Financial Advisory Gaming & Hospitality Public Policy Research Real Estate Advisory Regional & Urban Economics

> THE FUTURE BEYOND THE PANDEMIC NEVADA'S PLAN FOR RECOVERY & RESILIENCE: ECONOMIC FORECAST

## **PREPARED FOR:**

#### SRI International

&

Nevada Governor's Office of ECONOMIC DEVELOPMENT

**Empowering Success** 

## OCTOBER 2020 UPDATE

**Prepared By:** 

**RCG**economics

7219 West Sahara Avenue Suite 110-A Las Vegas, NV 89117 Main 702-967-3188 www.rcgecon.com

#### TABLE OF CONTENTS

Page I. INTRODUCTIONI-1
II. RESULTSII-1
III. METHODOLOGY
B. Current State of Pandemic III-11
C. Economic Model Design III-14

#### LIST OF TABLES

\_

ı Table II-1: Results Matrix, by Scenario: End-of-Year 2021	Page II-8
Table II-2: Results Percent Change Relative to No-Pandemic Matrix, by Scenario: Year-End 2021	II-9
Table II-3: Results Matrix, by Scenario: Year-End 2020	II-10
Table II-4: Results Percent Change Relative to No-Pandemic Matrix, by Scenario: Year-End 2020	II-11
Table III-1: Estimated Share of Active Nevada Jobs, by Phase	II-29
Table III-2: Phase Projections, by Scenario: 9/2020 to 12/2021	II-29
Table III-3: Daily Percent Isolation Reductions in GDP, by Scenario: 3/2020 to 12/2021	II-30
Table III-4: Total Monthly UI Benefits Claimants, by Scenario: 11/2020 to 12/2021	II-30
Table III-5: Weekly Enhanced Federal UI Benefits, by Scenario: 8/2020 to 12/2021	II-30

#### LIST OF FIGURES

~

Figure II-1: Nevada Real GDP Forecasts (2020 Dollars), by Scenario: 2014 - 2021	Page II-12
Figure II-2: Nevada Arts, Entertainment and Recreation Real GDP Forecasts (2020 Dollars), by Scenario: 2014 – 2021	II-13
Figure II-3: Nevada Accommodation and Food Services Real GDP Forecasts (2020 Dollars), by Scenario: 2014 – 2021	II-14
Figure II-4: Nevada Health Care and Social Assistance Real GDP Forecasts (2020 Dollars), by Scenario: 2014 – 2021	II-15
Figure II-5: Nevada Professional, Scientific and Technical Services Real GDP Forecasts (2020 Dollars), by Scenario: 2014 – 2021	II-16
Figure II-6: Nevada Construction Real GDP Forecasts (2020 Dollars), by Scenario: 2014 – 2021	II-17
Figure II-7: Nevada Taxable Sales Forecasts (Nominal), by Scenario: 2014 – 2021	II-18
Figure II-8: Clark County Taxable Sales Forecasts (Nominal), by Scenario: 2014 – 2021	II-19
Figure II-9: Washoe County Taxable Sales Forecasts (Nominal), by Scenario: 2014 – 2021	II-20
Figure II-10: Nevada Nonfarm Jobs Forecasts, by Scenario: 2014 – 2021	II-21
Figure II-11: Las Vegas MSA Nonfarm Jobs Forecasts, by Scenario: 2014 – 2021	II-22
Figure II-12: Reno-Sparks MSA Nonfarm Jobs Forecasts, by Scenario: 2014 – 2021	II-23
Figure II-13: Nevada Headline Unemployment Rate Forecasts, by Scenario: 2014 – 2021	II-24
Figure II-14: Las Vegas MSA Headline Unemployment Rate Forecasts, by Scenario: 2014 – 2021	II-25
Figure II-15: Reno-Sparks MSA Headline Unemployment Rate Forecasts, by Scenario: 2014 – 2021	II-26
Figure II-16: Nevada Initial Unemployment Insurance Claims Forecasts, by Scenario: 2014 – 2021	II-27
Figure II-17: Nevada Continuing Unemployment Insurance Claims Forecasts, by Scenario: 2014 - 2021	II-28
Figure II-18: Nevada Visitor Volume Forecasts, by Scenario: 2014 – 2021	II-29
Figure II-19: Nevada Property Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-30
Figure II-20: Local Government & School Districts Property Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-31
Figure II-21: Nevada Gaming Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-32
Figure II-22: Clark County Gaming Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-33

	Page
Figure II-23: Washoe County Gaming Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-34
Figure II-24: Nevada Room Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-35
Figure II-25: Local Tourism (County Fair & Recreation Boards) Room Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-36
Figure II-26: CCSD Room Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-37
Figure II-27: Nevada Sales & Use Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-38
Figure II-28: Clark County Sales & Use Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-39
Figure II-29: Washoe County Sales & Use Tax Forecasts (Nominal), by Scenario: 2014 - 2021	II-40
Figure II-30: Nevada Consolidated Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-41
Figure II-31: Clark County Consolidated Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-42
Figure II-32: Washoe County Consolidated Tax Forecasts (Nominal), by Scenario: 2014 – 2021	II-43
Figure II-33: Nevada Modified Business Tax Forecasts (Nominal), by Scenario: 2014 - 2021	II-44
Figure II-34: Nevada Marijuana Excise Taxes Forecasts (Nominal), by Scenario: 2014 – 2021	II-45
Figure III-1: U.S. COVID-19 Deaths per 100,000 Persons, by Age: 8/31/2020	III-31
Figure III-2: U.S. Deaths, by Pandemic or Conflict: 8/31/2020	III-31
Figure III-3: U.S. Case-Load Over Time vs All Countries: 1/22/2020 to 8/31/2020	III-32
Figure III-4: U.S. Case-Load per 100,000 Persons Over Time vs All Countries: 1/22/2020 to 8/31/2020	III-32
Figure III-5: U.S. Case-Load Over Time vs Most Populous Countries: 1/22/2020 to 8/31/2020	III-33
Figure III-6: U.S. Case-Load per 100,000 Persons vs Most Populous Countries: 8/31/2020	III-33
Figure III-7: U.S. Deaths Over Time vs All Countries: 1/22/2020 to 8/31/2020	III-34
Figure III-8: U.S. Deaths per 100,000 Persons Over Time vs All Countries: 1/22/2020 to 8/31/2020	III-34
Figure III-9: U.S. Deaths per 100,000 Over Time vs Most Populous Countries: 1/22/2020 to 8/31/2020	III-35
Figure III-10: U.S. Deaths per 100,000 Persons vs Most Populous Countries: 8/31/2020	III-35
Figure III-11: Nevada Case-Load Over Time vs States: 1/22/2020 to 8/31/2020	III-36
Figure III-12: Nevada Case-Load per 100,000 Persons Over Time vs States: 1/22/2020 to 8/31/2020	III-36

