

Expectation versus outcome - Price of public health measures to counter COVID-19 versus economic recovery.

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As the pandemic loomed governments around the world weighed up the odds of the economy being crippled by impact of the disease on their health systems, population, and businesses, against closing borders, quarantining, and restricting people to reduce the spread of the disease with the intention of eliminating it altogether.

The greatest fear was that businesses would close, trade, financial markets and movement of goods would be stifled. The economy would not recover if a full public health approach were instigated. The value of a life lost to COVID-19 was being balanced against the possibility of major depression of economic activity leading to irretrievable job losses and business closures, lowering the volume of goods and services with downstream effects of rising poverty and widening income gaps.

The purpose of this paper is to examine the cost of public health measures in NZ, identifying areas of improvement and further public expenditure necessary to continue a positive investment in the capability of our people in the first instance to engender positive economic recovery and future resilience. The cost effectiveness of New Zealand's COVID-19 recovery effort to achieve elimination and current position of the New Zealand economy even before opening of international travel (this being a constant inhibitory factor across the world) will be compared with the counter-factual approach of the USA during 2020 to estimate the value of life against the cost of taking action to eliminate COVID-19, or inaction.

Issues

Society has always been exposed to emerging diseases for which there was little known of the causative agent, no cures and where people were at the mercy of exposure to the disease. Examples include the plague, tuberculosis, smallpox, and polio. The most effective means of control in the first instance has been containment from and quarantine of those with the illness. Communities that took on the challenge of meeting the needs of everyone in their jurisdiction always came out best, in a position to recover more quickly and offer labour and governance to move society forward following the crisis.

Sizing up the risk in 2020 of the rapid spread of an infectious respiratory disease such as COVID-19 was balanced against the concerns of limiting business. Because COVID-19 is a pandemic (worldwide) it affected global supply chains, tourism, and remittances worldwide, so all economies are affected. Suitable modelling on the speed at which such a disease can overwhelm populations and health systems has not been available to policy makers in a form that can be utilised early in the exponential time frame while spread of the disease can be limited. An example is provided in the US where, if guidelines were issued a week earlier a 55% drop in mortality could have been achieved (Matthews Burwell, Fragos Townsend, Bollyky, & Patrick, 2020, p. 66).

New Zealand's quick action to close borders and commence lockdowns protected economic units (each person) from loss of life such that citizens were able to resume economic activity gradually, albeit limited by border closure and supply issues once the pandemic was proven to be under control within New Zealand's borders later in 2020 and into 2021.

United States of America (US) chose not to impose at a federal level any restrictions upon the individual and played down the severity of the new disease. The US is the world's largest individual country economy.

Point to consider is what is the relative impact on these two economies of these choices?

New Zealand:

Cumulative deaths from COVID-19 stands at 26 people as of 6 June 2021.

Total cases per million population is 536/m, death per million is 5/m

Proportion of cases per total population is $2639/5,002,100$ (June 2020) = 0.05 percent

Total cases in NZ = 2639, proportion of world total of 173m cases as at 5 June 2021 is 0.0015%

United States:

Cumulative deaths from COVID-19 stands at 612,158 as at 5 June 2021.

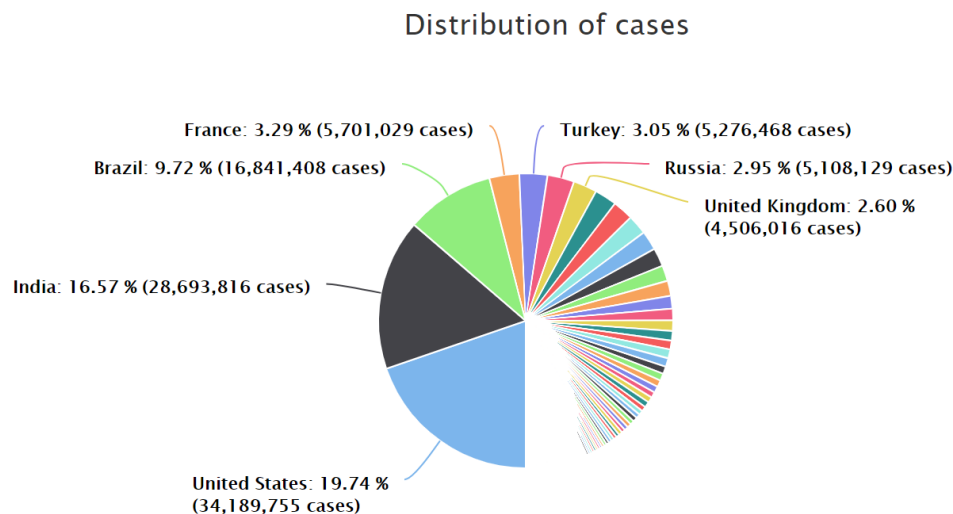
Total cases per million population is 22,231/m, deaths per million is 1839/m

Proportion of cases per total population is $612,158/332m = 0.18$ percent, 1 order of magnitude higher than NZ.

