COVID-19 Planning for 2021: Comparing the Economic Impact of Alternative Recovery Scenarios

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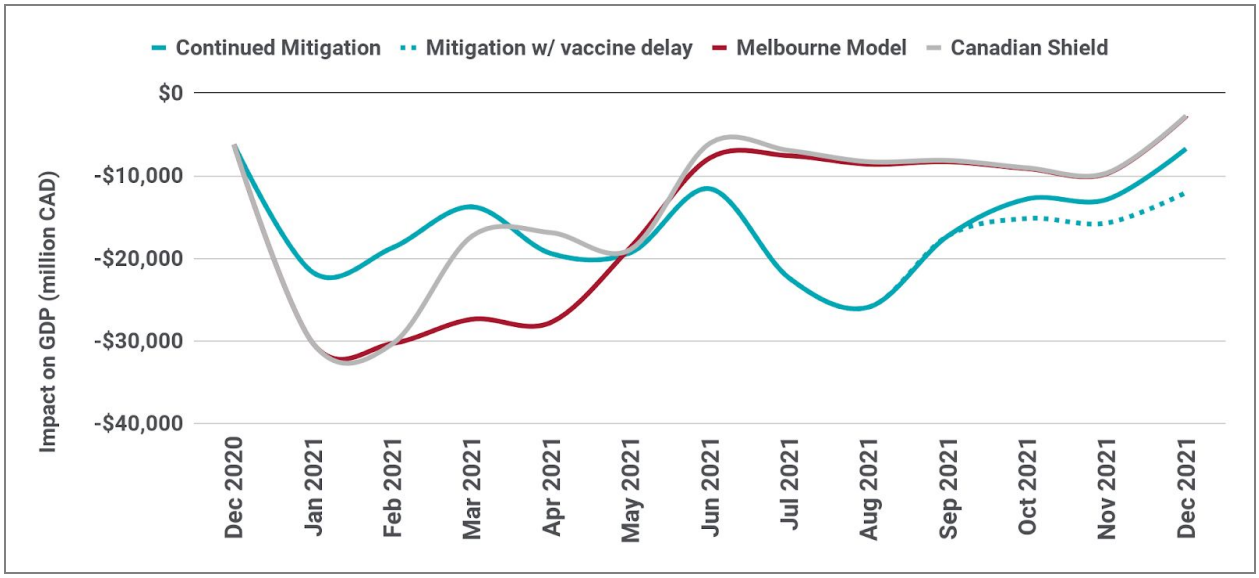

Projections from Limestone Analytics STUDIO model

Introduction

Limestone Analytics, together with economists from Queen's University, developed the Short-Term Under-capacity Dynamic Input-Output (STUDIO) model to measure the economic impact of COVID-19.[2] The model is designed to provide GDP and workforce projections under various pandemic mitigation and recovery policies.

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[2] The academic paper summarizing the methodology is: Cotton, Christopher, Brett Crowley, Bahman Kashi, Huw Lloyd-Ellis, and Frederic Tremblay (2020). Quantifying the Economic Impacts of COVID-19 Policy Responses on Canada's Provinces in (Almost) Real Time. Queen's Economic Department Working Paper 1441. https://limestone-analytics.com/publications/

STUDIO captures *dynamic* input-output interactions between industrial sectors resulting from the lock-down and recovery policies. The highly-flexible model can consider policies implemented at either the province-wide or location-specific levels to provide projections down to the level of census division and industry level using readily-available public data sources. It can accommodate various scenarios regarding how the disease is likely to spread and consumer behaviour likely to change over the recovery period. The model has been implemented for all of Canada and provides the economic projections for the federally funded Looking Glass project supported through Canada's Digital Technology Supercluster.

In this policy brief, we highlight the ability of the STUDIO model to provide rapid-response policy analysis to guide short-to-medium term policy response within Canada. The analysis applies the model to three alternative strategies COVID-19 mitigation and recovery that are being debated among policy leaders going into 2021. By design, the analysis presented here was conceived of and completed quickly in order to inform the efforts of Canada's COVID Strategic Choices Group to provide policymakers with justifiable economic estimates to complement epidemiological projections around the same set of policies. This is a first step in a policy analysis process that can provide more-detailed projections for more-specific scenarios regarding the spread of the disease and the evolution of policy over the coming months.