Figure III-13: Nevada Case-Load per 100,000 Persons vs States: 8/31/2020	<b>Page</b> III-37
Figure III-14: Map of Nevada Case-Load per 100,000 Persons vs States: 8/31/2020	III-38
Figure III-15: Nevada Deaths Over Time vs States: 1/22/2020 to 8/31/2020	111-39
Figure III-16: Nevada Deaths per 100,000 Persons Over Time vs States: 1/22/2020 to 8/31/2020	111-39
Figure III-17: Nevada Deaths per 100,000 Persons vs State: 8/31/2020	III-40
Figure III-18: Map of Nevada Deaths per 100,000 Persons vs State: 8/31/2020	III-41

## I. INTRODUCTION

The purpose of this analysis is to provide advisory economic and fiscal impacts of the COVID-19 virus on the State of Nevada's economy, including the Las Vegas Metropolitan Statistical Area ("MSA") and the Reno-Sparks MSA, and to develop three economic/fiscal scenarios and associated projections—best, most-likely and worse case. The analyses herein have been performed by RCG Economics ("RCG").

This analysis consists of two main sections: a results section and a methodology section. In the results section, RCG presents the results of the forecasts and discussed the findings of the Study. In the methodology section, we describe the two models used to estimate:

- Nevada's gross product and
- A set of associated economic and fiscal indicators.

Our analysis herein does not make any claims relative to the disease known as COVID-19. We have simply used the information available at the time of our research to make informed assumptions in order to estimate subsequent economic outcomes.

## 

## **II. RESULTS**

In this section, RCG presents and discusses its forecast results for the Study's select group of indicators. Our discussion herein is also focused on how the forecasts relate to the assumptions used. For a deeper discussion of these assumptions and how the forecasts have been produced, please see *Section III, Methodology*. The indicators discussed in this section are relative to:

- Real Gross Domestic Product ("GDP")
- Taxable Sales
- Non-Farm Employment
- Headline Unemployment Rate
- Unemployment Claims
- Visitor Volume
- Property Tax
- Gaming Tax
- Room Tax
- Sales & Use Tax
- Consolidated Tax
- Modified Business Tax
- Marijuana Excise Taxes

RCG has developed three forecast scenarios for each indicator. They are listed below, based on RCG's research (see Figures II-1 – II-34). Additionally, the Study discusses and compares the forecast results against a "No-Pandemic" scenario—a hypothetical forecast that assumes that the COVID-19 pandemic did not occur (see Tables II-1 – II-4):

- 1. No-Pandemic
- 2. Worst-Case
- 3. Most-Likely-Case
- 4. Best-Case

## 

#### **Gross Domestic Product**

#### **Total GDP**

According to the U.S. Bureau of Economic Analysis ("BEA"), Nevada real GDP declined 12.8 percent in Q2, 2020 relative to Q1. This was significantly larger in magnitude than the nine percent drop at the national level.<sup>1</sup> This large drop is not surprising considering that Nevada has been hit hard by the pandemic compared to most other states because of its largely tourism-driven economy,<sup>2</sup> especially the Las Vegas MSA. Nevada Governor Steve Sisolak's statewide economic lockdown especially affected the tourism industry (about 23 percent of the state's economy<sup>3</sup>). Seasonally-adjusted jobs in the industry dropped by 43 percent, or by 152,800 jobs from 356,400 to 203,600 between April 2019 and April 2020 as result of the lockdown that began on March 17. By October, the industry had regained 99,600 of the jobs lost in April.

The Most-Likely-Case scenario of RCG's Nevada GDP model forecasts a 3.2 percent increase in Q3, 2020 compared to Q2, or an annualized rate of 13 percent. By the end of 2021, we expect that the state's GDP will be \$177.6 billion (in 2020 Dollars), or 4.8 percent less than what it hypothetically would have been had the pandemic not occurred. However, in the Worst-Case, we project that Nevada GDP could fall to as low as \$162.0 billion by the end of 2021, similar to the state's GDP in Q2, 2017. This represents a 13.2 percent loss in GDP compared to the No-Pandemic scenario. Such a drop would significantly impact the state's economy. It would potentially take years, possibly a decade<sup>4</sup> or more, for the economy to return its pre-pandemic growth path. On the other hand, our Best-Case scenario projects that the pandemic does not ravage the state's economy. In this scenario, state GDP in Q4, 2021 is projected to be \$184.9 B, or only 0.9 percent below the No-Pandemic scenario. In this case, Nevada's economy would be able to recover from the COVID pandemic in a relatively short period of time.

