Economic and Transmission Impact Reopening Industries in Washington

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What do we already know?

Social distancing lockdown measures have been successful to limit the spread of COVID-19 in Washington State. A plan for reopening the economy has been issued. As we consider how to safely and effectively reopen, we must consider tradeoffs between the economic benefits of and the transmission risks associated with reopening industries.

What does this report add?

We quantify tradeoffs between the economic impact of reopening and the relative transmission risk of reopening each industry.

Compared by industry:	**Measured by:**
Economic impact	Income loss due to unemployment Profit loss
Transmission risk	Number of employees per workplace Human interactions Ability to work from home Size of industry

What are the implications for public health practice?

We find that the manufacturing of metal and electronics and construction industries should be targeted for early reopening, while the arts, entertainment, and recreation industry should be delayed. Mitigation interventions should be put in place to decrease transmission risk for all industries reopening.

What are the limitations of this report?

This report does not present data or recommendations below the industry level (i.e., the sub-industry level) nor does it capture the social, cultural, emotional, or cascading economic impacts behind

continued industry openings or delays in openings. Further data analyses is underway to provide greater clarity on these tradeoffs and illuminate exceptions within industry groupings.

This report also does not take demographics data into account to assess economic losses or transmission risk along socioeconomic or race/ethnic lines. Additional reports are forthcoming to illustrate demographic vulnerabilities within Washington State to inform understanding, discussions, and decisions from an equity lens.

Additional limitations are indicated in this report.

Executive summary

Shutdown measures have been successful in controlling the spread of COVID-19 in Washington State. Now, we must thoughtfully decide how to lift stay-at-home orders and reopen the economy. A blanket reopening of industries could lead to not only drastic increase in Covid-19 cases, but also even greater economic downturn due to health burden and consumer risk, and prompt subsequent, and potentially extended, shutdowns. The economic impacts of the shutdown have been heterogeneous across industries; therefore, reopening will have differential impacts for different industries due to factors described below. Additionally, and importantly, transmission risk differs by industry, depending on the nature of the work and the amount of social mixing. This means industries can be assessed based on risk of transmission; however, it also means mitigation tactics need to be tailored industry by industry.

There are many factors that should go into the policy and decision-making process – spanning the short- and long-term impacts. Economics and transmission at the industry-level are only two among a vast list. In this analysis, we quantify the tradeoffs between economic impacts and health risks for economic reopening by industry in Washington. It provides only a starting point to inform discussions on industry openings.

We evaluated (1) the economic impact of the shutdown and (2) the relative transmission risk of each industry in Washington. Economic impact was quantified as the sum of income loss due to unemployment and profit loss. Transmission risk was quantified as an index consisting of the sum of four factors: (1) average number of employees per individual workplace in each industry, (2) expected marginal increase in human interactions if the specific industry was reopened, (3) percent of jobs that cannot be done from home in each industry, and (4) total number of employees in each industry in Washington. This transmission index informs relative risk only and cannot be used to project the number of cases or disease burden directly.

We found that the industries with the highest estimated economic impact due to COVID-19 in Washington were: (1) healthcare and social assistance, (2) manufacturing of metal and electronics, (3) construction, and (4) accommodation and food services (see Figure 1 below). Those with the largest transmission risk index were: (1) healthcare and social assistance, (2) arts, entertainment, and recreation, and (3) accommodation and food services (see Figure 2 below).

In examining economic impact and transmission risk simultaneously, we should aim to target industries for reopening that have a high economic impact and low transmission risk index and ones for continued shutdown that have a low economic impact and a high transmission risk index (see Figure 3 and Table 1 below). We identified manufacturing of metal and electronics and construction as having the highest economic impact relative to their transmission risk in Washington, while arts, entertainment, and recreation has a low economic impact relative to a high transmission risk index.

Additional data and research will be needed to inform policy decisions. This includes data and research that offers clarity on the sub-industry level to differentiate the economic impact and transmission risks within industries, the cultural and emotional value by business types, the role of demographics and ways to address the needs of vulnerable populations, and implications of additional cascading impacts.