Policy Options and Scenarios

We provide economic projections for the period of January to December 2021 for three mitigation and recovery strategies that map into alternative approaches for addressing COVID-19 in Canada until the widespread vaccination of the population.

Policy 1: Continued Mitigation

One option available to policymakers is to continue along the current path in many locations of locking down in cases where hospitals are at risk of being overrun by the disease, and restricting high-risk activities and large gatherings, but otherwise avoiding strict economic and social restrictions. Such a policy may play out in several different ways, depending on the disease spreads and the effectiveness of short term mitigation strategies. Based on consultations with other members of Canada's COVID Strategic Choices Group, we model the Continued Mitigation policy as an on-again, off-again lockdown strategy.

As an estimation of how such a policy will play out, we assume that the first month of each quarter involves moderate lockdown restrictions, defined as being 2/3rds as economically restrictive as the lockdown policies in each province in May 2020 (during the first stage of the more-relaxed lockdown restrictions that were rolled out following the stricter policies from March and April). Each one-month lockdown period followed by two months of reopening before another round of light-to-moderate lockdown is implemented.

In the primary 'Continued Mitigation' scenario, we assume that such an on-again, off-again cycle continues through up until fall 2021, after which time we assume vaccinations are widely-available enough to avoid another wave of lockdown restrictions. This means that the last month of lockdown is July 2021 and no additional lockdown occurs in October 2021, and the economy converges to the trajectory of the recovery from summer to fall 2020.

We also consider an alternative 'Mitigation with vaccine delay' scenario that may play out under the same strategy if the vaccine is delayed and an October 2021 lockdown is not avoided. This is more likely the case if widespread vaccination does not occur until later in the year.

Policy 2: Melbourne Model

A second policy option involves the imposition of immediate and wide-reaching lockdown restrictions in an effort to bring local transmission rates of COVID-19 close to zero, which offers a promise of a fully-open economy before wide-spread vaccination is feasible. Such a scenario is modeled after the zero-COVID strategy implemented in Australia, referred to as the Melbourne Model, which led to low rates of the disease and economic reopening.

This scenario assumes that the economy implements relatively restrictive lockdown policies from January through March, 2021, and then reopens, with economic activity converging towards 'normal' over the coming months. We assume that the lockdown restrictions early in the year are 2/3rds as economically restrictive across all industries and provinces as the heavy lockdown restrictions that were in place across Canada during April 2020. This could reflect moderately less-strict or better-targeted restrictions compared to early-crisis lockdown measures, as well as the fact that many businesses are better able to cope with remote work and travel bans than they were in the beginning of 2020.

Policy 3: Canadian Shield

A third policy pursues the same eventual goal as the Melbourne Model, but assumes moderately-less-restrictive lockdown measures are used for a longer period of time compared to the Melbourne Model. For this policy case, the January lockdown restriction is assumed to be identical as the Melbourne Model, with economic costs being 2/3rd as intense as they were under the most-restrictive measures from April 2020. In February, the strict lockdown restrictions from January are then relaxed moderately and remain in place through April 2020. These less-restrictive measures defined as being 2/3rds as economically restrictive as the policies that were in place across provinces in May 2020. From May 2021 onward, the economy begins its recovery towards 'normal' activity.

Economic Projections

The STUDIO model can provide economic projections by industry at the local level for all of provincial Canada.[3] For the purposes of this report, we present results aggregated across all industries in terms of GDP and full-time equivalent employment by province and for all of provincial Canada. The estimates are presented in terms of lost economic activity compared to the level of activity that would have been expected for each location in the given time period had the COVID-19 pandemic never happened.

The first set of tables (Tables 1 and 2) provides estimates of the total economic costs of COVID-19 under the three main mitigation and recovery scenarios for each province/region in Canada aggregated across all of 2021.

[3] Due to limitations in the public data sources used for the analysis, estimates are not available for the territories.