United States proportion of total world cases is 19.4% as at 5 June 2020.

[Coronavirus Graphs: Worldwide Cases and Deaths - Worldometer \(worldometers.info\)](https://www.worldometers.info/coronavirus/)

Countries cases distribution



Source: Worldometer - www.worldometers.info 

United States with a population of 332m leads in the burden of disease stakes even though it is not the world's most populated country. India has 1.3 billion and China 1.4b people. The US population level is more like a nearer neighbour to New Zealand, Indonesia with 276m people.

Measuring the impact of disease in terms of the economic unit (the person) is difficult as there have been no recent studies of value of human life relative to a fast moving pandemic where there is no differentiation according to wealth or class, the disease makes no exceptions.

Political systems that tried to minimise the economic effect did so on the basis that although the pandemic would be widespread the scale of the economic consequences of significant numbers of deaths and widespread temporary instability because of illness and fear of death would not be large enough to suppress economic activity. This approach failed, because the effect of deaths at the local economic unit level and the impact generated outward was widespread and the fear of death had a much wider effect economically than had been anticipated, suppressing economic activity in wider society. This is not to be confused with the actions taken by New Zealand where people were ordered to remain indoors during lockdown and the effect of this on economic activity for a period of time. I am asking the reader to consider the impact of lives lost rather than the cost of business shutdowns. The counterfactual to the approach I take in this paper is, was President Trump right? Is this just a blip of no real concern to humanity and the economic system other than a passing storm?

Consider that COVID-19 cost more in 2020 than the world's combined natural disasters in any of the past years (April 20 6:14am AEST, The Conversation Media Group Ltd, Australia).

On January the 3rd 2020 Fauci said that he 'didn't expect such a high US death toll from COVID-19. It's something that we have absolutely got to grasp ... turn infection down by very intensive adherence to public health measures uniformly throughout the country with no exception (Budryk, 2021)'.

Valuing Human Life

There are four methods: the Willingness to Pay (WTP) total cost method, the Friction Cost Method (FCM), the Human Capital Method (HCM) and the Disability Adjusted Life Years (DALY) methods.

The HCM considers lost productivity related to fatal causes and provides a means of calculating this and the large numbers of people absent from work.

Estimating the cost to the economy of economic units unable to participate in the workforce because of illness, or death in a fast running pandemic will include the direct costs of scaling up of health services to manage the event.

The indirect costs to the economy are output losses, residual private costs, duration of worker and carer paid days lost, average daily earnings influenced by the proportion of cases of disease in the working age population, and loss of future income and benefits of investment by society in that economic unit forfeited, and the cost of pain and suffering endured by those who are caring, witnessing the tragedy, and grieving.

RNZ broadcast (7:30 – 8:00am) on ANZAC day 25 April 2021 talked about the loss of potential following the loss of servicemen and women in the First World War to New Zealand. The speaker claimed that knowledge and skills were not immediately replaced and their absence in fact slowed down potential development in New Zealand over the next 20 years.

Job specific human capital maybe lost, which will make ramping up of production more difficult later as the crisis recedes ("The Economy in the Time of Covid-19," 2020, p. 46).

Mortality Risk Evaluation

Cost effectiveness of New Zealand recovery relative to US pre-vaccination.

Below is a strengths and weakness two axis diagram comparing the proportion of whole of world number of cases and possible approaches to the pandemic using statistics as available on 6 June 2021.

Table 1: Two axis diagram comparing approaches using figures as of 6 June 2021

NO PUBLIC HEALTH CRITERIA FOR CONTAINMENT Palliative care, wait for vaccination UNITED STATES 19.74% cases Deaths per million = 1839/m	ELIMINATION* Lockdown and border control NEW ZEALAND 0.0015% cases Deaths per million = 5/m
STATUS QUO Rely on current health system Do not inflate it as an issue BRAZIL 9.72% cases Deaths per million = 2,201/m	MITIGATE Partial lockdowns, slow adoption of public health criteria UK 2.60% cases Deaths per million = 1,187/m

*Noting that the disease trajectory is complex as Peru took similar urgent measures as NZ did in early 2020 with the intention of eliminating but has not been able to contain the disease following lifting restrictions in July 2020. Peru is presently at 5,551 deaths per million. The World Bank report suggests that national security and social unrest could contribute to raising disease levels (Bank, 2020).