Introduction

The first confirmed case of COVID-19 in the United States was a travel-associated case in Snohomish County, Washington screened on January 19th, 2020.[1] As of May 8th, Washington State has reported 16,231 cases with the majority in King and Snohomish counties.[1]

On February 29th, Governor Jay Inslee declared a state of emergency in Washington, soon after which companies began urging employees to work from home if possible.[2] Over the next several weeks, shutdown measures increased with some school closures beginning March 2nd. Event size limits were announced March 13th.[2] On March 16th, all restaurants, bars, and entertainment facilities were closed. Finally, on March 23rd, a stay-at-home order, called "Stay Home, Stay Healthy" was issued.[3] While social distancing measures had some success at decreasing mobility prior to "Stay Home, Stay Healthy," we observed a particular success in social distancing measures leading to a decrease in transmission following this announcement. At the end of February, the measure was extended through the end of May.[4]

While shutdown measures have been necessary and successful to control the spread of COVID-19 in Washington, they also take a toll on the economy: unemployment in Washington is now more than 30%.[5] Heedlessly reopening the economy could lead to not only drastic increases in COVID-19 cases, but also even greater economic downturn due to added health burden and consumer risk.[6] Governor Inslee has issued a plan to begin reopening the economy in Washington to mitigate risk.[7] As part of this plan, it will be necessary to consider which businesses to reopen when.

The economic impacts of the shutdown have not been the same for all industries; therefore, reopening will have differential impacts for different industries. More people have become unemployed in industries that rely on in-person interactions, specifically those that cannot be done with remote work such as restaurants and in person retail. Ideally, we will target reopening industries that have experienced large unemployment or overall economic distress due to COVID-19; however, it is also important to consider the transmission risks in each industry. Workplaces that require significant close contact with large numbers of people or cannot be done remotely likely have higher transmission risk than others. We defined reopening of an industry to indicate that stay-at-home orders would be lifted, but employees able to work from home would continue to do so, and safety interventions such as hand-washing and mask wearing would continue to be used.

In this analysis we aim to quantify the tradeoffs between economic impact and health risks for economic reopening by industry in Washington.

Methods

We aimed to evaluate (1) the economic impact of the shutdown and (2) the relative transmission risk of reopening industries in Washington. Industries were categorized by the North American Industry Classification System (NAICS).[8]

There are many sub-industries and business types within the NAICS industry groupings with economic impacts and transmission risks that may not be accurately reflected in industry-level data. The fact that this report reflects only industry-level data is a limitation of this report.

Economic Impact

To estimate total economic impact by industry, we summed income loss due to unemployment and profit loss.

To estimate income loss due to unemployment, we found the number of people unemployed due to COVID-19 in each industry multiplied by the average weekly wage in that industry.[9] New unemployment claims are available for Washington by industry each week.[10] We used total new claims data from March 8th through May 17th to calculate the distribution of unemployment due to COVID-19 by industry, and applied that to the total unemployment due to COVID-19 in Washington. Total unemployment due to COVID-19 was assumed to be the difference between unemployment the week of May 16th and the average unemployment for all of 2019.[11] Wages for each occupation were distributed proportionally to relevant industries in Washington.[12]

To estimate profit loss, we first found the percent decrease in sales likely attributed to Covid-19. Using SafeGraph* weekly mobility data[13], we calculated the percent decrease in customer interactions in each industry from the week of March 30th, 2020, which was lowest point of mobility in Washington, to the equivalent week in 2019, assuming that customer interactions included any interaction lasting less than four hours.[13] We assumed that any job that can be done from home would not be subject to profit loss.[14] For jobs that cannot be done from home, we calculated profit loss as the percent decrease in sales multiplied by the weekly gross business income and expected profit margin.[15, 16]

Transmission Risk Index

We calculated a transmission risk index based on a summation of four factors: (1) workplace size: average number of employees per individual workplace in each industry, normalized 0-1, (2) human interactions: expected number of human interactions that would re-start if industry were reopened, normalized 0-1, (3) inability to work from home: percent of jobs that cannot be done from home in each industry, normalized 0-1, and (4) industry size: total number of employees in each industry in Washington, normalized 0-1. This risk index is intended to quantify potential transmission risk differences between industries. It cannot be used to directly predict cases or disease burden.

