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Some Economic Implications of the COVID-19 Pandemic in Nebraska

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Market Report	Year Ago	4 Wks Ago	4-17-20
Livestock and Products, Weekly Average			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight.	130.00	*	*
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb.	183.34	163.94	159.46
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb.	155.53	130.57	113.82
Choice Boxed Beef, 600-750 lb. Carcass.	232.50	243.03	NA
Western Corn Belt Base Hog Price Carcass, Negotiated	81.17	*	NA
Pork Carcass Cutout, 185 lb. Carcass 51-52% Lean.	85.88	77.36	NA
Slaughter Lambs, wooled and shorn, 135-165 lb. National.	152.54	162.84	162.25
National Carcass Lamb Cutout FOB.	378.29	428.82	429.98
Crops, Daily Spot Prices			
Wheat, No. 1, H.W. Imperial, bu.	3.83	4.42	4.52
Corn, No. 2, Yellow **Columbus**, bu.	3.44	3.22	2.84
Soybeans, No. 1, Yellow **Columbus,** bu.	7.75	8.24	7.64
Grain Sorghum, No.2, Yellow Dorchester, cwt.	5.36	5.52	5.61
Oats, No. 2, Heavy Minneapolis, Mn, bu.	3.29	3.32	3.25
Feed			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.			*
Alfalfa, Large Rounds, Good Platte Valley, ton.	123.33	90.00	90.00
Grass Hay, Large Rounds, Good Nebraska, ton.	*	85.00	85.00
Dried Distillers Grains, 10% Moisture Nebraska Average.	133.50	164.80	211.67
Wet Distillers Grains, 65-70% Moisture Nebraska Average.	46.00	51.54	57.24

*** No Market**

It is now clear that the spread, mortality and morbidity impacts of the coronavirus pandemic are sizeable but extremely heterogeneous across multiple dimensions. Geography shows that places with lower human concentrations (urban/rural divide) and away from main travel axes, such as major interstate highways and international airports, have a lower incidence of cases. Large urban centers with high human concentrations have been much disproportionally affected and with much higher mortality rates. Age and health status are equally important. Mortality increases dramatically for people 60 years old and older. People with comorbidities (cardiovascular, obesity, diabetes, and others) are much more likely to be hospitalized and die of COVID -19 than are healthy people. Family and household composition is also important. Multigenerational households are much more common in say Italy than in Sweden. Swedish households tend to live more independently often in one-person households, which provides some "cultural" self-isolation, which is helpful in case of a pandemic. In addition, medical infrastructure and preparedness vary greatly across states with devastating consequences like in New York City, partly because the pandemic hit early, and partly because of the lack of intensive care unit (ICU) infrastructure (COVID-19 Project). States in the Midwest had more time to prepare and learn to ramp up testing etc.

In contrast to this great heterogeneity, most states in the U.S. are pursuing quite similar blanket distancing policies (so-called Non-Pharmaceutical Interventions or NPIs) to reduce the spread of the disease and to manage the finite medical capacity to treat severely affected people. All these factors combined produced dramatic and tragic crises in and around New York

City, and surreal halted situations like in much of Nebraska with arrested economic and social activities and a manageable medical situation and much fewer deaths.

To this economist, comes the question: Given this incredible heterogeneity in outcomes and conditions, can we design less costly policies to manage the pandemic within our state and cities? Policies are at the local, state, national and global levels. We only control a subset of these policies, but it is worth considering whether we could design better-targeted policies which could achieve distancing at a lower economic cost.

In the following sections, I first provide some context on public health and mortality in Nebraska and the projected impact of COVID-19 on mortality. I discuss the gross benefits of current NPI policies in terms of reduced mortality and morbidity. I follow with a discussion of the economic costs from the pandemic and NPIs for Nebraska. Then, I discuss policy options to take advantage of the noted heterogeneity within Nebraska, and relative to other states and countries affected by the pandemic. I also discuss some policy issues at the local and state levels, which may help restart economic activity.

