




ECONOMIC ANALYSIS *of a* **CASCADIA SUBDUCTION ZONE EARTHQUAKE**


PORTLAND METROPOLITAN REGION
EXECUTIVE SUMMARY | JULY 2020

The Cascadia Subduction Zone event (CSZ event) is a potential 9.0 magnitude earthquake that would inflict a substantial human, physical, and economic toll across the Pacific Northwest. This study¹ addresses how a CSZ event would specifically disrupt the economy of the Portland Metropolitan Region by overlaying spatially explicit economic models with predicted physical damage previously estimated by Oregon’s Department of Geology and Mineral Industries (DOGAMI).² These results are designed to help regional decision-makers understand the potential economic toll of a CSZ event, as well as evaluate policies that can be implemented now to minimize the resulting adverse consequences.




What this study IS

The results of this study are intended to provide a high-level understanding of how economic systems might respond to a CSZ event. By estimating potential disruption, revealing potential vulnerabilities, and testing business sensitivity to specific resilience interventions, this study lays the groundwork for future avenues of research. It provides business owners and public planners with a preliminary understanding of economic impacts, and suggests possible areas to focus ongoing planning efforts, invest in data development, and develop future research inquiries.




What this study is NOT

This study is not a benefit-cost analysis of a particular policy, nor does it prescribe a set of recommendations for how the region can bolster economic resilience. By focusing on the Portland Metro region, this study does not directly capture economic consequences of disruption that occur throughout the Pacific Northwest nor the cyclical effects of such a broad regional disaster.



Study Objectives

This study provides insights into the scope and scale of economic disruption in the Portland metro region following a CSZ event. It illustrates the sensitivity of the economy to different types of resilience interventions. Finally, it explores the distribution of economic effects across some populations who may experience impacts more than others.



Read the Full Report

This executive summary focuses on the high-level findings of this economic study. The full report describes the research process, data sources, and detailed conclusions of the analysis, and is available for download at RDPO’s website: <https://rdpo.net/>

With a more complete picture of the risks of disruption, leaders can better make the case for investments that will minimize economic disruption and shrink equity gaps following a CSZ event. While this study does not recommend specific policies to enhance resilience, it does demonstrate that reducing inequality and preparing for CSZ-related impacts can yield dividends now and in the future. Leaders and business owners in the Portland region can use the results of this study to support policies that reduce economic risk and vulnerability, and take steps to help economic recovery happen more rapidly and equitably after such an event. The report has four key takeaways:

1. A CSZ event would significantly disrupt business and economic activity in the Portland Metro area.

A CSZ event will disrupt day-to-day activities of local businesses and affect their ability to access labor, capital, and supply chain inputs. While the safety and stability of buildings will cause an initial disruption, a far wider set of inputs affect the resiliency of individual businesses. Extended disruption to public utilities, transportation infrastructure, and regional markets are all external factors that businesses will have to navigate. However, even business-specific characteristics such as size, financial strength, and the industry sector they work in may determine their ability to recover.

Although the exact timeline of the broader physical recovery from a CSZ event is unknown, the extent of the impacts are broad, with over 71 percent of firms in the Portland Metro area likely to temporarily close, affecting over three-quarters of a million jobs. Assuming that the closure period lasts at least one month, this will result in a loss of about \$4.3 billion dollars in income in the region. Absolute impacts on jobs and income are largest in the health care, manufacturing, and retail sectors.