We hypothesized that a workplace building with more employees would be more likely to facilitate higher levels of transmission. For this factor, we found the mean number of employees per establishment in each industry in Washington and normalized the result from zero to one.[17] This data source does not include the physical size of each workplace (e.g., warehouse workers may have less frequent physical contact than those in office buildings), which is a limitation of this approach.

In addition to potential interactions between employees, we aimed to quantify a factor for total human interactions in each industry that have been eliminated due to social distancing and shutdown policies. These interactions would be expected to restart if the industry were reopened. We used SafeGraph weekly mobility data to calculate the difference in total interactions between the week of March 30th, 2020, which was lowest point of mobility in Washington, to the equivalent week in 2019 for each industry, and normalized average change in interactions from zero to one.[13]

Additionally, we included a factor for the percent of jobs that cannot be done from home for each industry and included a factor for the size of the industry, measured by total number of employees in Washington, normalized from zero to one.[10, 14, 18]

Results

We found that the industries with the highest estimated economic impact due to COVID-19 in Washington were (1) manufacturing of metal and electronics, (2) healthcare and social assistance, and (3) construction (see Figure 1). Economic loss in the manufacturing industry was driven primarily by profit losses, as opposed to income loss due to unemployment.

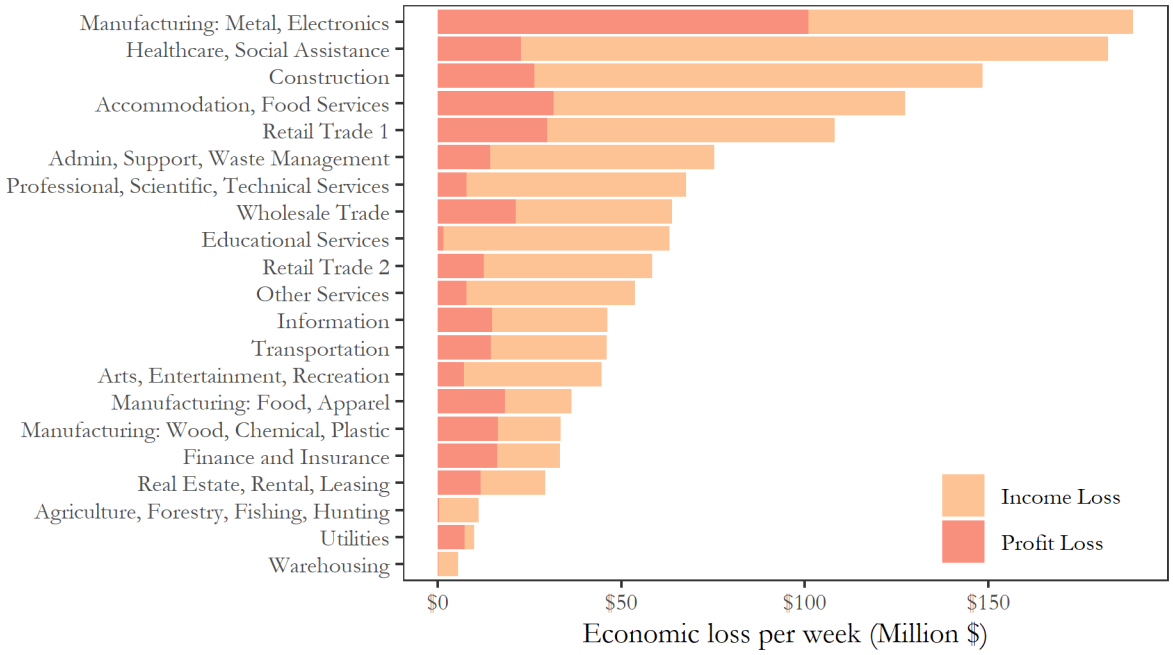

Figure 1. Economic impact from income loss due to unemployment and profit loss attributed to COVID-19 in Washington. Highest estimated economic impact due to COVID-19 in Washington was in manufacturing of metal and electronics. Retail Trade 1: Vehicles, Furniture, Electronics, Materials, Grocery, Gas, Clothing; Retail Trade 2: Sporting, Books, General, Other.

Upon summing the four factors of workplace size, human interactions, inability to work from home, and industry size, we found that the three largest transmission risk indices were for (1) accommodation and food services, (2) health care and social assistance, and (3) retail trade (Figure 2).