The Public Health Context in Nebraska

Projected deaths from COVID-19

First, let us discuss what is projected to happen with COVID-19 in Nebraska. The University of Washington's projections (the "Murray" model and the COVID-19 Project) is the major model used to predict the state-level impact of the pandemic. The recently projected total deaths from COVID-19 for Nebraska hover around a total of 270-290 deaths by August 4, with a large uncertainty interval (ranging from as low as 50 to as high as 1,000). Earlier projections from the Murray model were around 450 deaths. When comparing recent projections and actual data, projections seem to overstate deaths so far. For example, as of April 16, 2020, Nebraska had 24 deaths, while the Murray projections of April 13 predicted 31 deaths by the same date. Therefore, the upper boundary of the projections of 1,000 deaths appears very unlikely at this point. It just reflects the challenge of epidemiological modeling. These models do not say anything about subsequent waves of the pandemic, which are likely to occur, given that herd immunization is not taking place.

Mortality in Nebraska

The latest detailed data from the CDC on causes of death in Nebraska is for 2017. The data are shown in Table 1 along with projected deaths due to COVID-19 up to August 4. There are no projections available for beyond August 2020, that is, for subsequent waves of infections.

The table shows the importance of chronic respiratory diseases, heart diseases, diabetes, flu and pneumonia in the patterns of mortality in Nebraska. These causes of death in Table 1 are major comorbidities afflicting COVID-19 patients, who are critically ill. It is difficult to sort out exactly what a unique cause of death is. The CDC counts any death with COVID-19 as a COVID-19 death, possibly over-counting these. Projected COVID-19 deaths are less than 2% of total deaths (2017 CDC deaths + projected COVID-19 deaths).

NPIs aim is at "flattening the curve" to decrease the mortality and morbidity of COVID-19. It is hard to know what the impact of a counterfactual experiment would be. Most countries and states have imposed NPIs to various degrees and one cannot observe a natural experiment (with and without NPIs). Regarding mortality, the early projections by Ferguson et al. in the United Kingdom had predicted 2.2 million deaths from COVID-19 in the U.S. without intervention and about 1.1 million deaths with NPIs,. That is roughly a 50%-decrease in deaths induced by NPIs. Note that these early projections are out of range with current projections for the U.S. from the Murray model, or even with the consensus estimates provided by the White House (100,000 to 240,000 deaths). Greenstone and Nigam use Ferguson et al. and account for additional lives saved with NPIs by reducing the number of sick people needing intensive care, and who could not access it from a lack of ICUs (constrained medical capacity). They estimate that in addition to Ferguson et al. estimates, about 630,000 lives would be saved in the U.S. by reducing the excess demand for intensive care. What are the implications of these national estimates for Nebraska?

If we accept the assumption of doubling the number of deaths in the absence of NPIs, then these policies are projected to save about 280 lives in our state. Nebraska has a first-rate medical infrastructure that can accommodate a much larger number of people needing intensive care (COVID-19 Project) than the capacity that is needed under NPIs. According to the COVID-19 Project, Nebraska has 232 ICU beds available for COVID-19 patients. With NPIs in place, the projected need, for ICU beds dedicated to COVID-19 cases, is fewer than 100. The medical infrastructure could accommodate twice as many intensive-care cases without hitting its limit. Therefore, NPIs will not save additional lives because of a limited medical capacity in Nebraska. This is unlike what is predicted for the nation as a whole, by Greenstone and Nigam.