For the Best-Case scenario to actually occur, Nevada (like other states) would require the federal government to provide an additional tranche of virus-related financial relief, including continued and substantive unemployment benefits to workers, direct aid to states and local governments, additional paycheck protection program dollars to small businesses and, at some point, large-scale infrastructure investments.<sup>5</sup> This would require the federal government to add several trillion dollars to the national debt but would likely protect the U.S. economy from a

<sup>&</sup>lt;sup>1</sup> BEA SQGDP9 Table, Real GDP by State.

<sup>&</sup>lt;sup>2</sup> https://www.stlouisfed.org/publications/regional-economist/third-quarter-2020/jobs-hit-hardest-covid-19

<sup>&</sup>lt;sup>3</sup> https://www.travelnevada.biz/wp-content/uploads/Nevada-Visitor-Economic-Impact-2018.pdf

<sup>&</sup>lt;sup>4</sup> Congressional Budget Office. July 2020. An Update to the Economic Outlook: 2020 to 2030.

https://www.cbo.gov/system/files/2020-07/56442-CBO-update-economic-outlook.pdf

<sup>&</sup>lt;sup>5</sup> RCG has not made an effort to estimate probability of each scenario occurring. Instead, we have crafted the scenarios such that they represent reasonable ranges relative to the available information.

continued free-fall<sup>6</sup> and probably accelerate its recovery<sup>7</sup> from possibly decades to a handful of years. Such a scenario would also need help from the natural world. Namely, the severity of COVID-19 in the fall and winter will need to remain unchanged relative to the summer months. This would allow governments to continue to reopen the economy more fully and safely and lessen consumer fears and uncertainty about leaving their homes and self-quarantining. However, based on the experiences of New England in early-2020 and southern Brazil in mid-2020, this is not a given.

The Worst-Case scenario for the state assumes a series of negative events to happen. First, COVID-19 hospitalizations and deaths in the state would increase such that the Las Vegas metropolitan area would potentially look like New York City in March 2020: being almost overwhelmed by infections. This would likely trigger a second lockdown. We suspect that could also likely heighten fears relative to COVID-19 and lead to higher levels of sheltering in place, compounding the effects of a potential lockdown. The Worst-Case also assumes a continued deadlock on Capitol Hill and no further enhanced federal unemployment insurance ("UI") benefits to workers. The continued absence of these benefits potential political stalemate of this order would be unlikely—even in an election year—should COVID-19 deaths spike nationwide. Other factors, such as the Paycheck Protection Program, have been included in the scenario assumptions and are described in greater detail in the *Methodology* section.

In the Most-Likely-Case scenario, which RCG considers the most likely scenario, we assume that Q4, 2020 will experience a minor surge in COVID-19 deaths. In this case, Nevada would probably return to Governor Sisolak's Phase 1 guidelines for three months, but not experience a full lockdown, also referred to as Phase 0. We have assumed that the preference by a large-share of Nevada residents to sheltering in place would increase slightly relative to Summer 2020 levels but would again decline in the Spring of 2021. This also assumes that the COVID-19 vaccine will be widely manufactured and distributed at an affordable price by the middle of 2021. Should the Most-Likely-Case scenario play-out, the economic forecast for Nevada potentially looks more like the Best-Case scenario than the Worst-Case scenario.

 <sup>&</sup>lt;sup>6</sup> Thomson-DeVeaux A. What Economists Fear Will Happen Without More Unemployment Aid. FiveThirtyEight. August 11, 2020. <u>https://fivethirtyeight.com/features/what-economists-fear-will-happen-without-more-unemployment-aid/</u>
 <sup>7</sup> Parrott S, Sherman A, Llobrera J, Mazzara A, Beltrán J and Leachman M. More Relief Needed to Alleviate Hardship. Center on Budget and Policy Priorities. <u>https://www.cbpp.org/research/poverty-and-inequality/more-relief-needed-to-alleviate-hardship</u>
 <sup>8</sup> Robinson S and Hinojosa-Ojeda R. U.S. failure to renew COVID-19 stimulus threatens further economic decline and unemployment. Peterson Institute for International Economics. <u>https://www.piie.com/blogs/realtime-economic-issues-watch/us-failure-renew-covid-19-stimulus-threatens-further-economic
</u>



RCG has not included forecasts for the MSAs in this analysis because the Nevada sub-state data for the most recent year appear to have problems. The Reno-Sparks MSA shows negative growth, which does not appear accurate. According to the Governor's Office of Economic Development ("GOED"), the issue stemmed from certain accounts being recorded as located in the Las Vegas MSA, while the activity really took place in the Reno-Sparks MSA.<sup>9</sup>

#### Sector GDP

In terms of GDP by sector, we found a range of various outcomes that can be seen in the aforementioned tables. Arts, Entertainment and Recreation shows the widest possible range of outcomes at the end of 2021, from 4.3 percent less than the No-Pandemic scenario in the Best-Case to 46.3 percent less in the Worst-Case. The Most-Likely-Case shows a 20.4 percent change. The other sectors presented (Accommodation and Food Services, Accommodation and Food Services, Health Care and Social Assistances, Professional, Scientific and Technical Services and Construction) also show significant relative declines, ranging from about one percent to 20 percent in the Most-Likely-Case.

#### **Taxable Sales**

For taxable sales, the three geographies analyzed showed varying outcomes at the end of 2021. In the Worst-Case, there would be approximate drops of 18 and 25 percent in Nevada and Clark County, respectively, compared to the No-Pandemic scenario. In Washoe County, there is an anticipated drop of only 3.6 percent. The Most-Likely-Case estimates changes of 6.6, 10.2 and 1.3 percent for Nevada, Clark County and Washoe County, respectively. Meanwhile, the Best-Case shows relatively small changes ranging from 0.3 to two percent.