Table 1: Average monthly deficit in (full-time equivalent) employment due to COVID-19, 2021

	AB	BC	ON	QC	Prairies (MB + SK)	Atlantic Canada	CA
Continued Mitigation	-157,636	-203,240	-524,416	-228,956	-70,210	-63,939	**-1,248,397**
Mitigation with vaccine delay	-167,448	-229,712	-579,416	-238,802	-74,343	-73,811	**-1,363,531**
Melbourne Model	-124,873	-133,304	-389,366	-268,587	-55,925	-51,710	**-1,023,766**
Canadian Shield	-114,297	-127,546	-371,030	-218,055	-51,670	-44,284	**-926,883**

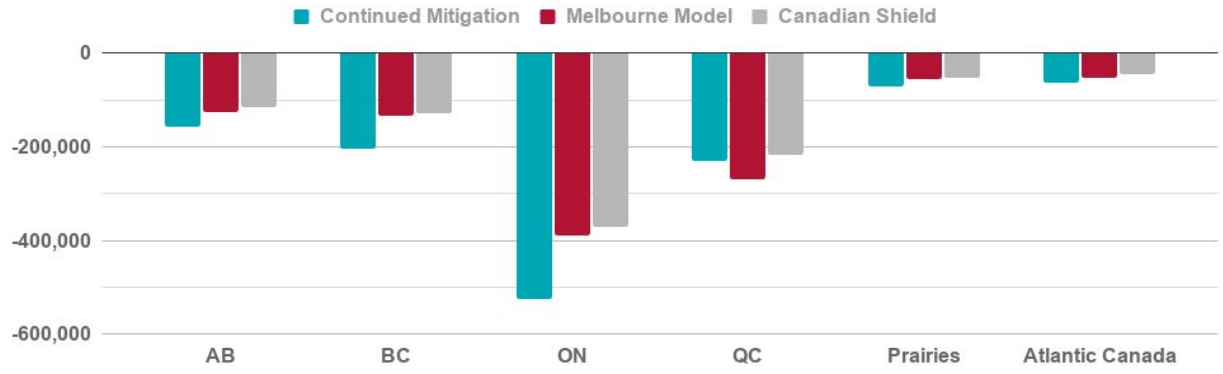
Projections from Limestone Analytics STUDIO model

Table 2: Annual deficit in GDP due to COVID-19 (millions CAD), 2021

	AB	BC	ON	QC	Prairies (MB + SK)	Atlantic Canada	CA
Continued Mitigation	-$34,600	-$28,156	-$82,627	-$34,187	-$14,636	-$8,128	**-$202,335**
Mitigation with vaccine delay	-$35,519	-$30,406	-$88,038	-$34,006	-$15,774	-$9,115	**-$212,858**
Melbourne Model	-$31,813	-$21,813	-$65,597	-$48,018	-$12,335	-$8,674	**-$188,250**
Canadian Shield	-$28,679	-$19,397	-$60,951	-$37,219	-$11,572	-$6,771	**-$164,587**

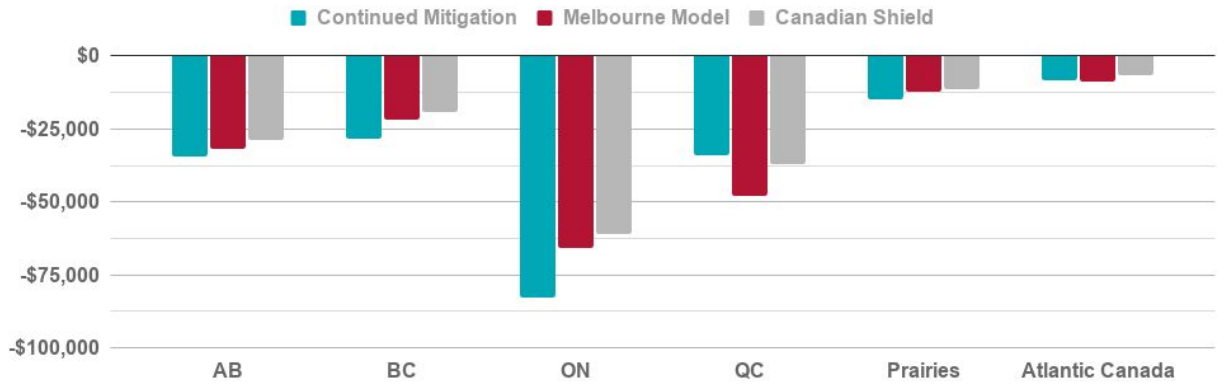
Projections from Limestone Analytics STUDIO model