Table 1. CDC Mortality Data in Nebraska for 2017 by Major Causes

Cause	Number of deaths	Share of total
1. Heart Disease	3,581	20.9%
2. Cancer	3,502	20.4%
3. Chronic Lower Respiratory Disease	1,224	7.1%
4. Accidents	811	4.7%
5. Stroke	760	4.4%
6. Alzheimer's disease	698	4.1%
7. Diabetes	575	3.4%
8. Flu/Pneumonia	393	2.3%
9. Suicide	275	1.6%
10. Hypertension	274	1.6%
Other causes		
Firearm Deaths	160	0.9%
Drug Poisoning Deaths	152	0.9%
Homicide	50	0.3%
Traffic Deaths	228	1.3%
COVID-19 Deaths (projected in April under NPIs to 8/4)	280	1.63%
Total Deaths 2017 (CDC data)	16,878	98.37%
Total Deaths + projected deaths under NPI	17,158	100.00%

NPIs also decrease morbidity. Nebraska also should expect savings from the reduced morbidity induced by NPIs. Hospital stays tend to be longer for COVID-19 patients and complications require intensive care. The COVID-19 Project provides estimates of daily new hospital admissions and new ICU cases as well as how many ventilators are needed daily until August 4. One can sum up the new admissions and ICU cases to get total projected admissions (1370) and ICU cases (350). Counting the number of cases involving ventilators is a bit more difficult because patients on ventilators tend to stay in ventilation for several days. About 88% of ICU stays require ventilation based on the Murray model (mean daily IC bed/mean ventilator daily use). Hence, to estimate the total cases of ventilated ICUs, I take 88% of 350 or 308 cases of ventilations for Nebraska. Again, if we accept the premise of doubling the morbidity of COVID-19 without NPIs, these figures indicate the reduced morbidity induced by NPIs.

Some Economic Implications of these Reduced Health Incidences

How to value the reduced mortality induced by NPIs? Economists use a concept called value of a statistical life (VSL), which captures the willingness to pay to reduce the risk of death by a small amount. The typical example is that people are willing to pay $10 to reduce the risk of death by 0.000001. Scale that number up by a million, and this means that society is willing to pay $10 million to save one life. The VSL in the U.S. hovers around $10 million per death avoided. This is

the dollar value society is willing to pay to decrease mortality risk by one death. This is not the value of life as it is often misunderstood. VSL is used in cost-benefit analysis for projects having impacts on mortality, like new road projects. A safer road infrastructure reduces car accidents and associated deaths. In the cost-benefit analysis, the projected reduction in mortality is valued using VSL. People still face risk in traffic (no zero risk), and drive accepting that risk but value the fact that driving is safer, post project. Table 1 shows actually that traffic accidents killed 228 Nebraskans in 2017 (and 249 in 2019). People are not told to stop driving.

VSL varies by age, income levels, and other factors; but the $10 million figure has been used by many studies and is generally accepted as a reference value. Note that with COVID-19, the majority of deaths take place among the elderly. In Italy and France, for which large datasets are available, the average age at death from COVID-19 was around 80 years of age. CDC data show that 78% of COVID -19 related deaths in the nation are people 65 or older. For that reason, some economists and public health professionals prefer to use quality of adjusted life years (QALY), to account for the age distribution of mortality from COVID-19. Their point of view is that reducing mortality for a person of 80 should be valued differently from reducing mortality for a person 10-years of age. Other economists (Greenstone and Nigam) use an age-dependent VSL from $14.7 million for children 0-9 years of age to $1.5 million for people 80 and older. These two approaches are more controversial and not used here.

Using the VSL of $10 million, the gross benefits of the NPIs in Nebraska (state, local, and national) to decrease mortality due to COVID-19 are estimated at around $2.80 billion, with a large range of gross benefits ($.500 to $10 billion). The range reflects the considerable uncertainty on death projections discussed previously. Based on national data, the benefits of reduced COVID-19 mortality are strongly skewed in favor of the older segments of the population and that should hold for Nebraska as well[1]. Using age-adjusted VSLs would dramatically lower this estimate.