#### Employment

The results for employment show that the Las Vegas Metropolitan Statistical Area ("MSA") would fare worse than the Reno-Sparks MSA in each case. In the Worst-Case scenario, the state would experience a 15 percent decline relative to the No-Pandemic case. The Las Vegas MSA would see an 18 percent change and the Reno-Sparks MSA with a 12 percent change. In the Most-Likely-Case, the regions ranged from 4.4 to seven percent. All were less than 1.5 percent worse off than the No-Pandemic case in the Best-Case scenario.

<sup>&</sup>lt;sup>9</sup> Bob Potts, GOED Deputy Director, personal communication, September 1, 2020.

#### **Headline Unemployment Rate**

While the No-Pandemic and Best-Case scenarios show low unemployment rates in the 2.5 to 4.5 percent range, the Most-Likely-Case shows that unemployment is expected to be slightly higher - 3.1 percent in the Reno-Sparks MSA and 5.3 percent in the Las Vegas MSA, with the state as a whole at 4.7 percent. The Worst-Case unemployment rates range between six percent for the Reno-Sparks MSA to 15.1 percent for the Las Vegas MSA. While nowhere near the over-30 percent rate seen early in the pandemic in the Las Vegas MSA, 15.1 percent would still be extraordinarily high considering that unemployment peaked at 14.1 percent during the Great Recession.

#### **Unemployment Claims**

With the unemployment claims estimates, there is the potential of fraudulent claims affecting the historical data. Nevertheless, useful insights can be gained on the health of the job market. Initial claims in the Worst-Case are approximately 2.5 times higher than in the Best-Case, while the Most-Likely-Case is only marginally worse than the Best-Case. Relative to continuing claims, the results look reasonable. The Best-Case projects monthly average claims of around 28,000, while the Most-Likely-Case is about four times higher at 104,000. Continuing claims for the Worst-Case are approximately 10 times greater than in the Best-Case.

#### **Visitor Volume**

Estimates show a significant hit to visitor volume in every scenario. The Best-Case scenario would be least impacted by the pandemic, experiencing a seven percent hit to visitation compared to the No-Pandemic scenario in Q4, 2021. The Most-Likely-Case sees a drop of 33 percent, while the Worst-Case suggests a 72 percent drop. This is plausible considering that visitation dropped 99 percent year-over-year in April during lockdown.

#### **Property Tax**

Regarding the tax estimates, because the distributions between the state and sub-state levels are stable, and in some cases (see Methodology section) calculated as a fixed share of the state-level revenues, the trends are very similar.

The Property Tax estimates show relatively small hits to total collections, from about one to five percent based on the scenario compared to No-Pandemic. This appears reasonable based on the continued strength of the housing market nationally and in the state.

#### **Gaming Tax**

Relative to the No-Pandemic case, the Worst-Case would see drops in Gaming Tax collections of about 3.7 percent in 2021. The Most-Likely-Case predicts a two percent drop and the Best-Case a 1.1 percent drop. These drops are possibly not as large as initially thought, suggesting that gaming revenues have thus far outperformed visitation to the state and that local gamblers are providing casino-resorts much need revenue.

#### **Room Tax**

Estimates on the Room Tax show potential drops of three to 11 percent relative to the No-Pandemic case in 2021. The Most-Likely-Case, our most-likely outcome, suggests a six percent decline in collections compared to what they would have been had the pandemic not occurred.

#### Sales & Use Tax ("SUT")

The SUT revenues are estimated to experience hits of 2.8 percent (Best-Case), five percent (Most-Likely-Case) and 8.7 percent (Worst-Case) in 2021 relative to the No-Pandemic case. These would be significant impacts to state and local coffers as the SUT is the largest revenue generator. Additionally, it is possible that enhanced UI benefits and the direct pandemic payouts are inflating the model outputs because they were in effect for much of the post-pandemic data but ended for much of the period since. For this reason, these estimates may be overly-optimistic in every scenario.

#### Consolidated Tax ("CTX")

The same limitations that exist regarding the SUT apply to the CTX. Even with this possible overestimation, the CTX is still expected to experience declines in 2021 of 3.1 percent (Best-Case), 16 percent (Most-Likely-Case) and 36 percent (Worst-Case). It makes sense that these drops are greater in magnitude than for the SUT because CTX revenues are largely dependent on spending that is easier to cut out of a household's budget, like cigarettes and alcoholic beverages.

#### Modified Business Tax ("MBT")

The MBT is a state-level payroll tax. With lower levels of employment, it is expected that these revenues would be diminished as well. According to the model results, these declines in 2021 relative to the No-Pandemic case would amount to about 4.8 percent in the Best-Case, nine percent in the Most-Likely-Case and 16 percent in the Worst-Case.

#### **Marijuana Taxes**

The Marijuana Taxes, the last collections estimated under the model discussed below, are expected to take hits similar to those of the MBT (by coincidence). In the Best-Case, we expect a drop of about 4.2 percent compared to the No-Pandemic case. In the Most-Likely-Case, that drop would be about 7.9 percent while in the Worst-Case we estimate a 15 percent drop.