Figures 1 and 2 illustrate the impact on full-time equivalent employment and GDP by province/region under each policy scenario, providing a graphical depiction of the main scenarios from the previous tables. For these graphics, we assume that vaccination allows us to avoid a final round of lockdowns later in the year under a mitigation strategy. A delay in vaccines would increase the costs associated with the continued mitigation strategy, as illustrated by the vaccine delay scenario presented in the tables.



Projections from Limestone Analytics STUDIO model

Figure 1: Projected avg. monthly deficit in FTE employment due to COVID-19 by policy, 2021



Projections from Limestone Analytics STUDIO model

Figure 2: Projected annual deficit in GDP due to COVID-19 (millions CAD) by policy, 2021

From the tables and figures, we observe some variation in optimal policy across location. As defined, a Canadian Shield policy is shown to be consistently less-costly than a Melbourne Model policy, with this relationship holding across all locations. In most locations the Continued Mitigation policy is shown to be most costly for the economy, even when we assume widespread vaccination and permanent relaxation of lockdown restrictions by fall. This is not the case in Quebec or Atlantic Canada, however, where a Melbourne Model policy is shown to be more economically costly.

Despite these differences across locations, the Continuous Mitigation policy is more costly economically than either the Melbourne Model or Canadian Shield policies for Canada as a whole.

The geographic variation in optimal policy highlights a potential difficulty in coordinating a Canadian Shield or Melbourne Model strategy across all provinces without a mandate from the federal government. It also raises the question of whether travel restrictions could enable some provinces or regions to feasibly pursue a Canadian Shield or Melbourne Model strategy if their neighboring provinces did not pursue a similar policy.

We can consider how the economic costs of COVID-19 evolve over the course of the year under the different scenarios. Tables 3 and 4 break out the projected Canadawide economic impact by quarter. The chart in Figure 3 displays the trends under each scenario from December 2020 through December 2021.

Table 3: Quarterly average monthly deficit in FTE employment due to COVID-19 by policy, 2021

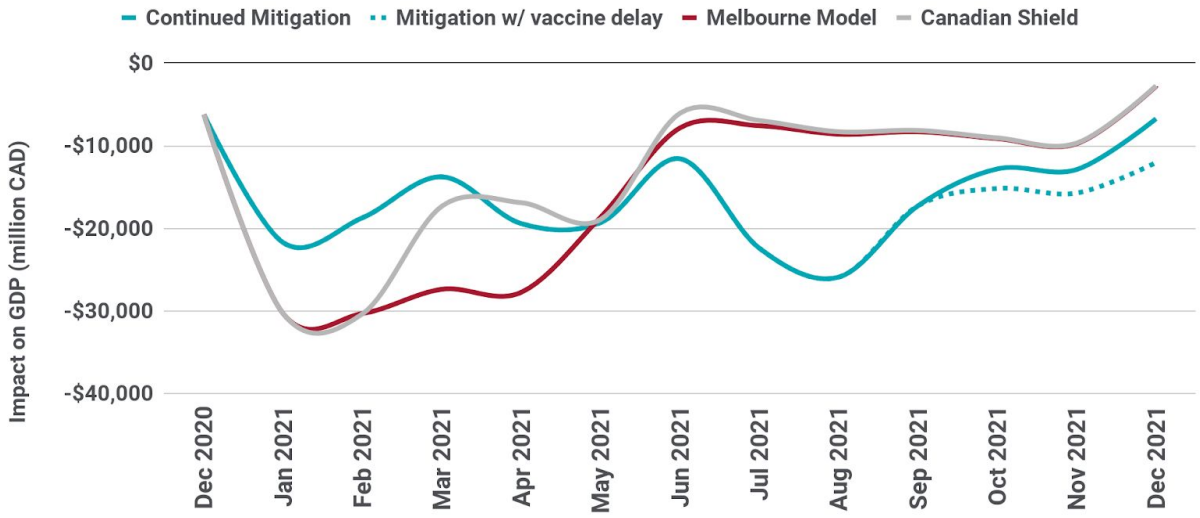
	Q1	Q2	Q3	Q4	Total
Continued Mitigation	-1,329,678	-1,276,069	-1,696,058	-691,784	**-1,248,397**
Mitigation with vaccine delay	-1,329,678	-1,276,069	-1,696,058	-1,152,321	**-1,363,531**
Melbourne Model	-2,035,019	-1,219,115	-536,303	-304,625	**-1,023,766**
Canadian Shield	-1,828,970	-1,056,690	-521,106	-300,765	**-926,883**