Regarding reductions of morbidity measures of COVID-19, Kaiser Permanente estimates that COVID-19 hospital stays without complication would cost about $10,000 per stay.; those with complications would cost on average about $20,000 per stay. Cases requiring ventilators would cost much more, especially if ventilation is required for more than four days (Rae et al.). The cost of cases with ventilation goes up from $34,000 for less than 4 days to $88,000 beyond 4 days. We average the latter figures to value a ventilated case saved. As explained above, projected hospital admissions are 1370 including 350 ICU interventions of which 308 are ventilated cases. Again, if we assume that NPIs reduce morbidity incidences by 50%, as for mortality reduction, we can develop back-of-the-envelope estimates of the morbidity savings from NPIs. These savings are worth about $30 million. These are negligible compared to the gross benefits of the reduction in mortality. All these figures are imprecise and tentative, but they provide orders of magnitude and ranges of values, which are insightful.

The GDP of Nebraska was 127 billion dollars (rounded) in 2019, the last year with detailed industry accounts. The projected gross benefits induced by NPIs to reduce mortality at all levels represent about 2.2% of GDP (2.80/127) and with a range of benefits (0.4% to 7.9%).

The Economic Cost Induced by the Pandemic and Associated Policies

Beyond the health costs and savings discussed above, it is difficult to sort out the respective economic costs of the pandemic and the cost of the NPI policies and the disruption costs from NPIs and disruption abroad. It is also challenging to disentangle the costs of NPIs at the local, state and national levels. Humans have a strong sense of self-preservation and abate risk without NPIs. Elderly Americans voluntarily stay put at home and decrease consumption outside of the home. All these factors will require much data and economic modeling to be sorted out in the future.

In Nebraska, to gauge the immediate economic impact of the crisis, we can observe jobless claims with little delay. The data are from the Nebraska Department of Labor. The latest available data on these claims are for April 4 (as of 4/15/2020). In the last 4 weeks about 82,682 people filed for unemployment benefits, twice as many as the whole of 2019 (41,000 claims). Table 2 shows a comparison for calendar years (CY) 2018-20 for the first 15 weeks of the year. The impact is staggering.; the year 2020 had started as a year of strong job gains before the pandemic took place.

The industry distribution of the job losses in the last 4 weeks is shown in Table 3. The source is also the Nebraska Department of Labor.

[1] According to CDC data as reported on April 15, an 85 year old and over is 31 times more likely to die of COVID-19 than a 45-54 year old person. . This is calculated by taking the ratio of the COVID-19 mortality rate of the two groups (0.042/0.0013) as reported by the CDC on April 15.

Table 2. Initial Unemployment Claims in Nebraska

Week Ending Date	Weeks	CY 2020	CY 2019	CY 2018	2020-19 % Change
1/4/2020	Week 1	1,149	1,310	1,925	-12.29%
1/11/2020	Week 2	1,055	1,327	1,365	-20.50%
1/18/2020	Week 3	951	1,210	1,056	-21.40%
1/25/2020	Week 4	967	1,127	922	-14.20%
2/1/2020	Week 5	825	1,042	807	-20.83%
2/8/2020	Week 6	690	860	789	-19.77%
2/15/2020	Week 7	558	737	687	-24.29%
2/22/2020	Week 8	487	701	729	-30.53%
2/29/2020	Week 9	497	744	812	-33.20%
3/7/2020	Week 10	500	722	706	-30.75%
3/14/2020	Week 11	796	781	719	1.92%
3/21/2020	Week 12	15,666	730	732	2046.03%
3/28/2020	Week 13	24,533	643	613	3715.40%
4/4/2020	Week 14	26,542	584	606	4444.86%
4/11/2020	Week 15	15,944	573	533	2682.55%

