergence of e-commerce is likely to have unequal impacts on regional economies and workers. E-commerce giants like Amazon are rapidly expanding their national presence through technological innovations for consumers and massive scaled expansions of their logistics systems. The growing e-commerce sector is already impacting the traditional retail sector, and many stores are unable to compete with prices offered on e-commerce outlets. Alternatively, traditional retail stores are moving more operations to e-commerce platforms to respond to consumer preferences. These shifts will have an impact on land use patterns, and although data shows that e-commerce is still a minority of total retail spending, the sector continues to grow rapidly.

Exhibit 1. E-Commerce Sales as a Share of Total Retail, 2008 to 2022 (Forecasted)
Source: Forrester Research, 2018



[1] Bughin, Jacques, and Jonathan Woetzel. "Navigating a world of disruption." McKinsey Global Institute. January 22, 2019. https://www.mckinsey.com/featured-insights/innovation-and-growth/navigating-a-world-of-disruption.

[2] Muro, Mark, Robert Maxim, and Jacob Whiton. "Automation and Artificial Intelligence: How machines are affecting people and places." Brookings Institution. January 24, 2019. https://www.brookings.edu/research/automation-and-artificial-intelligence-how-machines-affect-people-and-places/.

Automation and E-Commerce: Research Summary

Automation

While observations about the current trend of automation indicate that it is usually *tasks* that are automated rather than entire occupations, automation can also lead to job displacement. Nationally, the type work that is most susceptible to automation are in the manufacturing, food service, and transportation sectors. There is a moderate risk in office administration, maintenance, construction, agriculture, and personal care sectors. Statisticians, mathematicians, research scientists and others in the computers and software industries are at low risk of displacement. Database administrators, web developers, and computer network specialists are at a moderate risk[3].

The Portland metropolitan area is highly specialized in computer and electronics sector, most of which is related high-tech manufacturing. Both the region's largest share of jobs and the largest share of the region's GDP are in this sector. The Portland region also has substantial industry clusters in apparel and outdoor recreation, food and beverage, software, and design and media sectors. Employment in each of these sectors make up a large share of the regional workforce. In the past five years, growth in employment and output of these industry sectors have outpaced most other sectors that are present in the region. Though clean tech and distribution and e-commerce sectors also make up a modest portion of the regional workforce, they have been growing at a relatively slow pace. Finally, the metals sector is a large but outpaced sector in the region.[4]

An examination of the national level research about industry sector susceptibility to automation combined with a review of industry clusters most prevalent in the Portland region, shows that, regionally, job displacement risk related to automation is most likely to impact jobs related to goods distribution and food and beverage production and services. An analysis of regional occupational data reveals that, seventy percent of occupations in metals sector and ninety percent of occupations in food and beverage sector face the risk of automation. Automation risk exists for about half of occupations in distribution and e-commerce, apparel and outdoor recreation, and software sectors. In contrast, computer and electronics sector and clean tech sector are at a relatively low risk of automation.[5]

Worksystems Inc, the primary workforce development organization in the Greater Portland region, reports that the occupations with the highest potential for displacement from automation in the region are related to food preparation and service, office and administrative support, construction, building and grounds cleaning and maintenance, production, and

[3] Muro, Mark, Robert Maxim, and Jacob Whiton. "Automation and Artificial Intelligence: How machines are affecting people and places." Brookings Institution. January 24, 2019. https://www.brookings.edu/research/automation-and-artificial-intelligence-how-machines-affect-people-and-places/.

[4] Portland Metro CEDS Cluster Analysis. May 2020.

[5] CEDS Target Industries Automation Index, an analysis by Steven Pedigo using data from EMSI and Bureau of Labor Statistics, Occupational Employment Statistics (June 2019).

transportation and material moving.[6] They estimated that, by 2030, 186,000 (16%) workers in Portland MSA are in occupations that could be downsized due to automation. Most of these occupations are low- and medium-skilled occupations, which do not require extensive training or a four-year degree. Furthermore, the likely-to-be automated occupations in these sectors are more likely to be held by people of color. For example, a third of the workers in the food and beverages sector are people of color, half of which are Hispanic or Latino. The study also examined impacts on occupations due to the COVID-19 pandemic. They found that the employment impacts of COVID-19 is the largest in retail, accommodation, and food services industries. They concluded that the pandemic is likely to accelerate the trends in automation and e-commerce.

E-Commerce

Until recently, e-commerce has been a small but accelerating part of the retail sector. As Worksystems put forth in their recent study, the COVID-19 pandemic has pushed e-commerce to the fore. Restricting the activity of in-person retail outlets to address the health concerns means consumers have had to shift to online retailers for a larger share of their shopping needs.

In a broader view, the growing e-commerce trend has meant that traditional retailers are more likely to rely on a diverse set of retail strategies that target sales through both physical locations and online platforms. Many surviving storefronts serve as "guideshops" that provide customers with unique, memorable experiences that are hard to find or impossible to replicate online while simultaneous driving sales transactions on their online platforms. Examples include Amazon's bookstores, Bonobos for men's clothing, and Warby Parker for prescription glasses. But e-commerce is not just about big companies and high-end products. Many small, locally owned businesses, are also finding e-commerce as a profitable way to reach more customers. Although, smaller firms face multiple barriers to venturing into e-commerce, including operational and financial challenges and heightened competition.

The supply chains for e-commerce requires much more robust warehousing and logistics systems than those used for traditional retailers. In 2017, 30% of new warehouse and logistics space was occupied by e-commerce related companies. This e-commerce growth is impacting land use patterns in warehousing areas. In comparing the economic growth periods before and after the Great Recession, the average new warehouse grew in size (143%) and height (to 32.3 ft).[7] The National Association of Industrial and Office Properties (NAIOP) estimates that 40-ft warehouse ceilings may be the new standard, along with greater demand for high-voltage power and air-conditioned storage spaces.[8]

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[6] Worksystems. "The Future of Work."