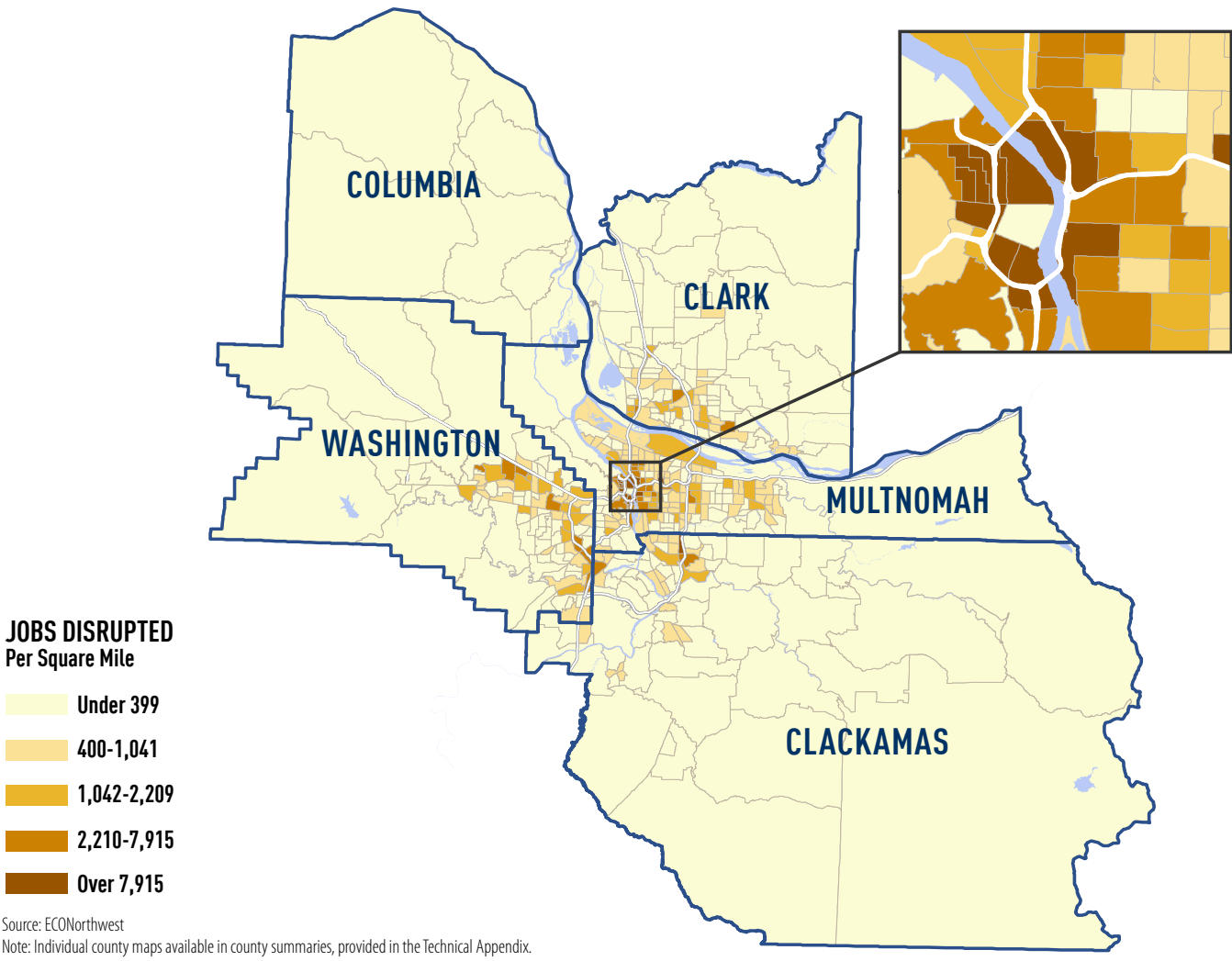
Initially, many businesses will temporarily close because of direct or neighborhood damage, disruptions in utility and transportation services, and the inability of employees to work. As goods and services are no longer being produced and consumed, economic activity drops. The distribution of the effect across sectors varies. For some sectors, such as construction, this drop may be brief or not occur at all. For other sectors, such as tourism, the effect may be substantial and long-lived.

Ultimately, recovery will be supported in part by financial resources from outside the region. Federal disaster aid or insurance payments represent money that would not have otherwise arrived in the economy and are used to rebuild capital. They directly support industries engaged in the rebuilding efforts

(e.g. construction), and indirectly support a wide range of other businesses providing inputs to the recovery effort, including satisfying the demands of people — many of whom may come from outside the region — to support the recovery process. The magnitude and timing of this increase in new economic opportunity depends on when federal aid and private insurance

payouts arrive. The net effect in the long-run on the region’s economy depends on when and to what extent these economic losses and gains are realized. Past research reveals that the distribution of impacts to economic activity across businesses and industry sectors may vary significantly, resulting in clear winners and losers in both the short-run and long-run.

JOB DISRUPTED BY SQUARE MILE



DIRECT BUSINESS DISRUPTION ESTIMATES BY COUNTY

COUNTY	# OF BUSINESSES DISRUPTED	% OF BUSINESSES DISRUPTED	# OF JOBS AFFECTED	LOST INCOME (MILLIONS \$)
Clackamas	9,180	68%	133,757	\$553
Clark	9,807	70%	109,006	\$457
Columbia	809	70%	7,766	\$24
Multnomah	22,867	72%	397,858	\$1,920
Washington	12,310	70%	222,982	\$1,330
TOTAL/MEAN	54,973	70%	871,369	\$4,284

Note: “Disrupted” refers to a temporary closure of a firm. The estimate of lost income assumes an average one-month closure period. Source: ECONorthwest analysis of QCEW, DOGAMI, and City of Portland data.