Table 3. Initial Unemployment Insurance Claims by Major Industry

Industry Sector	4 weeks Ending 4/11/20	GDP contribution in 2019 GDP ($ billion)
Accommodation and Food Services	16,596	2.81
Health Care and Social Assistance	10,856	10.072
Retail Trade	10,032	6.771
Other Services, Ex. Public Admin	7,791	2.609
Manufacturing	4,678	13.455
Administrative and Waste Services	4,106	3.546
Construction	3,606	3.501
Educational Services	2,944	1.07
Arts, Entertainment, and Recreation	2,700	0.736
Professional and Technical Services	2,155	5.625
Transportation and Warehousing	1,993	10.517
Wholesale Trade	1,543	7.932
Real Estate and Rental and Leasing	1,015	12.913
Information	964	3.735
Finance and Insurance	879	12.699
Total (all claims number of people)	82,682	$97.98 billion

The table shows that all industries have been affected, but particularly and disproportionally, "nontraded" services industries, not directly affected by global or international shocks but rather by local, state, or regional shocks and distancing policies. The implied unemployment rate is around 12% as of April 11 if one adds the latest unemployment figures to the March rate of 4.2% reported by the Nebraska Department of Labor.

Looking at the impact by occupation from the same data, the most affected categories are in decreasing order Waiters and Waitresses; Hairdressers, Hairstylists, and Cosmetologists; Bartenders; Retail Salespersons; Childcare Workers; Cooks, Restaurant; Cashiers; Dental Assistants; Customer Service Representatives; Managers, All Other; Dental Hygienists; and Manicurists and Pedicurists. Most of these jobs cater to local markets. These formerly active workers will receive some unemployment benefits, which in many cases will not replace lost earnings and economic security. These lost jobs also reflect forthcoming business closures and bankruptcies.

Given the lack of data, it is hard to gauge the economic value of these losses in these industries and occupations. One can look at the importance of these sectors in the Nebraska economy to have a sense of what is impacted. Our state GDP was $127 billion in 2019. The impacted sectors, with the highest unemployment claims, represented nearly $98 billion out of $127 billion of GDP last year. Table 3 shows each industry that lost the most jobs and with their contribution to our state GDP as of last year. Of course, some activity remains, but the figures suggest how deep the shock is and will be. These costs, largely imposed by distancing policies, not all state or local, are likely to dwarf the gross benefits from the reduced mortality in Nebraska. The distancing policies made much sense initially for precautionary reasons, given the many unknown implications of the pandemic. Now we know that mortality is limited but significant for elderly people. We also learned that NPIs are disproportionally benefiting the elderly and people with comorbidities from the health perspective. On the economic front, current NPIs especially handicap younger adults and their families employed in service industries, in Nebraska, as well as the older adults in these industries. Those with morbidities in these industries, face a difficult tradeoff between reduced health risk and vanished earnings. Everyone has been affected negatively by the NPIs, through reduced portfolio value, lost jobs, reduced businesses, etc. Do these blanket NPIs still make sense now, given the induced economic disaster and the increasingly precarious situation many Nebraskans are facing? The policy process should debate these tradeoffs more vigorously.

Potential Policy Options in Nebraska

Given the tremendous impact on these industries and occupations, can we design better-targeted distancing? Distancing will have to stay until an effective vaccine, or much more effective treatments are discovered to treat acute cases.

First, as stated elsewhere, some blanket sanitary policies could be required (mask wearing in commercial locations, more extensive use of gloves, etc.). Similarly, rapid testing should be widely available and widespread and with the capability of self-administration. The latter may still take time to scale up.

The heterogeneity of the coronavirus risk across age groups suggests that health risk is very moderate for young people and adults without comorbidity. Mortality is nearly nonexistent for the young. Adults younger than 60 and without morbidity also face low-risk as suggested above. The health risk, especially mortality, rises dramatically for the elderly. It also rises for adults with comorbidity. How to protect the elderly and allow less stringent distancing for the young and adults? For instance, schools are risk vectors for older teachers and teachers with morbidities. Another group at risk with school reopening is the elderly in multi-generational households. So designing ways to protect the latter two groups and reopen schools should be possible.