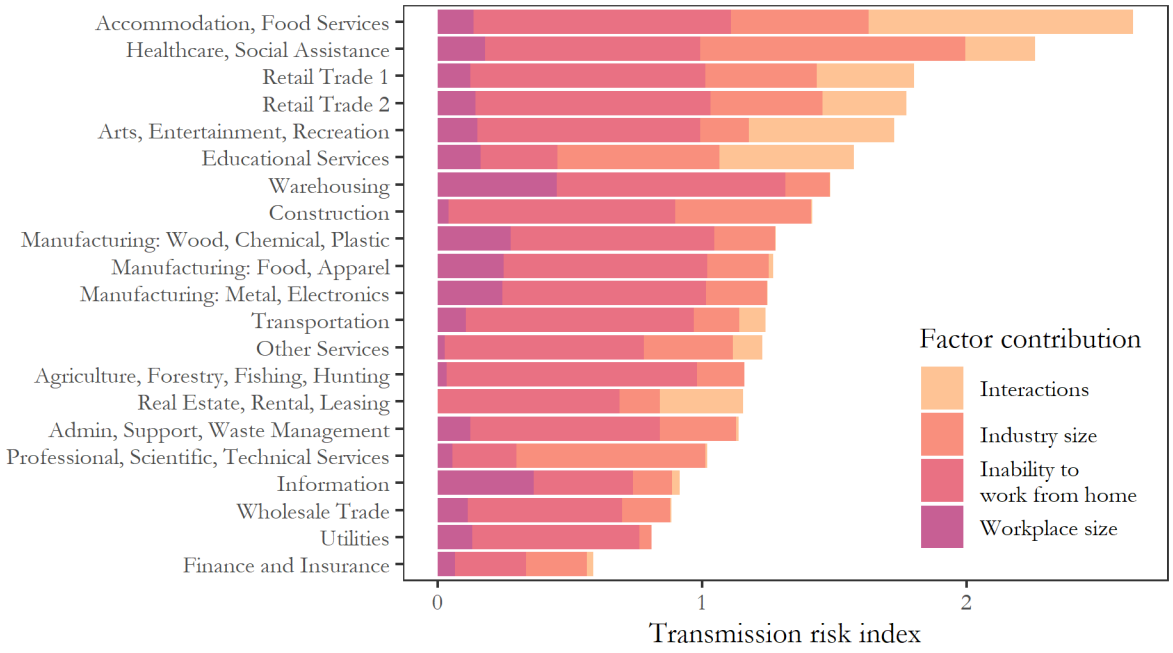

Figure 2. Total transmission risk index calculated as a sum of contributions from four factors. The four factors are: (1) workplace size: normalized number of employees per individual workplace in each industry, (2) interactions: normalized number of human interactions that would re-start if industry was reopened, (3) inability to work from home: percent of jobs that cannot be done from home in each industry, and (4) industry size: normalized number of employees in each industry in Washington. Largest transmission risk index was found in accommodation and food services. Retail Trade 1: Vehicles, Furniture, Electronics, Materials, Grocery, Gas, Clothing; Retail Trade 2: Sporting, Books, General, Other.

In examining economic impact and transmission risk simultaneously for reopening purposes, we should aim to target industries for reopening that have a high economic impact and low transmission risk index. In terms of tradeoffs of economic losses from the shutdown versus the health risk of reopening, industries toward the top left of the Figure 3 would have the most economic gain for the health risk we would take on.

Figure 3. Estimated weekly economic impact of COVID-19 and transmission risk index for each industry in Washington. Manufacturing of metal and electronics and construction have the highest economic impact relative to their transmission risk in Washington, therefore should be targeted for earlier reopening. Retail Trade 1: Vehicles, Furniture, Electronics, Materials, Grocery, Gas, Clothing; Retail Trade 2: Sporting, Books, General, Other.

Manufacturing of metal and electronics and construction have the highest economic impact relative to their transmission risk in Washington, therefore should be targeted for earlier reopening (see Figure 3 and Table 1). Arts, entertainment, and recreation had a low economic impact relative to a high transmission risk index, indicating benefits of delaying reopening. While accommodation and food services overall did not have a particularly high economic impact relative to transmission risk, full-service restaurants specifically had a very high economic impact.