[7] CBRE. "How has e-commerce shaped industrial real estate demand?" CBRE Research. 2017. http://www.cbre.us/real-estate-services/real-estate-industries/omnichannel/the-definitive-guide-to-omnichannel-real-estate/real-estate-impact/how-has-e-commerce-shaped-industrial-real-estate-demand

[8] NAIOP. "The Future of E-commerce Fulfillment Centers." Summary 2016. https://www.naiop.org/fulfillmentcenters

The urban landscape may see more uses dedicated to last-mile delivery services as the popularity of next-day or same-day shipments grow. Though larger *first*-mile warehouses will be located outside urban areas, smaller urban warehouses—ranging from 50,000 to 75,000 square feet—may take the place of urban infill locations that are typically zoned for other commercial uses. To afford these changes, development standards will need to change. Large parking areas, higher building heights, and a reassessment of freight routes would need to be reconsidered near these sites.

If e-commerce jobs move farther from population centers and become hard to reach by transit, workers are likely to reassess their own housing locations; perhaps choosing to move from currently dense housing areas to those closer to e-commerce centers and/or lower cost locations. Should this shift happen at scale, local transportation networks and zoning will need to be reevaluated to respond to these intra-region migration patterns.

Findings and Implications for Greater Portland Region

As a synthesis of both our research and our engagement with local stakeholders, we present key findings and implications related to those findings in regard to how the trends of automation and e-commerce are currently, and are likely to, impact the Portland region's economy. These findings are framed around the three dimensions of people, business, and land use.[9]

- **Opportunities and barriers to automation exist for small and medium-sized manufacturing businesses in the region.** The dynamics of automation are complex and often difficult for all but the largest of firms to implement. To transition to automation, smaller businesses will require access to resources to help them determine the types of automation—operations, processes, equipment, administration, etc.—that would be suitable for their business. While certain types of automation can help with economies of scale as well as the health and safety of workers, there are tradeoffs for workers, including risk of job displacement.
    - *Implications for people*. While stakeholders noted that it is difficult to isolate the effect of automation as a specific driver of the evolution of the workplace, low and medium-wage workers are generally at the most at risk of losing their job. Businesses with positive worker-employer relationships are more likely to figure out ways to coexist with increases in automation. If a worker's task is automated, then the employer finds other non-automated (or semi-automated) tasks for the worker to manage. This relationship helps with retention of workers and generally safer work environments. When the employer does not value this relationship with the worker, then the transition to automation presents more barriers for these workers. Workers in transportation, warehousing, manufacturing, and service sectors are most likely to be affected by transitions to automated processes.
    - *Implications for business*. Some of the types of industries in the Portland region that are most affected by automation include non-regulated medical device production,

[9] For more information about these dimensions and research methods, see the Cover Memorandum.

food, beverage, and cosmetic manufacturing, electronic assembly, textiles, machine and metals manufacturing, and cannabis processing. Many of these businesses in the Portland region are small to medium-sized businesses that are slower to adopt automated processes than larger companies and have less access to capital to make strategic investments to support automation.

- **The Covid-19 pandemic accelerated e-commerce business.** The initial economic shock of the pandemic led many business owners to reevaluate their online presence. Small and medium-sized businesses in Portland that are owner-operated that did not have online platforms before the pandemic are challenged to identify the best practices and resources needed to shift to e-commerce. Further, large businesses that had an existing e-commerce platform are exploring ways to scale up as more consumers shop online. Before the pandemic, e-commerce was slowly gaining traction and the use of, and demand for, traditional retail spaces was declining. The COVID-19 pandemic is accelerating these trends.
  - *Implications for land use*. Increases in e-commerce will require demand for warehouse and distribution locations throughout the region. Large businesses in e-commerce sales are choosing locations based on "rooftops" (i.e., the density of nearby households), access to workers, and proximity to transportation networks. That is, location criteria for regional e-commerce uses echo that of traditional retailers. Land constraints and traffic congestion in the Greater Portland Metro region may be barriers to responding to the shifts in e-commerce. Reuse and redevelopment of underutilized retail spaces may help to address some of these challenges. Similarity, the location decision criteria between emerging e-commerce needs and traditional large format retailers indicates that vacant large format retail located in close proximity to large residential populations could be re-positioned to more distribution related uses (assuming that it could be allowed by local land use regulations).
  - *Implications for people*. Workers in traditional retail environments have experienced the initial shock of the COVID-19 pandemic, as physical stores have closed at fast rates and businesses have not fully rehired personnel during the phased reopening. With trends in the retail sector increasingly moving towards e-commerce, some businesses are likely to eliminate these jobs entirely. As the popularity of e-commerce grows, there are also likely to be opportunities for more employment with firms that help businesses shift to online platforms as well as an increase in the number of jobs in the distribution and logistics field.
  - *Implications for business*. The process of moving a business to an e-commerce platform is challenging for many owner-operated small businesses. The lack of organized resources or best practices was apparent during the initial shock of the pandemic, and continues to be a challenge. Possible solutions to address this ongoing barrier for many business owners include a training program focused on underserved small businesses, especially those with Black, Indigenous, and People of Color (BIPOC) business owners. Another potential solution would be the capitalization of a fund

that helps business owners with their transition to an e-commerce platform, as e-commerce for small businesses is out for reach for most traditional business finance mechanisms, such as venture funding. The needs for small business support to help better access e-commerce markets requires training to understand the tools and operating procedures to access new markets, process payments, track orders, and efficiently deliver goods and services.