Teachers in risk groups could receive a medical health score and be excused above a certain level of risk. They could still do some teaching remotely with the help of a teacher assistant in the classroom. One could also give incentives for early retirements for older teachers interested in exiting their profession. Elderly people in multi-family households could be provided with accommodations to self-quarantine. In addition, traceability using frequent testing and phone apps could help locate and trace infected people to reduce risk, including in schools. This is practiced and enforced in several Asian countries with success. These practices raise privacy issues but can be workable as the car insurance industry does with young drivers. Signing-up for the app and good driving behavior lead to a lower premium (here it could be a health insurance premium). These ideas could also apply to our daycares and universities and other adult-learning facilities. The Extension service at the University of Nebraska and other state agencies could provide education services on how to effectively self-quarantine and practice good hygiene to limit the contagion. This step, reopening schools, will also allow young parents to return to work for those who worked from home and

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The 4.2% unemployment rate is computed using the reference week ending on March 14, as indicated in the Nebraska Department of Labor press release of April 17. The subsequent weeks experienced the surge in claims as shown in Table 2.

from home and remain employed. Productivity should rise dramatically!

Reopening Retail and Food Services

One could conceive reopening retail businesses, using segregated hours for people at risk. Many stores already provide discounts and special hours for seniors. The same idea could be used to reopen retail shops. For example, retail businesses would scrub and the stores could open early, say twice a week, to elderly costumers only and allow them to shop safely with good distancing in the retail location. Then lower risk groups could use the stores, still with safe distance with masks, etc.

Restaurants could do the same with early opening "happy hours," exclusively for the elderly and people at risk. Some of these strategies may not work if groups at risk remain cloistered at home, but at least activity could resume. Restaurants will have to respect distancing within their space. The staff has the potential to be a vector of contamination. Hygiene would have to be beefed up. We already have health inspections for food services. These inspections should be strengthened with a focus on mask wearing, hand washing, glove wearing etc. in the medium terms. Restaurants will have to innovate more enticing take-out packages, home catering, or segregated smaller dining rooms.

For each retail and service sector, and with concerted efforts, one could imagine how to restart many subsectors of these industries, while limiting contamination.

Using the rural-urban heterogeneity, one notes that rural areas are much less affected than urban ones in Nebraska. The Omaha, Lincoln, and Grand Island areas have the majority of cases in Nebraska. The interstate corridor also exhibits higher cases. Outside of these areas, rural counties should have more leeway to cautiously relax rules and let business go on as usual.

Exploiting these dimensions (age, health, and geographical location) for more flexible, local and state policies could already bring back considerable economic activity.

Remaining Issues

A myriad of economic issues remain with defaults and late payments and shocks at the national and international levels. These are not easily actionable at the state or local levels. The travel and tourism industries will take much time to recover as long as borders and travel remain restricted. One could think of a COVID-19 "yellow" book like the vaccination book to travel internationally to riskier destinations. Travelers would have to show that they took a recent coronavirus test and are negative before they can hop on a plane. Airlines have been devastated once again. The car industry will also take time to recover given the credit constraints many families are facing. No silver bullet here.

Agriculture is also deeply impacted by the crisis, with no easy remedy in sight. Trade costs for agriculture exports, for example, have nearly doubled with disruptions in logistics and harbors, especially with labor shortages. Reduced foreign demand also affects export demand. Commodity prices have fallen quite significantly for Midwest commodities (Hart et al.). The latter authors estimate overall annual damage for Iowa's agriculture sector of $788 million for corn, $213 million for soybean, $2.5 billion for ethanol, $658 million for fed cattle, $34 million for calves and feeder cattle, and $2.1 billion for hogs. One would expect comparable losses for Nebraska's agriculture. Farm programs will compensate for some of these losses, but not all. Food supply chains have to reorganize to address labor shortages and repackaging away from food services towards home-preparation formats. See also the *Cornhusker Economics* issue of April 16 on how to manage COVID-19 related risk and commodity price risk.

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