Projections from Limestone Analytics STUDIO model

Table 4: Quarterly deficit in national annual GDP due to COVID-19 (millions CAD), 2021

	Q1	Q2	Q3	Q4	Total
Continued Mitigation	-$54,166	-$50,269	-$65,534	-$32,367	**-$202,336**
Mitigation with vaccine delay	-$54,166	-$50,269	-$65,534	-$42,890	**-$212,859**
Melbourne Model	-$87,958	-$54,179	-$24,455	-$21,659	**-$188,251**
Canadian Shield	-$77,937	-$41,838	-$23,369	-$21,443	**-$164,587**

Projections from Limestone Analytics STUDIO model



Projections from Limestone Analytics STUDIO model

Figure 3: Projected trends in national GDP deficit due to COVID-19 under each policy alternative

The projections above estimate the differences in economic costs under different scenarios over the course of 2021. By December 2021, however, only the Mitigation strategies are still performing worse

than the Melbourne Model and Canadian Shield strategies. This suggests that the Continued Mitigation strategies will underperform the other models through at least the early months of 2022, and that extending the model to longer time horizons would strengthen the case in favour of the Melbourne Model or Canadian Shield strategies relative to continued mitigation. The STUDIO model is, however, designed to provide projections of economic outcomes over the short-to-medium term. We therefore take the conservative approach of limiting our formal economic estimates to a 12 month period.

Discussion

The economic projections compare economic costs under four mitigation and recovery scenarios which map into policy proposals being considered by Canada's COVID Strategic Choices Group. The projections are intended to enable more-informed policy discussion and provide rigorous quantitative estimates to help guide policy recommendations.

The analysis clearly illustrates how a more intense early year lockdown can be less costly for the economy than less-intense, shorter duration lockdowns spread across a longer period of time. We show that this is the case even under an expectation that vaccinations will be widely available in the second half of the year, facilitating a more robust recovery in the fall and winter even without an early-year lockdown. This is because full economic activity does not immediately resume with the lifting of economic restrictions; rather the economy takes time to fully recover. This means that an intense lockdown that allows for full reopening afterwards may result in fewer overall jobs lost and a lower decline in GDP than on-again, off-again lockdowns where new restrictions are required every few months before the economy has a chance to fully recover from the previous round of restrictions.

Understanding how various lockdown policies are likely to impact the economy is essential for Canada's policy response. However, the employment and GDP figures considered here are just some of the outcomes that need to be considered by policymakers when weighing alternative options. It is important to acknowledge several effects that are not fully accounted for in our projections. First, the model provides estimates of lost employment and GDP; it does not assign any additional economic value to declines in health or mortality. Second, our model does not account for differences in impact on mental health, social interactions, or education outcomes, even though these factors are likely to affect future productivity and economic outcomes into the future. A full accounting of the costs and benefits of alternative policy choices would need to account for these effects, and others. It is important to consider the extent to which some of these additional costs may be avoided under any new wave of lockdown policies.

These projections highlight the ability for Limestone's STUDIO model to guide policy through the analysis of a myriad of mitigation and recovery scenarios. It can provide justifiable quantitative projections based on a rigorous peer-reviewed methodology for any description of how the disease and policy is likely to evolve over the coming year. The accuracy of the economic projections will depend on how well the scenarios fed into the model match the actual evolution of the disease and policy response that occurs under any policy.