¹The Regional Disaster Preparedness Organization (RDPO) supported this work, which was guided by input from emergency managers representing local governments across the Portland region.
² Bauer, J.M., W.J. Burns, and I.P. Madin. 2018. *Earthquake Regional Impact Analysis for Clackamas, Multnomah, and Washington Counties, Oregon*. Department of Geology and Mineral Industries. Available at <https://www.oregongeology.org/pubs/ofr/p-0-18-02.htm>

2. A CSZ event would disproportionately affect vulnerable populations, further entrenching existing social and economic disparities.

Earthquake-induced physical and economic disruption has the potential to exacerbate existing inequalities. Oregonians experience quality of life in many ways, and current and historical disparities in access to resources and lived experiences have created inequality. A CSZ event is likely to amplify these inequities by benefiting those who have the

resources to respond and recover and further harming those who don't.

A CSZ event could result in long-lasting changes that leave many Oregonians worse off. Past research has shown that large disasters exacerbate housing affordability challenges, increase poverty levels, and reduce economic opportunities. However, with sufficient preparation, the disruption could be minimized, providing opportunities for realignment and growth. How a CSZ event ultimately affects Oregon's economy largely depends on the capacity of individuals, households,

businesses, and institutions to adapt through the sequence of shock, response, and recovery.

The map shows the relationship between social vulnerability and building damage arising from a CSZ event. Areas with high levels of vulnerability and high levels of residential building damage are dark purple. Areas with high levels of vulnerability but low levels of damage are bluer, while tracts with high levels of damage but lower levels of vulnerability are more orange. Comparisons of building damage and social vulnerability indicate that people of all social vulnerability measures are expected to experience structural damage following a CSZ event. However, concentrations of darker purple, where a CSZ event may produce the highest impacts among vulnerable populations, occur in Clark, Multnomah, and Washington counties.

4. Actions taken now can lead to faster, broader, and more equitable economic recovery.

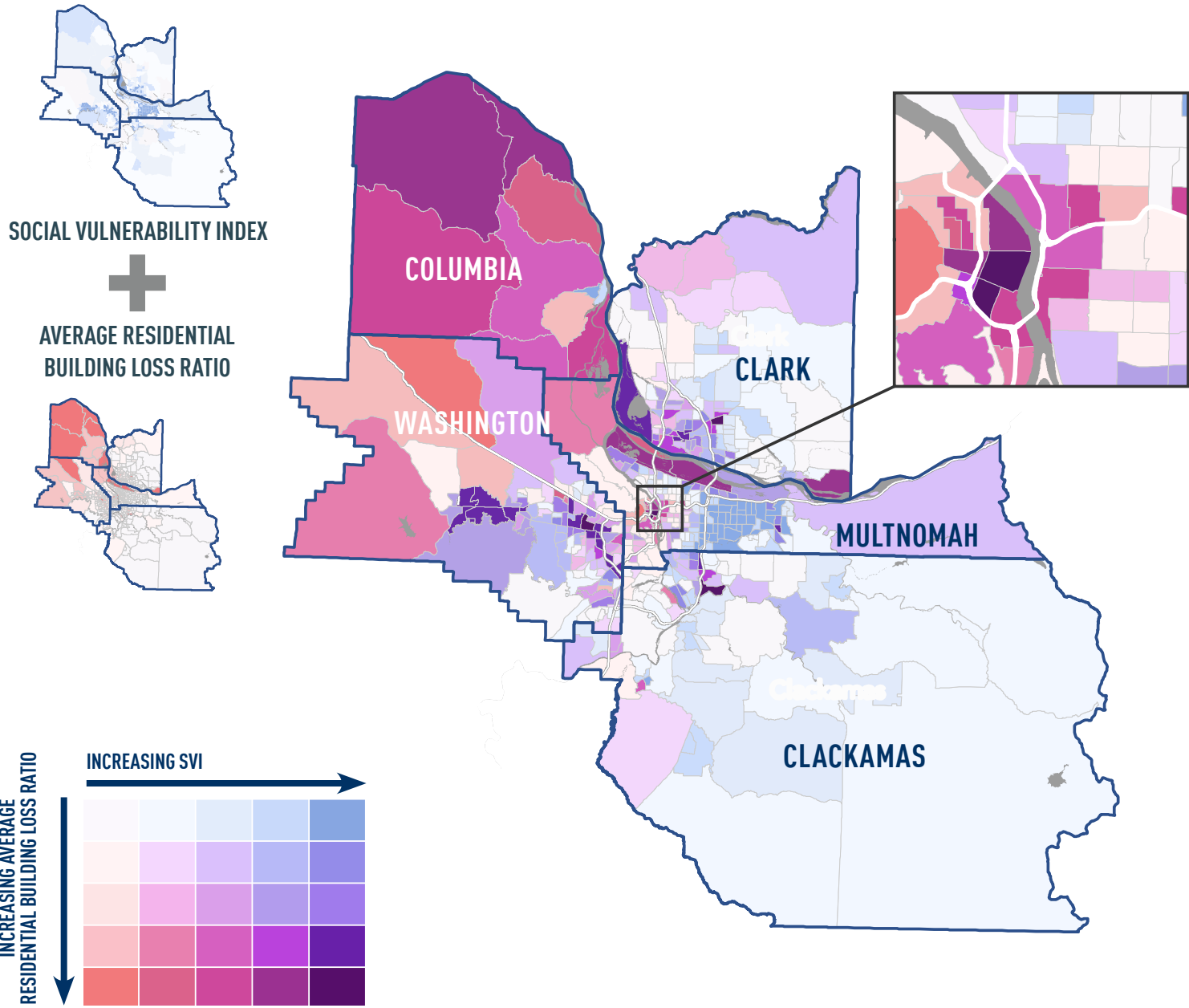
Economic systems are complex, adaptive, and integrally linked to the assets they are built on. The resilience of the economy is — at least initially — only as resilient as the people, structures, and institutions it is built on. The region has begun to invest in critical infrastructure and conversations are underway within the private and public sectors about how best to lay the foundation for physical and economic recovery. Investments in infrastructure clearly have the potential to pay economic returns, laying a foundation for businesses to act creatively to minimize their own disruption.