Policies and Actions: Summary Assessment of Next Steps

The last section of this discussion provides a summary of the impacts of automation and e-commerce on the Greater Portland Region's economy. These considerations for policies and actions can serve as the beginning of a framework for discussions at Metro and GPI.

Considerations for Policies and Actions

Based on the research and stakeholder input provided in the discussion above, as well as the implications for the dimensions of people, business, and land use, we have presented key questions and potential policy examples for Metro and GPI to consider in upcoming implementation processes.

Automation and E-commerce

What is Metro and GPI's role from a policy perspective to help support businesses shift to automated processes and mitigate for unintended consequences of automation? Are we planning for employment or economic productivity?

- Metro and GPI could identify a strategic policy direction related to the impacts of automation on access to employment, job densities, and economic productivity. Increased automation could have positive net benefits for the Portland region such as increased economic productivity, in the form of GDP, while also having negative impacts on employment and job density goals in the region. It is important for regional organizations to identify clear outcomes for the future of work and develop strategic policies to support those outcomes.

How do current trends in e-commerce impact local sector businesses and how can Metro and GPI best help support small local businesses adapt to changes in consumer behavior?

- Metro and GPI should work with local governments and regional service providers to develop training and assistance to help businesses better access e-commerce markets. This work would require training to understand the tools and operating procedures to access new markets, process payments, track orders, and efficiently deliver goods and services. This training program could also be one way of advancing racial equity goals and programs and services should be focused on BIPOC and women owned businesses.

How do current trends in ecommerce impact regional land capacity and how can Metro better understand the role of modern ecommerce distribution and fulfillment in the context of regional employment land use planning?

- E-commerce distribution and fulfillment centers are beginning to make site location decisions in ways that are very different than traditional warehousing and distribution users. Recent trends in distribution and fulfillment centers indicates that there is a broad size range of facilities and land needs that range from smaller urban context last mile facilitates to larger regional distribution facilities. Urban and suburban infill sites are likely to play a more important role for e-commerce fulfillment centers. Oftentimes, development standards and use allowances on large format retail infill and redevelopment sites prohibit small or medium fulfillment centers through use restrictions or development standards that do not match the needs of modern ecommerce.

  Metro should identify clear policy parameters for allowing—or prohibiting—e-commerce fulfillment centers in general commercial land uses areas throughout the region that were previously identified for retail use. This is especially important in light of COVID-19 impacts on brick and mortar retailers and what is likely to be an increasingly large inventory of vacant retail sites in the region.

What impacts will an increase in e-commerce activity have on local government funding and the provision of local services?

- As a larger share of consumer expenditures shift to e-commerce purchases, local government should think about the impact that our current tax structure has on the ability of government to support needed services across our communities. As the nature of economic productivity, consumer expenditures, job types, and real estate demand shift in response to increases in automation and ecommerce, local governments should understand the fiscal impacts of these trends. While strict constitutional tax limitations in Oregon and Washington limit the ability of local governments to raise revenues, these governments could explore the political, legal, and fiscal impacts of something similar to a value-added tax in response to a growing trend of e-commerce (and automation) if traditional taxing mechanisms might become less effective for generating revenue.

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DATE: September 17, 2020
TO: Alisa Pyszka, Bridge Economic Development
CC: Metro, GPI
FROM: Tyler Bump, Matt Craigie, and Margaret Raimann, ECONorthwest
SUBJECT: Workplace Disruptions: Gig-Sharing Economy, Remote Work and Co-Working – REVISED DRAFT

This report describes the challenges posed to the region's economy by the trends and economic disruptions associated with **gig-sharing economy, remote work and co-working.** What follows is a synthesis of our research into how these trends and disruptions impact local economies combined with input from our stakeholder engagement efforts. For a more detailed description of the purpose, background, and methods behind this work see the companion cover memorandum.

The Sharing Economy to Remote Work: Trends that continue to influence how and where work happens.

Disruptions to the how and where work is conducted has evolved and accelerated with the rapid integration of technology and the emergence of the knowledge-based economy. Three types of economic disruptions describe some of the predominate aspects of this dynamic—the "gig-sharing" economy, the rise of remote work, and the trend towards co-working space.

First, the **gig-sharing economy** (also called the "sharing economy") refers to the emergence of technology platforms to either facilitate the sharing of capital assets (e.g. Airbnb enables home sharing) or the facilitation of tasks directly between workers and consumers (e.g. Taskrabbit, or Uber). Much of this work is organized through a third-party, web-based platform. However, this form of work has been taking place before the emergence of these technological platforms. The "shared economy" can also encompass what is sometimes categorized as "informal economy" work, such as house cleaning or landscaping.

Second, the emergence of **remote work** builds on the slow gains of telecommuting trends that started with the growth of internet related occupations in the 1990s. Remote work describes the situation where a worker conducts their work in a physical location apart from their firm's location or staff that do not co-locate in one location. As knowledge-based occupations have continued to grow in recent decades, remote work has become more and more popular for knowledge economy workers that desire to live in high quality of life areas. The trend is also beneficial for firms as they are able to access talented workers beyond the confines of their local labor pool.

Finally, **co-working** refers to spaces for small businesses or entrepreneurs to meet dynamic market conditions and scale up or down more easily through providing flexible office space and amenities typically provided by a larger company. These spaces, while they began with minimalist designs intended to foster a collaborative environment, have evolved into companies themselves with an associated culture and office design. With worker preferences

evolving to prefer some of the amenities offered by co-working spaces over traditional office spaces, some larger companies have sought out co-working spaces to house certain teams (e.g., R&D).

All three of these trends and disruptions are present and actively influencing the economy of the Portland region.