#### **EXHIBITS**

#### Table II-1: Results Matrix, by Scenario: End-of-Year 2021

Total GDPNevadaArts, Entertainment and Recreation GDPNevadaAccommodation and Food Services GDPNevadaHealth Care and Social Assistances GDPNevadaProfessional, Scientific and Technical Services GDPNevadaConstruction GDPNevadaTaxable SalesNevadaTaxable SalesClark CounTaxable SalesWashoe CoNon-farm EmploymentNevada	2021-10-0 2021-10-0 2021-10-0 2021-10-0 2021-10-0 2021-10-0 2021-10-0 2021-10-0 4021-10-0 2021-10-0 2021-10-0 405A 2021-10-0	<ul> <li>2020 Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Thousand Jobs</li> <li>Thousand Jobs</li> </ul>	186,640,231,720 5,508,551,663 21,109,332,021 12,357,420,537 9,415,072,629 9,120,344,273 18,633,695,781 13,859,924,688 2,798,111,235 1,512	162,007,928,934 2,956,216,080 13,243,956,619 10,466,862,923 8,476,825,556 8,787,851,108 15,297,756,838 10,346,492,722 2,696,259,924 1,289	177,622,512,592 4,386,134,754 17,797,395,426 11,628,625,168 9,060,107,018 8,998,620,779 17,412,431,140 12,453,139,434 2,760,385,237	184,903,030,734 5,271,987,176 20,426,603,775 12,213,556,754 9,345,625,956 9,096,895,087 18,398,427,627 13,577,081,721 2,790,803,704
Arts, Entertainment and Recreation GDP     Nevada       Accommodation and Food Services GDP     Nevada       Health Care and Social Assistances GDP     Nevada       Professional, Scientific and Technical Services GDP     Nevada       Construction GDP     Nevada       Taxable Sales     Nevada       Taxable Sales     Clark Count       Taxable Sales     Washoe Co       Non-farm Employment     Nevada	2021-10-0 2021-10-0 2021-10-0 2021-10-0 2021-10-0 2021-10-0 ty 2021-10-0 2021-10-0 2021-10-0 4SA 2021-10-0	<ul> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Thousand Jobs</li> <li>Thousand Jobs</li> </ul>	5,508,551,663 21,109,332,021 12,357,420,537 9,415,072,629 9,120,344,273 18,633,695,781 13,859,924,688 2,798,111,235 1,512	2,956,216,080 13,243,956,619 10,466,862,923 8,476,825,556 8,787,851,108 15,297,756,838 10,346,492,722 2,696,259,924 1,289	4,386,134,754 17,797,395,426 11,628,625,168 9,060,107,018 8,998,620,779 17,412,431,140 12,453,139,434 2,760,385,237	5,271,987,176 20,426,603,775 12,213,556,754 9,345,625,956 9,096,895,087 18,398,427,627 13,577,081,721 2,790,803,704
Accommodation and Food Services GDPNevadaHealth Care and Social Assistances GDPNevadaProfessional, Scientific and Technical Services GDPNevadaConstruction GDPNevadaTaxable SalesNevadaTaxable SalesClark CountTaxable SalesWashoe CoNon-farm EmploymentNevada	2021-10-0 2021-10-0 2021-10-0 2021-10-0 2021-10-0 2021-10-0 2021-10-0 2021-10-0 4SA 2021-10-0	<ul> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Thousand Jobs</li> <li>Thousand Jobs</li> </ul>	21,109,332,021 12,357,420,537 9,415,072,629 9,120,344,273 18,633,695,781 13,859,924,688 2,798,111,235 1,512	13,243,956,619 10,466,862,923 8,476,825,556 8,787,851,108 15,297,756,838 10,346,492,722 2,696,259,924 1,289	17,797,395,426 11,628,625,168 9,060,107,018 8,998,620,779 17,412,431,140 12,453,139,434 2,760,385,237	20,426,603,775 12,213,556,754 9,345,625,956 9,096,895,087 18,398,427,627 13,577,081,721 2,790,803,704
Health Care and Social Assistances GDP     Nevada       Professional, Scientific and Technical Services GDP     Nevada       Construction GDP     Nevada       Taxable Sales     Nevada       Taxable Sales     Clark Coun       Taxable Sales     Washoe Co       Non-farm Employment     Nevada	2021-10-0           2021-10-0           2021-10-0           2021-10-0           2021-10-0           ty         2021-10-0           2021-10-0           2021-10-0           x0SA         2021-10-0           xsMSA         2021-10-0	<ul> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Thousand Jobs</li> <li>Thousand Jobs</li> </ul>	12,357,420,537 9,415,072,629 9,120,344,273 18,633,695,781 13,859,924,688 2,798,111,235 1,512	10,466,862,923 8,476,825,556 8,787,851,108 15,297,756,838 10,346,492,722 2,696,259,924 1,289	11,628,625,168 9,060,107,018 8,998,620,779 17,412,431,140 12,453,139,434 2,760,385,237	12,213,556,754 9,345,625,956 9,096,895,087 18,398,427,627 13,577,081,721 2,790,803,704
Professional, Scientific and Technical Services GDP     Nevada       Construction GDP     Nevada       Taxable Sales     Nevada       Taxable Sales     Clark Coun       Taxable Sales     Washoe Co       Non-farm Employment     Nevada	2021-10-0 2021-10-0 2021-10-0 ty 2021-10-0 2021-10-0 2021-10-0 v(SA SA 2021-10-0	<ul> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Thousand Jobs</li> <li>Thousand Jobs</li> </ul>	9,415,072,629 9,120,344,273 18,633,695,781 13,859,924,688 2,798,111,235 1,512	8,476,825,556 8,787,851,108 15,297,756,838 10,346,492,722 2,696,259,924 1,289	9,060,107,018 8,998,620,779 17,412,431,140 12,453,139,434 2,760,385,237	9,345,625,956 9,096,895,087 18,398,427,627 13,577,081,721 2,790,803,704