Measuring the effect on the economy of the pandemic

To undertake this, I have compared the Gross Domestic Product (GDP) increase of US and NZ over 2020 and looked at the relative proportion of the size of the economy that has been lost by each country due to the pandemic.

Value of a statistical life (VSL)

Although there has been very little recent research into the statistical value of each economic unit (a life) in the economy I have taken into account STRATA (Bosworth, Hunt, & Ahsan, 2017) and the EPA United States Environmental Protection Agency advice on mortality risk evaluation. I will use a conservative figure of \$10m USD as an approximation for the purposes of this analysis to represent the value of a statistical life (VSL). [Mortality risk evaluation EPA Mortality Risk Valuation | Environmental Economics | US EPA.](#)

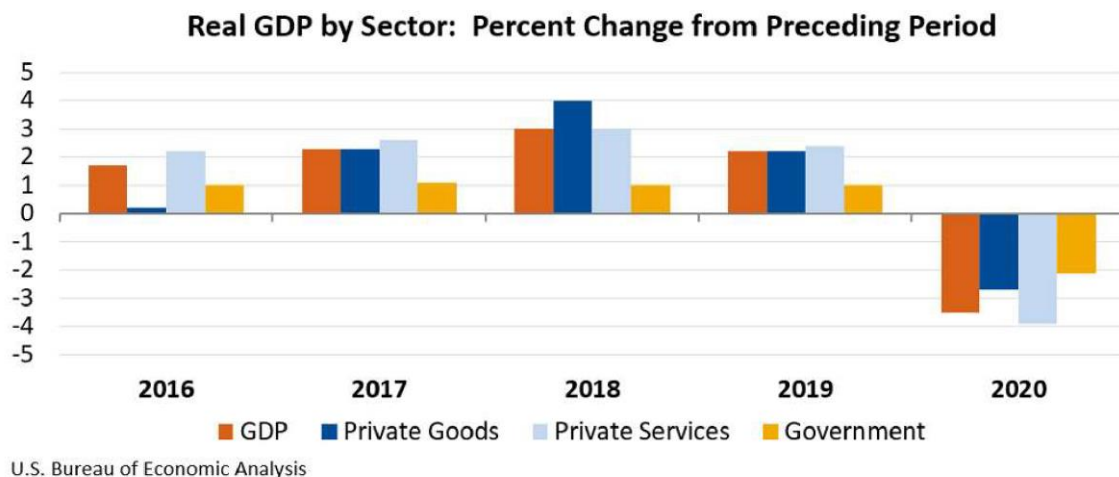
For the New Zealand economy the value of a statistical life can be taken from the 2010 NZIER Insights (Guria, 2010) which valued this at \$3.5m NZD at June 2009 prices which corresponds to \$4.2m NZD in 2021.

The VSL is the marginal rate of substitution between income (or wealth) and mortality risk. The VSL measures the amount the individual is willing to pay to avoid the risk of death and is generally calculated by considering the WTP to prevent loss of life in road accidents. Governments, life insurers, and health insurance companies use VSL to calculate whether the value of lives saved outweighs the costs of purchase of policy changes/interventions.

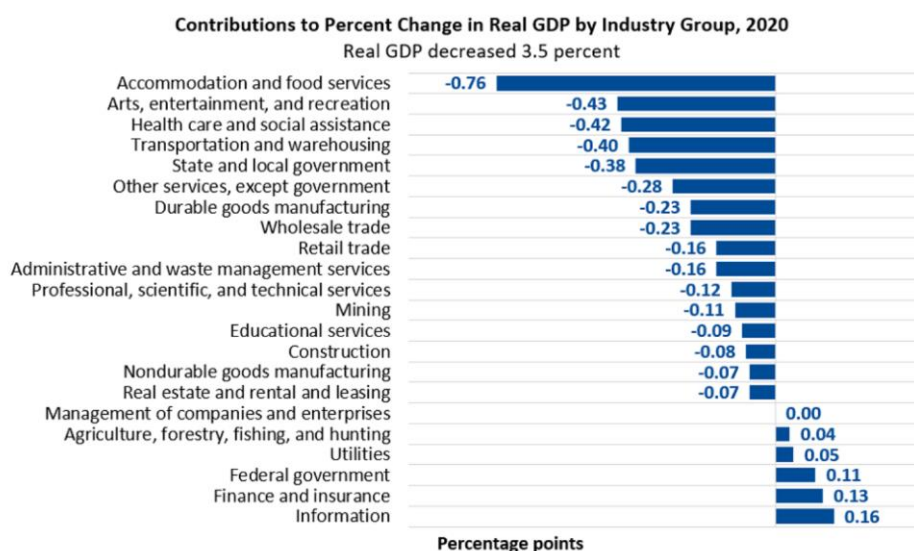
Gross Domestic Product (GDP) over 2020 relative to 2019