Economic Trends and Disruptions: A Primer

Gig-Sharing Economy

The Brookings Institution defines the gig-sharing economy in the context of "contingent work arrangements, which broadly include independent contractors as well as part-time, temporary, seasonal, or subcontracted workers."[1] Specifically, the gig-sharing economy describes the trend for businesses to offer platforms for workers to complete tasks, generally in service to a firm, without qualifying them as employees of the firm. This type of work arrangement allows businesses to access workers while lowering the overall cost of labor, react to quickly changing consumer demands, and remove obligations related to continued training or skill building often offered to traditional salaried or hourly employees at a firm. While independent contractors have been a part of many industries, the emergence of the gig-sharing economy through web-based platforms has accelerated the disruption in workplace environments, and as Brookings notes "has led to important regulatory gaps."[2]

An important distinction within the definition of the gig-sharing economy is between workers that use the gig-sharing economy to supplemental their household income and those that rely on the gig-sharing economy for their primary source of household income. Some workers, mostly high skill/high wage earners are able to take advantage of the flexibility and opportunities presented by the gig-sharing economy. These workers are able to "freelance" and in many cases set their wage and hours. This differs from workers that are reliant on the gig-sharing economy for their primary source of income. These "necessity entrepreneurs" participate in the gig-sharing economy because they have few, if any alternatives. Some of these workers may be legally challenged to find better work (e.g., limited by immigration status) while others may be high skilled workers in a competitive employment market. Often, these workers are employed through multiple gig platforms without access to benefits of a traditional work agreement.[3]

The distinction between these two groups of gig-sharing economy workers ("gig-workers") is important as it informs present disparities within the economy. For example, high skilled freelance gig-workers may be able to benefit from the flexibility provided by web-based

[1] Dokko, Mumford, and Schanzenbach. "Workers and the Online Gig Economy A Hamilton Project Framing Paper." (2015) https://www.brookings.edu/wp-content/uploads/2016/07/workers_and_the_online_gig_economy.pdf

[2] Ibid.

[3] Ibid.

platforms. On the other side, "necessity entrepreneurs" are less likely to be able to access worker benefits and have limited opportunities for wage increases.

The gig-sharing economy in the United States is expansive. Although, various sources have used inconsistent methods in estimating the actual number of workers in the gig-sharing economy in the U.S. For example, until 2018 the Bureau of Labor Statistics only measured gig-workers who sourced their main source of income from gigs—short one-off tasks. This data excluded those who supplement their primary source of income with gig work; a quite limited perspective on the overall picture of the gig-sharing economy. Other sources such as the Federal Reserve and a study completed by the consulting firms McKinsey and Upwork reported that over a third of the workforce in the U.S. participated as workers in the gig-sharing economy in 2018.[4]

As the gig-sharing economy has evolved and grown, state and local governments have sought opportunities to identify, measure, and respond to the needs of gig-workers and gig-oriented businesses. This work spans the range from major lawsuits that have sought to reclassify gig-workers from independent contractors to full-time employees to a general shifting mindset about what work is in the 21st century and how gig-workers may need a new set of "portable benefits." [5]

The National Association of Counties (NaCo) put forth several best practices for addressing the gig-sharing economy which include recognizing (providing education resources); measuring (data collection understand who gig-workers are and which communities they serve); and adapting to it (permits, licenses, and benefits for gig workers). Once the gig-sharing economy is recognized and measured accurately, they argue, then counties and other local governments can better align policies and regulations to support and protect gig-workers. This work to integrate the gig-sharing economy into local government practices could also present benefits for local governments, including collecting revenues from permits or licenses.[6]

Remote Work

Remote work refers to workers who work from a location separate from the company's headquarters or other affiliated physical office space. Synonymous with "telecommuters," these workers may choose to live in a separate location for quality of life, family, or other personal reasons. Improvements to broadband internet connections across the U.S. have allowed remote work to emerge as a viable option for many workers and companies. This trend is predominantly accessible to workers in occupations that typically require higher levels of education and whose work is able to be conducted on a computer. Remote work allows

[4] Marcela Escobari and Sandy Fernandez. "Measuring American gig workers is difficult, but essential" Thursday, July 19, 2018.

[5] Emilia Istrate and Johnathan Harris. "The Future of Work: The Rise of the Gig Economy." November 2017 https://www.naco.org/featured-resources/future-work-rise-gig-economy

[6] Emilia Istrate and Johnathan Harris. "The Future of Work: The Rise of the Gig Economy." November 2017 https://www.naco.org/featured-resources/future-work-rise-gig-economy

companies to retain existing employees who prefer to live in a different location, or expand options for recruitment of new employees in locations across the US without opening a physical office space. In this way, remote work allows companies to expand their labor pool beyond the local labor market.

The estimated number of remote workers in the US is difficult to measure, as it is not standard data point gathered by the Federal government. A recent study completed by researchers at the University of Chicago attempted to estimate the number of occupations that could be done remotely. The study was completed in response to the COVID-19 pandemic, which has led to many workers needing to abruptly adjust to remote work in a temporary capacity. The study estimated that 37% of occupations in the US could be done remotely, with "significant variation across cities and industries."[7] Knowledge-based occupations and occupations in larger cities had larger shares of potential for remote work.

Co-working

Co-working describes both a physical space and the relationship of workers in that space. Generally, co-working spaces provide a flexible office environment with amenities to freelance workers in exchange for a membership fee. While business accelerators and incubators take on a similar space as co-working spaces, and the collaborative environment may be similar, the purpose and business models differ. Business accelerators and incubators provide business services to coach, guide, and incubate small businesses. The business model for co-working spaces is focused on maximizing a primary leaseholders rental income by selling memberships. Co-working spaces emerged in concert with the rise of the knowledge economy in the 2000s and 2010s.