Construction GDP     Nevada       Taxable Sales     Nevada       Taxable Sales     Clark Coun       Taxable Sales     Washoe Co       Non-farm Employment     Nevada	2021-10-0 2021-10-0 ty 2021-10-0 2021-10-0 2021-10-0 MSA 2021-10-0 (s MSA 2021-10-0	<ul> <li>2020 Dollars</li> <li>2020 Dollars</li> <li>2010ars</li> <li>2001ars</li> <li>2001ars</li> <li>3001ars</li> <li>4001ars</li> <li>4001</li></ul>	9,120,344,273 18,633,695,781 13,859,924,688 2,798,111,235 1,512	8,787,851,108 15,297,756,838 10,346,492,722 2,696,259,924 1,289	8,998,620,779 17,412,431,140 12,453,139,434 2,760,385,237	9,096,895,087 18,398,427,627 13,577,081,721 2,790,803,704
Taxable Sales     Nevada       Taxable Sales     Clark Coun       Taxable Sales     Washoe Co       Non-farm Employment     Nevada	2021-10-0 ty 2021-10-0 2021-10-0 2021-10-0 MSA 2021-10-0 cs MSA 2021-10-0	<ul> <li>Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Dollars</li> <li>Thousand Jobs</li> <li>Thousand Jobs</li> </ul>	18,633,695,781 13,859,924,688 2,798,111,235 1,512	15,297,756,838 10,346,492,722 2,696,259,924 1,289	17,412,431,140 12,453,139,434 2,760,385,237	18,398,427,627 13,577,081,721 2,790,803,704
Taxable Sales     Clark Coun       Taxable Sales     Washoe Co       Non-farm Employment     Nevada	ty 2021-10-0 unty 2021-10-0 2021-10-0 MSA 2021-10-0 cs MSA 2021-10-0	<ul><li>Dollars</li><li>Dollars</li><li>Thousand Jobs</li><li>Thousand Jobs</li></ul>	13,859,924,688 2,798,111,235 1,512	10,346,492,722 2,696,259,924 1,289	12,453,139,434 2,760,385,237	13,577,081,721 2,790,803,704
Taxable Sales Washoe Co Non-farm Employment Nevada	unty 2021-10-0 2021-10-0 MSA 2021-10-0 <s 2021-10-0<="" msa="" td=""><td><ul><li>Dollars</li><li>Thousand Jobs</li><li>Thousand Jobs</li></ul></td><td>2,798,111,235 1,512</td><td>2,696,259,924 1,289</td><td>2,760,385,237</td><td>2,790,803,704</td></s>	<ul><li>Dollars</li><li>Thousand Jobs</li><li>Thousand Jobs</li></ul>	2,798,111,235 1,512	2,696,259,924 1,289	2,760,385,237	2,790,803,704
Non-farm Employment Nevada	2021-10-0 MSA 2021-10-0 <s 2021-10-0<="" msa="" td=""><td><ul><li>Thousand Jobs</li><li>Thousand Jobs</li></ul></td><td>1,512</td><td>1,289</td><td>1 400</td><td></td></s>	<ul><li>Thousand Jobs</li><li>Thousand Jobs</li></ul>	1,512	1,289	1 400	
i i i i i i i i i i i i i i i i i i i	MSA 2021-10-0 ks MSA 2021-10-0	1 Thousand Jobs			1,426	1,495
Non-farm Employment Las Vegas N	ks MSA 2021-10-0		1,110	911	1,032	1,094
Non-farm Employment Reno-Sparl		L Thousand Jobs	276	244	264	274
Unemployment Rate Nevada	2021-10-0	l Percent	3.6	13.1	4.7	3.7
Unemployment Rate Las Vegas M	MSA 2021-10-0	l Percent	4.0	15.1	5.3	4.2
Unemployment Rate Reno-Sparl	ks MSA 2021-10-0	l Percent	2.5	6.0	3.1	2.6
Initial Claims Nevada	2021-10-0	L Claims	44,024	120,788	63,703	47,272
Continued Claims Nevada	2021-10-0	1 Claims	9,351	267,486	103,852	27,556
Visitor Volume Nevada	2021-10-0	L Visitors	12,500,836	3,557,694	8,416,885	11,631,785
Property Tax Nevada	2021-01-0	L Dollars	2,827,821,429	2,687,481,224	2,751,250,272	2,787,460,022
Property Tax LocalGovSe	chDist 2021-01-0	L Dollars	2,675,076,389	2,542,316,674	2,602,641,230	2,636,895,108
Gaming Tax Nevada	2021-01-0	L Dollars	720,185,504	693,719,463	705,745,341	712,573,953
Gaming Tax Clark Coun	ty 2021-01-0	L Dollars	616,991,745	594,317,963	604,620,680	610,470,836
Gaming Tax Washoe Co	unty 2021-01-0	L Dollars	54,877,388	52,860,703	53,777,062	54,297,395
Room Tax Nevada	2021-01-0	L Dollars	325,310,434	289,593,189	305,822,713	315,038,266
Room Tax CCSD	2021-01-0	L Dollars	100,479,309	89,447,249	94,460,096	97,306,523
Room Tax LocalTouris	sm 2021-01-0	L Dollars	10,959,452	9,756,166	10,302,926	10,613,390
Sales & Use Tax Nevada	2021-01-0	L Dollars	5,557,608,520	5,072,539,898	5,280,933,184	5,401,131,677
Sales & Use Tax Clark Coun	ty 2021-01-0	L Dollars	4,019,654,803	3,668,818,934	3,819,543,669	3,906,479,705
Sales & Use Tax Washoe Co	unty 2021-01-0	L Dollars	736,834,005	672,523,060	700,152,077	716,088,129
Consolidated Tax Nevada	2021-01-0	L Dollars	597,014,595	379,994,597	501,636,189	578,214,091
Consolidated Tax Clark Coun	ty 2021-01-0	L Dollars	170,511,559	108,529,124	143,270,816	165,142,003
Consolidated Tax Washoe Co	unty 2021-01-0	L Dollars	42,092,449	26,791,478	35,367,805	40,766,921
Modified Business Tax Nevada	2021-01-0	L Dollars	753,927,750	633,861,229	686,213,616	717,843,133
Marijuana Taxes Nevada	2021-01-0	L Dollars	113,747,474	97,236,916	104,739,164	108,999,139