United States

The real GDP in the US decreased by 3.5% in 2020 year on year, compared with an increase of 2.2% in 2019.



The decrease in real GDP in 2020 reflected decreases in personal consumption expenditures (PCE), exports, private inventory investment, non-residential fixed investments, and state and local government and were partly offset by increases in federal government spending and residential fixed investment. Imports decreased. Page 6 of IMF report; US has 9m fewer employed people than in February 2020 (Analysis, 2021).



New Zealand

Over the year to December 2020 New Zealand annual GDP declined by 2.9 percent.

[Gross domestic product: December 2020 quarter | Stats NZ](#)

Calculation against the size of the country's economy

The size of the US economy is \$20.93t (Economy of the United States – Wikipedia). Note that Current-dollar GDP is quoted more recently in the News Release by U.S. Bureau of Economic Analysis as having increased 6.3% in the 4th quarter 2020 to \$21.49 trillion. So, it would be fair to round the

size of the **US economy** to **\$21t USD** (a trillion dollars is one million, million dollars 1,000,000,000,000 which is 10^{12} dollars in power of 10 notation).

Using VSL \$10m USD, against 532,844 cumulative deaths due to COVID-19 recorded for US on 16 April 2021 covering 12 months approximately is 344,227.

5.32×10^5 (deaths) $\times$ \$10⁷ USD (VSL) = \$5.32 $\times 10^{12}$ USD = \$5t USD is the cost of loss of life due to COVID-19 over that period.

The proportional effect of loss of life by COVID-19 in US is $5t/21t \times 100 = \mathbf{24 \text{ percent}}$ of the size of the US economy.

The size of **NZ economy** in current prices is **\$322b NZD**, and the VSL is \$4.2m NZD.

Cumulative deaths in New Zealand due to COVID-19 recorded on 16 April 2021 was 26.

26 deaths $\times$ \$4.2m NZD = \$109m NZD is the cost of loss of life over the same period of 12 months

The proportional effect of loss of life by COVID-19 in New Zealand is $(\$1.09 \times 10^8 \text{ NZD} / \$3.22 \times 10^{11} \text{ NZD}) \times 10^2 = \mathbf{0.33 \text{ percent}}$ of the size of the New Zealand economy.

Comparing the impact of the US approach to the impact of the New Zealand utilising a public health elimination approach the New Zealand economy is $24/.33 = 72$ times better off than the US economy by taking an elimination approach.

In not generating a whole of country approach and electing to wait for vaccination and treating patients as they came in an unacceptable number of lives were lost and which includes prior investment in those persons to participate in the economy and loss of their future potential. These figures do not factor in the distress and economic hardship and loss of potential imposed upon relatives and associates left behind because of the loss of these lives. Their ideas and skills have been removed. People are not instantly replaceable.

From an interview of actor David Eigenberg by Emma Clifton 'The filming of the tail end of season eight of Chicago Fire was disrupted by Covid-19 and Eigenberg admits that at the beginning of the pandemic, he, like so many of us, underestimated what was coming next. "I was a little bit dumb at the beginning, that ignorant thing of, 'Oh, everything will be OK,' and then unfortunately I had friends die in New York early on, and it got pretty serious pretty quickly." (Clifton, 2021)

Conclusion

There has been a downturn worldwide since the pandemic. My study demonstrates that the relatively small economy of New Zealand has suffered to a lesser degree with a 2.9% reduction over 2020 compared to a 3.5% reduction in the US. The impact of the relative loss of lives in each country due to the pandemic and the action each country took is much more telling.

The use of an internationally agreed value of a statistical life, proportional to each economy may assist in decision making when decisions to mobilise adequate resources need to be made within a very short period in the wake of an incoming threat such as a pandemic to allow more realistic evaluation of the economic impact and generate mobilising of resources with confidence that the necessary downturn in business will be bolstered by the lessening of lives lost.

Delay increases both the human and economic toll of a disaster.

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