Co-working spaces offer communal amenities, varied office layouts, and promote their ability to foster networking opportunities between workers. As co-working has grown in popularity, even large businesses have shifted to leasing co-working spaces or adopted similar office environments. These changes have occurred as larger businesses have responded to the interests of employee preferences and also due to the flexibility and scalability offered by co-working memberships when compared to traditional lease arrangements.

Work Design, an office consultancy, states that "industry experts still forecast that growth will not subside, and that the next phase will entail massive 'turnkey co-working' solutions in which properties are converted from fixed, large tenants with massive real estate footprints to open, membership-based, multi-company spaces operating on a month-to-month basis."[8] Although data is hard to identify, preliminary observations suggest that the COVID-19 pandemic will further push co-working style office trends.

[7] Dingel and Neiman, "How many jobs can be done at home?" University of Chicago. April 2020. https://bfi.uchicago.edu/wp-content/uploads/BFI_White-Paper_Dingel_Neiman_3.2020.pdf

[8] The Post-Recessions Rise of Coworking by Melissa Marsh and Teresa Whitney (2017) Work Design Magazine https://www.workdesign.com/2017/03/post-recession-rise-coworking/

Findings and Implications for Greater Portland Region

As a synthesis of both our research and our engagement with local stakeholders, we present key findings and implications related for the trends of the gig-sharing economy, remote work, and co-working trends as they are likely to impact the Greater Portland region's economy. These findings are framed around the three dimensions of people, business, and land use.[9]

- **The COVID-19 pandemic has intensified existing disparities for workers in the gig-sharing economy.** Prior to the pandemic, the gig-sharing economy already had an unequal labor landscape; many workers have relied on multiple low wage gig opportunities to make ends meet and even higher wage freelancers were challenged to access affordable benefits. These disparities have intensified during and after the initial economic shock.
  - *Implications for people*. Gig-workers who rely on the gig-sharing economy for their income generally lack a "safety net" for situations when gig-work availability declines. While some demand for gig-work increased during the pandemic (e.g., online grocery shopping and delivery services), other types of gig work dissipated, such as ride sharing and non-app-based gig work (e.g., domestic cleaning or in-home care giving).
- **Remote work is increasingly becoming more accessible for workers in select types of occupations.** Although slow to take hold, remote work has accelerated rapidly in 2020 in response to the COVID-19 pandemic. Despite much uncertainty about the nature of "the new normal" there is a growing consensus that remote work will play a much larger role in work-life than it has in the past. However, the kinds of occupations that can be completed remotely and the ease by which workers are able to transition and maintain productivity levels in a remote work environment is unequal across occupation type. Preliminary research indicates that occupations that are most efficiently transitioned to remote work are higher-wage jobs in occupations that require higher levels of educational attainment. Many low wage occupations are less likely to be efficient or even possible through remote work.
  - *Implications for people*. The ability to work remotely is not possible for many low-wage, service-sector occupations. This means that these workers are likely to face more employment insecurity. For those workers with occupations that can be done remotely, variable qualities of personal environments and access to technology—especially broadband internet—will result in unequal results in worker productivity. Those who cannot transition to remote work due to lack of access to technology or a productive workspace are also at risk of losing their employment. In our engagement with local stakeholders, we heard the observation from local firms that younger workers seem to more easily make the transition to remote-work environments, compared to older workers. In addition, some workers are seeing remote work as an opportunity to find less expensive housing further from

[9] For more information about these dimensions and research methods, see the Cover Memorandum.

traditional employment centers, with the assumption that future work environments will either be completely remote or a hybrid that includes working in the office a few times per week[10].

Implications for business. For businesses that are able to transition their work to a remote situation, they will need to redeploy capital previously used to maintain a centralized work environment to ensure that remote workers have the tools and technology needed to maintain productively levels. In addition, these businesses may benefit from having a remote workforce, as they will now have access to a wider labor force when offering remote-work positions.

- *Implications for land use*. As the COVID-19 pandemic is increasingly showing, the ability for workers in a variety of occupations to transition to remote work is unequal in many respects. From a land use and infrastructure standpoint, communities in our region have unequal access to broadband internet. At the national level, studies have shown that lower income areas are much more likely to have little to no internet access. To enable and empower workers to access work remotely, governments will need to evaluate how to best deploy broadband internet infrastructure along with services and regulations to ensure access to these underserved populations.

- **Transitions to remote work may change office spaces, both temporarily and permanently.** The long-term effects of the COVID-19 pandemic on the commercial real estate market is unknown, but it is clear that temporary changes to office spaces are necessary to maintain worker health and safety. As businesses reopen offices to a limited number of workers, they are considering options for temporary dividers, remodel of open-concept spaces, and special precautions for common areas.

  - *Implications for people.* Workers who prefer to live in suburbs or outside of the Portland region may use the option to work remotely and live in their preferred location. However, many workers will likely still prefer access to urban amenities and access to centralized office space after the COVID-19 pandemic subsides, and it is unclear which preferences will surface as a long-term trend.

  - *Implications for businesses.* The COVID-19 pandemic has allowed many businesses to see the effectiveness of remote work and the ability for many workers to be productive. Businesses will likely keep office spaces for in-person meetings and workspace for workers who prefer to not work remotely. While it is unclear what long-term trends will look like for the future of remote work in response to disruptions from COVID-19, it is likely that worker preference for in-office and remote work will increasingly be necessary for employers to address to attract talent from a competitive labor pool.

[10] Although, the evidence of pandemic induced worker migration has yet to be confirmed through studies. At this time, there are only observations and anecdotes that this migration is taking place.