Source: RCG Economics

Table II-2. Results Percent Change Relation			, by Scenar		u 2021
Series	Region	Date	WorstCase	MostLikely	BestCase
Total GDP	Nevada	2021-10-01	-13.20%	-4.80%	-0.90%
Arts, Entertainment and Recreation GDP	Nevada	2021-10-01	-46.30%	-20.40%	-4.30%
Accommodation and Food Services GDP	Nevada	2021-10-01	-37.30%	-15.70%	-3.20%
Health Care and Social Assistances GDP	Nevada	2021-10-01	-15.30%	-5.90%	-1.20%
Professional, Scientific and Technical Services GDP	Nevada	2021-10-01	-10.00%	-3.80%	-0.70%
Construction GDP	Nevada	2021-10-01	-3.60%	-1.30%	-0.30%
Taxable Sales	Nevada	2021-10-01	-17.90%	-6.60%	-1.30%
Taxable Sales	Clark County	2021-10-01	-25.30%	-10.20%	-2.00%
Taxable Sales	Washoe County	2021-10-01	-3.60%	-1.30%	-0.30%
Non-farm Employment	Nevada	2021-10-01	-14.70%	-5.70%	-1.10%
Non-farm Employment	Las Vegas MSA	2021-10-01	-17.90%	-7.00%	-1.40%
Non-farm Employment	Reno-Sparks MSA	2021-10-01	-11.60%	-4.40%	-0.90%
Unemployment Rate	Nevada	2021-10-01	267.70%	32.40%	3.90%
Unemployment Rate	Las Vegas MSA	2021-10-01	276.80%	33.50%	4.00%
Unemployment Rate	Reno-Sparks MSA	2021-10-01	141.10%	24.40%	3.40%
Initial Claims	Nevada	2021-10-01	174.40%	44.70%	7.40%
Continued Claims	Nevada	2021-10-01	2760.70%	1010.70%	194.70%
Visitor Volume	Nevada	2021-10-01	-71.50%	-32.70%	-7.00%
Property Tax	Nevada	2021-01-01	-5.00%	-2.70%	-1.40%
Property Tax	LocalGovSchDist	2021-01-01	-5.00%	-2.70%	-1.40%
Gaming Tax	Nevada	2021-01-01	-3.70%	-2.00%	-1.10%
Gaming Tax	Clark County	2021-01-01	-3.70%	-2.00%	-1.10%
Gaming Tax	Washoe County	2021-01-01	-3.70%	-2.00%	-1.10%
Room Tax	Nevada	2021-01-01	-11.00%	-6.00%	-3.20%
Room Tax	CCSD	2021-01-01	-11.00%	-6.00%	-3.20%
Room Tax	LocalTourism	2021-01-01	-11.00%	-6.00%	-3.20%
Sales & Use Tax	Nevada	2021-01-01	-8.70%	-5.00%	-2.80%
Sales & Use Tax	Clark County	2021-01-01	-8.70%	-5.00%	-2.80%
Sales & Use Tax	Washoe County	2021-01-01	-8.70%	-5.00%	-2.80%
Consolidated Tax	Nevada	2021-01-01	-36.40%	-16.00%	-3.10%
Consolidated Tax	Clark County	2021-01-01	-36.40%	-16.00%	-3.10%
Consolidated Tax	Washoe County	2021-01-01	-36.40%	-16.00%	-3.10%
Modified Business Tax	Nevada	2021-01-01	-15.90%	-9.00%	-4.80%
Marijuana Taxes	Nevada	2021-01-01	-14.50%	-7.90%	-4.20%
Source: RCG Economics	-	2			