Table 1. Estimated weekly economic impact of COVID-19 and transmission risk index for each industry in Washington. Retail Trade 1: Vehicles, Furniture, Electronics, Materials, Grocery, Gas, Clothing; Retail Trade 2: Sporting, Books, General, Other.

Industry	Estimated economic impact (million $)	Transmission risk index
Agriculture, Forestry, Fishing, Hunting	$11,677,667	1.2
Utilities	$10,196,202	0.8

Construction	$159,425,862	1.4
Manufacturing: Food, Apparel	$36,265,551	1.3
Manufacturing: Wood, Chemical, Plastic	$34,390,609	1.3
Manufacturing: Metal, Electronics	$201,376,398	1.2
Wholesale Trade	$67,896,581	0.9
Retail Trade 1	$118,296,675	1.8
Retail Trade 2	$58,614,336	1.8
Transportation	$48,965,243	1.2
Warehousing	$6,176,157	1.5
Information	$48,847,540	0.9
Finance and Insurance	$35,291,862	0.6
Real Estate, Rental, Leasing	$30,140,844	1.2
Professional, Scientific, Technical Services	$73,114,971	1.0
Admin, Support, Waste Management	$80,386,053	1.1
Educational Services	$67,081,486	1.6
Healthcare, Social Assistance	$183,624,778	2.3
Arts, Entertainment, Recreation	$43,099,800	1.7
Accommodation, Food Services	$108,405,996	2.6
Other Services	$50,938,784	1.2

Conclusions and Recommendations

In estimating the economic impact due to COVID-19 as well as the relative transmission risk in each industry in Washington, we find that the manufacturing of metal and electronics and construction industries would be good targets for early reopening. Conversely, we find that the arts, entertainment, and recreation industry should have a more delayed reopening due to low economic impact relative to high transmission risk. Given that most industry groupings consist of a variety of business types that may not be accurately represented in industry-level data, further sub-industry assessments and considerations be taken into account to inform reopening policy.

Additionally, considerations regarding transmission mitigation will be essential to ensure a safe reopening of the economy and determine industry reopening readiness. Within the accommodation and food services industry, for example, full-service restaurants have a high economic impact, but also present a high transmission risk. This risk, however, may be able to be decreased with mitigation interventions, such as capacity caps and hand-washing, in which case restaurants would be a key target for early reopening. Furthermore, the mitigation tactics – and the ease to which they are adhered to and enforced – will need to be thoughtfully considered, as they will vary significantly between and within industries. For instance, within the arts, entertainment, and recreation industry, social distancing may be appropriate for both movie theaters and concert venues, but be far easier to enforce in the movie theater setting. This may indicate movie theaters be a target for early reopening and suggest concert venues remain closed for the time being.

The healthcare industry should be given careful consideration for several reasons. First, the industry is essential, so it has not been fully closed. Instead, we consider reopening of the health care industry to mean restarting non-emergent and elective care. We see high economic impact and high transmission risk in this industry, largely driven by the large number of people employed healthcare in Washington.

We must consider transmission risk more carefully in this population, as many healthcare settings may have increased transmission risk due to likelihood of interactions with infected people.

Similarly, we must give careful thought to the education industry. First, for most settings within education, economic gain may not be the primary goal. This analysis does not incorporate the future effects of limited or lower quality education due to shelter-in-place policies. Additionally, our analysis is based on data assuming that teachers can work from home, which may not be the case for effective education, particularly for young children. We also do not consider the disproportionate effects of closing schools on marginalized and vulnerable populations, which is a limitation of this approach.[19–21] For these reasons, we recommend that education not be directly compared to other industries, and instead be given special consideration for reopening purposes.

Finally, this report is meant to inform initial discussions regarding the reopening of industries. While it illuminates high-level industry economic impacts and transmission risks, there are a host of other considerations vital to the policymaking processes. Questions remain regarding the social, cultural, and emotional impacts of industry closures that may outweigh risks of reopening. Data is newly surfacing on how the shutdown has disproportionately affected communities of color. We need to understand this better and ensure that burden relief reaches the most affected. These, among many other, questions and considerations need to be a part of the process with which policymakers develop policy and redefine the road back an open economy.

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