- *Implications for land use.* Demand for modifiable spaces and private offices are increasing, and new construction of office spaces is mostly on hold until the effects of the pandemic are clearer. Similar to the Great Recession, some businesses are considering sub-leasing office space and creating a co-working environment. Other business are considering potential for satellite offices with fewer employees, especially as employee location preferences become more apparent. Overall, the long-term effects of changes to office space needs and preferences for workers to remain in the Portland region (to move elsewhere either in or out-of-state) are unknown but could affect land use and transportation infrastructure decisions.

- **Co-working trends, coupled with remote work options, will continue to reshape how modern office spaces are designed and used.** As trends in worker preference in response to COVID-19 disruptions become clearer in the next couple years, many businesses are likely to reconsider their real estate footprints. If workers only need to be in the office a couple days each week or if pods of employees rotate through an office there could be less of a need for large leased office spaces. However, if social distance requirements are expected to continue into the near future, or if workplace planning starts to better integrate public health perspectives into the design of workplaces, reductions in employment densities in office environments could offset reductions in space necessary to support fewer employees.

  - *Implication for business.* Businesses, especially high-wage work in digitally oriented industries, had already started to reassess their office spaces as co-working trends emerged over the past 15 years. Driven by the need for health and safely protocols linked to the COVID-19 pandemic, businesses will need to rethink how and where their workers do their work. Together, these trends could mean a shift in business investment in large centralized office buildings to smaller and more flexible office spaces that could be dispersed more throughout the Portland Region.

  - *Implications for land use.* A shift in the level of real estate investment by downsizing businesses in downtowns, office parks, and employment areas could have land use and fiscal impacts for local and regional governments. The public sector will have to understand how to reprioritize investments in infrastructure to support these changes and how to help facilitate redevelopment of no longer productive land uses.

Policies and Actions: Summary Assessment of Next Steps

Based on the research and stakeholder input provided in the discussion above, as well as the implications for the dimensions of people, business, and land use, we have presented key questions and potential policy examples for Metro and GPI to consider in upcoming implementation processes.

Remote Work

- How do businesses that transition to higher rates of remote work provide support for workers to advance equitable outcomes?

- Determine broadband "dead zones" across region and incentivize infrastructure investment to make sure all residents have access to good internet.
- Develop programs that provide equipment to employees to work productively in a remote setting. Many workers lack the ability to maximize productivity when working from home because they are not provided the same level of work-place materials and dedicated workspace that they otherwise would be provided in a physical office space. In response to COVID-19 local governments and community organizations have stepped in to provide computers to workers that only previously had access to computers at their physical place of work.
- Develop workforce training programs that provide skills to workers to navigate a remote working environment. The reliance on collaboration software and remote working technology can be a barrier to workers who have limited experience with web-based digital collaboration and communication tools.
- Access to childcare can be a barrier to workers and lead to disproportionate gender, racial and social equity impacts. As workers might transition to more remote work or hybrid work scenarios, the location of childcare facilities and availability of affordable childcare could be a major barrier to caregivers who rely on childcare.

- How will land use and development patterns change as a result of more workers working remotely?
  - Areas in the region that have services and amenities nearby residential locations where workers can work from home and access daily needs are poised to be more competitive if remote work continues to increase. Inner-ring suburbs and regional centers with existing and planned services to meet the needs of both residents and workers could capture a higher share of mobile workers who are making residential location decisions that are more flexible without a requirement to commute to a physical office as frequently as in the past.
  - Cities throughout the region should re-evaluate residential use allowances and development standards that support work from home operations. Lower barrier opportunities for non-habitable accessory structures and home-based business regulations should be evaluated to support remote work options.
  - More dedicated resources for businesses to make short-term changes to physical office space will be needed to respond to the COVID-19 pandemic and the likely increases proportion of remote workers in its aftermath.

Gig-Sharing Economy

- How can workers in the gig-sharing economy, especially necessity entrepreneurs—those that rely mostly on the gig-economy for income—build wealth and a better safety net? Example policies could include:

- Encourage use of and educate gig-workers about opportunities for workers to save for retirement, specifically participation in the Oregon Saves program.[11]
- Explore opportunities for gig-workers to access other benefits such as unemployment insurance, Supplemental Nutrition Assistance Program, and other government programs.
- Advocate for protections for gig-workers including anti-harassment policies, occupation classification, and wage theft protection.
- Permitting processes for business operations can be onerous and complicated, especially for immigrant communities and those with limited English proficiency.
- In partnership with direct service providers and businesses, create a regional toolkit that local jurisdictions in the region can implement to remove barriers to business permitting and public health permitting requirements. [12]
- Partner with and support existing organizations that provide training and resources to workers that rely on gig-economy work for the majority of their income such as Voz Portland.

Co-Working

- What changes to the built environment will be needed to respond to workplace disruptions? Policy considerations may be similar to those for increases in remote work environments with changes to the way office space is used (e.g., more sub-leasing).
  - Coworking spaces have predominantly been located in high density employment areas as a function of market demand. Trends in increasing remote work activity could lead to a need for more dispersed coworking facilities throughout the region as workers might need scheduled meeting or office space. Evaluate development standards, use allowances, and change of use allowances to facilitate coworking spaces in areas throughout the region.
  - Identify opportunities to support renovation and occupancy of vacant retail spaces in regional centers with coworking spaces. Change of use requirements can be a major barrier to renovating previous retail spaces for office use.
  - Identify zoning barriers to allow more flexibility for non-traditional office uses like coworking spaces in commercial, and potentially even residential, zones throughout the region. Coworking spaces often operate in a grey area of use definition within zoning codes and clarity to allow for master and sub-lease agreements can be difficult to determine the use of final tenants when new development and tenant improvement permits are reviewed by current planning staff.