Past research has shown that disasters tend to intensify pre-existing structural inequalities in businesses. The age, gender, and race of the business owner influence access to capital, a key vulnerability indicator. Direct physical damage may impact firm survival, but the availability of lifeline services exhibits stronger influence on long-term viability. Moreover, researchers have documented the importance of entrepreneurs in a post-disaster economy. Ensuring that recovery opportunities are widely shared will help solidify broader community and economic resilience in the region.

This study helps to broaden the understanding of the region's capacity to initiate a robust economic recovery following a CSZ event. Vulnerable populations, including those with low incomes, ethnic and racial minorities, and others, are integral participants in the economy as business owners and workers. Their capacity to respond to and recover from disasters is often diminished because of limited access to capital and entrenched inequities, among other factors. This can hamper economic recovery by reducing the productive capacity of the labor force, and by underutilizing valuable creative resources.

These results lay a foundation for exploring specific strategies to build capacity in and support all businesses so they may fully participate in and benefit from economic recovery following a CSZ event.

SOCIAL VULNERABILITY AND EARTHQUAKE DAMAGE



Source: ECONorthwest

3. Investing in resilient utility systems, transportation networks, and buildings would reduce economic disruption and produce a more equitable recovery.

Regional leaders have an opportunity to make investments or advance policy changes that can reduce the expected disruption to businesses from a CSZ event. These are actionable changes that can be made now that have an impact on economic recovery. Through discussions with stakeholders, four specific policy interventions were evaluated: 1) Reinforcing transportation networks, 2) Reducing disruptions to utility services, 3) Retrofitting unreinforced masonry structures (URMs), and 4) Retaining population. These four scenarios are modeled to measure the relative benefit of their policy outcomes; however, this study does not evaluate the mechanism by which those outcomes are delivered or their costs.

While the decision to pursue a public policy action should, in part, consider the relative benefits and costs, this study does not make recommendations for policies or their implementation. Rather, this study evaluates the relative magnitude and distributional impact of these four interventions.

REDUCTION IN BUSINESS DISRUPTION IN THE PORTLAND REGION FROM RESILIENCE INVESTMENTS

RESILIENCE STRATEGY	REDUCTION IN BUSINESSES DISRUPTED	% OF BUSINESSES	# OF JOBS AFFECTED	CHANGE IN INCOME (MILLIONS \$)
Reducing Disruption to Utility Services	14,049	17.9%	176,313	\$781
Reducing Disruption to Transportation Networks	240	0.31%	3,036	\$16.75
Reinforcing URMs	534	0.8%	7,679	\$41.8
Retaining Population	Qualitatively Evaluated: Positive Effects Likely			

Note: "Disrupted" refers to a temporary closure of a firm. The estimate of lost income assumes an average one-month closure period. Source: ECONorthwest analysis of QCEW, DOGAMI, and City of Portland data.

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OREGON
Koin Center
222 SW Columbia St., Suite 1600
Portland, OR 97201
503-222-6060

OREGON
The Washburne Building
72 W Broadway, Suite 206
Eugene, OR 97401
541-687-0051

WASHINGTON
Park Place
1200 6th Avenue, Suite 615
Seattle, WA 98101
206-823-3060

IDAHO
Eagles Center
223 North 6th Street, Suite 430
Boise, ID 83702
208-515-3353