[11] While initially not available to gig-workers, the Oregon Saves Program has expanded to the gig economy as of November 2018. https://www.oregon.gov/newsroom/Pages/NewsDetail.aspx?newsid=3063

[12] Emilia Istrate and Johnathan Harris. "The Future of Work: The Rise of the Gig Economy." November 2017 https://www.naco.org/featured-resources/future-work-rise-gig-economy

Further Reading

This section provides a list of works cited throughout this memorandum.

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DATE: September 2020
TO: Alisa Pyszka, Bridge Economic Development
CC: Metro, GPI
FROM: Tyler Bump, Matt Craigie, and Margaret Raimann, ECONorthwest
SUBJECT: Portland CEDS – Disruptions Task – Natural Disasters

This report describes the challenges posed to the region's economy by the trends and economic disruptions associated with **natural disasters, specifically a Cascadia Earthquake, and a pandemic.** What follows is a synthesis of our research into how these trends and disruptions impact local economies combined with input from our stakeholder engagement efforts. For a more detailed description of the purpose, background, and methods behind this work see the attached cover memorandum.

Natural Disasters and Pandemics will have varying effects on the Portland Region's economy.

Disruptions in economic systems frequently stem from non-economic events. Oregon's State Planning Goal 7 identifies natural hazards that are common in Oregon, which includes wildfires, earthquakes, and floods among others. For this research, we have considered, at a high-level, the potential economic impacts associated with a natural disaster—the Cascadia Earthquake—and a pandemic. Natural disasters like earthquakes and pandemics—as experienced by the COVID-19 pandemic—can cause a sudden stop to regional economic activities. In addition, more expansive effects of climate change are starting to impact economies the world over. All three of these natural disasters have disparate and varying impacts that relate to the scale and type of event and the nature of the natural disaster itself.

Current economic disruptions caused by the COVID-19 pandemic demonstrate the power of a natural disaster to impact local economies. The initial shock at the onset of the COVID-19 pandemic hit the national economy harder than any event since the Great Depression and the impacts of the pandemic are far reaching. Not only must businesses and organizations identify and put in place new procedures in workplaces, schools, and commercial centers but a massive and society wide modification of behaviors (e.g., mask wearing and working remotely) is needed to protect the health of those most vulnerable. The current pandemic also shows how interrelated the economy is; with a halt to most retail activity (and most conspicuously at restaurants), millions are without work.

Climate change, the human-activity induced altering of the climate on the global scale, is likely to impact economies around the world in a variety of ways; from extreme weather to incremental changes in the balance of local ecosystems. To fully mitigate, or more likely *adapt* to climate change impacts, major shifts are needed in risk management systems, architecture, healthcare, emergency response systems, finance, and much more.

Perhaps the greatest natural threat to the Greater Portland region's economy is the Cascadia Subduction Zone (CSZ) earthquake. Predicted to be as strong as 9.0 on the Richter scale, this

likely calamitous earthquake is estimated to cause $4.3 billion in lost income in the first month after the initial shock of the CSZ event.[1] The cumulative impact of business and economic disruption of a CSZ event is likely to have major impacts to the Portland's Gross Regional Product (GRP) for years after the event.

Recent analysis conducted by RDPO and ECONorthwest evaluated the economic impacts to the Greater Portland region of a CSZ earthquake and identified four policy interventions that could support broader resiliency for the region's economy. These policy interventions are; reinforcing regional transportation networks, reducing disruptions to utility services, retrofitting unreinforced masonry buildings, and retaining population after an earthquake event. The economic effects of these four policy interventions were evaluated to determine impact to GRP relative to the expected baseline disruption of CSZ earthquake for each of the interventions. Generally, the study found that reducing disruptions to utility services would have the beneficial impact to the regional economy relative to a baseline disruption.

State and local agencies, such as the Department of Geology and Mineral Industries (DOGAMI), Oregon Office of Emergency Management, and Regional Disaster Preparedness Organization (RDPO, have programs underway to prepare for CSZ and other natural disasters. However, our engagement with local stakeholders and our observations during the COVID-19 pandemic indicate that our region is generally underprepared. Much more resources, capacity, and cooperation are needed to adequately address the likely impacts of these economic and natural disasters.

Findings and Implications for the Greater Portland Region

As a synthesis of both our research and our engagement with local stakeholders, we present findings and implications of those findings in regard to how economic and natural disasters are likely to impact the Portland region's economy. These findings are framed around the three dimensions of people, business, and land use.

- **Convening and cooperation are key components of creating partnerships for emergency preparedness.** The response to the COVID-19 pandemic highlighted deficiencies in the Portland region's lack of strong partnerships related to emergency preparedness. Attempts to convene organizations while a disaster is happening (or in its aftermath) is too late to identify key partnerships between organizations that can help with response and recovery.
  - *Implications for businesses*. The COVID-19 pandemic created a crisis in the regional economy. Businesses were legally required to close up shop, which meant that many needed to shut down their operations permanently. Some local jurisdictions were able to call on existing partnerships to set up emergency funds for businesses or leverage prior relationships with local businesses to coordinate aid. Other jurisdictions struggled to facilitate a timely response. In addition, the uneven

[1] RDPO and ECONorthwest. "Economic Analysis of a Cascadia Subduction Zone Earthquake." July 2020.

landscape of aid to local businesses meant that there was little strategy in which businesses received assistance. While other natural disasters, such as the Cascadia earthquake, will have different implications and sources of funding for businesses (e.g., physical damage), it will be important to create a coordinated system of response organizations and a strategy for deployment of business aid. In this way, the region can have a playbook for when a natural disaster strikes; knowing who is responsible for what and how assistance and aid will be distributed.

- *Implications for people*. As has been shown by the COVID-19 pandemic, natural disasters intensify existing inequities among workers and households, hitting some harder than others; in particular those in Black, Indigenous, People of Color (BIPOC) households. Ongoing systemic efforts are needed to identify the challenges and needs of these underserved and vulnerable populations. Service providers, employers, community organizations, and local governments will need to work together to ensure that every community within the region will have access to assistance during a crisis.
- *Implications for land*. Although, in the long run, climate change will likely have the most far reaching impacts on land use in our region, the Cascadia Earthquake is likely to have the most conspicuous and destructive impacts on land uses and infrastructure. Convening and coordinating with local jurisdictions and regional organizations ahead of time is crucial to implementing solutions to retrofit infrastructure, rethink locations of essential uses, and create redundancy in emergency preparedness. Together these types of actions will be required to avoid worst-case scenarios during the response phase and help shorten the recovery period.

- **Lack of communication is an ongoing issue for disaster preparedness**. Again, the COVID-19 pandemic offered insight into the Greater Portland region's level of disaster preparedness. The lack of cohesive communication surfaced across all levels of government and affected many organizations' ability to respond effectively. The Cascadia earthquake will further compound this issue, as many communication methods will be unavailable after damages to infrastructure.
  - *Implications for people*. Many people did not receive timely or consistent communication about the pandemic, and this was especially apparent for non-English speakers. While information was (and is) changing, the Portland region was not prepared to respond in a cohesive manner and did not have consistent protocols for distributing information in various languages. This breakdown in communication will be even more challenging in the aftermath of an earthquake, as communication services are likely to be damaged.
  - *Implications for businesses.* Effectively communicating to businesses when it is safe to reopen or which new regulations are in effect is important for safely reopening the regional economy after a natural disaster. As some local stakeholders have learned during the COVID-19 pandemic, these messages are most likely to be heard and acted upon if received through a trusted channel. One local stakeholder gave the

example of health department food workers being tasked with giving accurate pandemic regulatory information to small businesses.

- **Natural disasters cause economic shocks and varying degrees of economic damages. Multiple capital resources and creative solutions are needed to stymie economic damages to businesses, and economic hardship for workers and their dependents.** Although natural disasters vary in type, scale, and ways that they impact the economy, by definition they cause damage to businesses and workers. Proactively identifying resources that can be deployed in the aftermath of a crisis will go a long way to ease and shorten an economic recovery period
  - *Implications for businesses*. For many small business owners, personal assets like a home or vehicle act as collateral for their enterprise. Natural disasters can drastically alter their ability to call on this capital as it may be destroyed or devalued. Alternatively, the loss of business income due to a natural disaster may mean that these business owners are unable to keep up with payments for these assets, risking default and possible loss of the asset altogether. Creative financial tools are needed to stymie losses in these types of situations.
  - *Implications for people*. Natural disasters cause much economic hardship for workers and their dependents, especially for those workers at the lower end of the pay scale. As the COVID-19 pandemic has shown, massive expansions of social safety net programs are needed to prevent widespread economic hardship for workers and their dependents. At the regional and local scale, governments can examine how their own tools, resources, and partner relationships can leverage Federal safety net programs.

Considerations for Policies and Actions

The probable economic impacts resulting from future natural disasters is a far reaching topic with much speculation and uncertainty. We can learn from past disasters, but the unpredictable aspects of natural disasters (when, where, to what extent?) mean that adequately preparing for them is difficult. This unpredictable, and to many abstract, situation also means that mustering political forces to prioritize preventative measures is challenging if not impossible (e.g., lack of policies to prevent/adapt to climate change).

For these reasons, the policies and actions that will be needed to help mitigate natural disaster damages to the Portland region's economy could be expansive. But at this high-level scan, and informed by our engagement with local stakeholders, we see policy/actions responses falling into the following categories.

- **Communication**. Clear, consistent, and timely communication systems, including those for non-English speakers are needed during and after a natural disaster to ensure that businesses understand an evolving regulatory environment and workers know where to find assistance. State, local governments, Metro, and GPI should build on regional

coordination efforts from the COVID-19 pandemic and formalize ongoing communication with regional partners.

- **Capacity Building**. Local organizations with existing relationships with at-risk or vulnerable populations will need the capacity and tools to serve those communities in the time of crisis. Before a natural disaster strikes is the time to build and reinforce those relationships. Ongoing support of community-based organizations is needed to build long-term trust and build more recovery and resilience capacity.
- **Convening/Coordination**. It is the role of regional organizations to help bring together local partners—public sector, non-profits, service providers, and private business—to organize and prepare for natural disaster response. Metro should continue to coordinate with RDPO and other regional partners for disaster recovery planning efforts.
- **Capital**. New, responsive, and creative capital solutions are needed to respond to various types of natural disasters. Communities throughout the region who were able to deploy capital in the immediate aftermath of COVID-19 shutdowns were able to support businesses and community members in very uncertain times. Regional organizations and local governments should continue to work with CDFIs and community-based organizations to create new funding sources and deploy resources directly after disasters occur.
- **Regional Infrastructure**. Many of the region's critical infrastructure assets are at risk of failure in the event of a major earthquake. Specifically, large regionally significant transportation infrastructure assets—most importantly the region's aging bridges—are at risk of failure from these disasters. For this reason, prioritization of their replacement or retrofits along with support for disaster recovery efforts are necessary. These infrastructure assets are critical to support response and longer-term economic recovery efforts. Moreover, the ability to retain functional river crossings over the Willamette and Columbia rivers may dramatically improve regional economic resiliency.