#### Table II-2: Results Percent Change Relative to No-Pandemic Matrix, by Scenario: Year-End 2021

#### Table II-3: Results Matrix, by Scenario: Year-End 2020

Series	Region	Date	Units	NoPandemic	WorstCase	MostLikely	BestCase
Total GDP	Nevada	2020-10-01	2020 Dollars	181,330,155,860	151,837,751,692	157,181,285,222	163,299,043,610
Arts, Entertainment and Recreation GDP	Nevada	2020-10-01	2020 Dollars	5,388,161,882	2,557,451,002	2,927,145,429	3,416,466,709
Accommodation and Food Services GDP	Nevada	2020-10-01	2020 Dollars	21,154,530,484	12,106,001,341	13,394,300,985	15,038,442,682
Health Care and Social Assistances GDP	Nevada	2020-10-01	2020 Dollars	11,973,407,990	9,814,733,245	10,174,703,053	10,603,067,751
Professional, Scientific and Technical Services GDP	Nevada	2020-10-01	2020 Dollars	9,285,801,828	8,189,053,657	8,377,679,416	8,598,975,741
Construction GDP	Nevada	2020-10-01	2020 Dollars	8,794,911,941	8,396,815,875	8,468,944,267	8,551,523,345
Taxable Sales	Nevada	2020-10-01	Dollars	17,662,777,789	13,668,638,043	14,392,309,790	15,220,834,376
Taxable Sales	Clark County	2020-10-01	Dollars	13,064,717,449	9,206,208,677	9,808,987,223	10,547,712,432
Taxable Sales	Washoe County	2020-10-01	Dollars	2,626,183,105	2,512,143,955	2,532,432,189	2,555,861,244
Non-farm Employment	Nevada	2020-10-01	Thousand Jobs	1,448	1,197	1,239	1,289
Non-farm Employment	Las Vegas MSA	2020-10-01	Thousand Jobs	1,063	840	876	920
Non-farm Employment	Reno-Sparks MSA	2020-10-01	Thousand Jobs	265	229	235	242
Unemployment Rate	Nevada	2020-10-01	Percent	4.0	29.8	18.5	11.2
Unemployment Rate	Las Vegas MSA	2020-10-01	Percent	4.4	34.1	21.1	12.6
Unemployment Rate	Reno-Sparks MSA	2020-10-01	Percent	2.7	9.8	7.2	5.3
Initial Claims	Nevada	2020-10-01	Claims	54,725	183,233	147,202	114,564
Continued Claims	Nevada	2020-10-01	Claims	835	309,903	253,905	189,793
Visitor Volume	Nevada	2020-10-01	Visitors	11,318,985	2,252,363	3,285,832	4,766,480
Property Tax	Nevada	2020-01-01	Dollars	2,800,531,181	2,684,987,415	2,698,661,309	2,713,336,212
Property Tax	LocalGovSchDist	2020-01-01	Dollars	2,649,260,227	2,539,957,568	2,552,892,865	2,566,775,102
Gaming Tax	Nevada	2020-01-01	Dollars	715,038,976	693,249,168	695,827,858	698,595,323
Gaming Tax	Clark County	2020-01-01	Dollars	612,582,651	593,915,056	596,124,251	598,495,172
Gaming Tax	Washoe County	2020-01-01	Dollars	54,485,228	52,824,867	53,021,360	53,232,238
Room Tax	Nevada	2020-01-01	Dollars	318,364,937	288,958,503	292,438,573	296,173,405
Room Tax	CCSD	2020-01-01	Dollars	98,334,039	89,251,212	90,326,109	91,479,694
Room Tax	LocalTourism	2020-01-01	Dollars	10,725,463	9,734,784	9,852,025	9,977,848
Sales & Use Tax	Nevada	2020-01-01	Dollars	5,296,637,469	4,926,585,323	4,926,585,323	4,926,585,323
Sales & Use Tax	Clark County	2020-01-01	Dollars	3,830,902,117	3,563,254,282	3,563,254,282	3,563,254,282
Sales & Use Tax	Washoe County	2020-01-01	Dollars	702,234,169	653,172,238	653,172,238	653,172,238
Consolidated Tax	Nevada	2020-01-01	Dollars	540,405,807	396,339,352	396,339,352	396,339,352
Consolidated Tax	Clark County	2020-01-01	Dollars	154,343,692	113,197,301	113,197,301	113,197,301
Consolidated Tax	Washoe County	2020-01-01	Dollars	38,101,253	27,943,863	27,943,863	27,943,863
Modified Business Tax	Nevada	2020-01-01	Dollars	695,277,891	642,741,984	642,741,984	642,741,984
Marijuana Taxes	Nevada	2020-01-01	Dollars	105,180,947	105,180,947	105,180,947	105,180,947

Source: RCG Economics

Sarias	Pegion	Date	WorstCase	Mostl ikely	RestCase
Total GDP	Nevada	2020-10-01	-16.3%	-13 3%	-9 9%
Arts Entertainment and Recreation GDP	Nevada	2020-10-01	-52.5%	-45 7%	-36.6%
Accommodation and Food Services GDP	Nevada	2020-10-01	-42.8%	-36 7%	-30.070
Health Care and Social Assistances GDP	Nevada	2020-10-01	-18.0%	-15.0%	-11.4%
Professional Scientific and Technical Services GDP	Nevada	2020 10 01	-11.8%	-9.8%	-7.4%
Construction GDP	Nevada	2020-10-01	-4 5%	-3.0%	-7.8%
Taxable Sales	Nevada	2020-10-01	-22.6%	-18 5%	-13.8%
Taxable Sales	Clark County	2020-10-01	-29.5%	-24.9%	-19.3%
Taxable Sales	Washoe County	2020-10-01	-4.3%	-3.6%	-2.7%
Non-farm Employment	Nevada	2020-10-01	-17.3%	-14.4%	-11.0%
Non-farm Employment	Las Vegas MSA	2020-10-01	-21.0%	-17.6%	-13.4%
Non-farm Employment	Reno-Sparks MSA	2020-10-01	-13.7%	-11.4%	-8.6%
Unemployment Rate	Nevada	2020-10-01	636.5%	358.9%	175.9%
Unemployment Rate	Las Vegas MSA	2020-10-01	682.0%	384.5%	188.5%
Unemployment Rate	Reno-Sparks MSA	2020-10-01	258.0%	163.7%	91.8%
Initial Claims	Nevada	2020-10-01	234.8%	169.0%	109.3%
Continued Claims	Nevada	2020-10-01	37 009.4%	30 303.9%	22 626.9%
Visitor Volume	Nevada	2020-10-01	-80.1%	-71.0%	-57.9%
Property Tax	Nevada	2020-01-01	-4.1%	-3.6%	-3.1%
Property Tax	LocalGovSchDist	2020-01-01	-4.1%	-3.6%	-3.1%
Gaming Tax	Nevada	2020-01-01	-3.0%	-2.7%	-2.3%
Gaming Tax	Clark County	2020-01-01	-3.0%	-2.7%	-2.3%
Gaming Tax	Washoe County	2020-01-01	-3.0%	-2.7%	-2.3%
Room Tax	Nevada	2020-01-01	-9.2%	-8.1%	-7.0%
Room Tax	CCSD	2020-01-01	-9.2%	-8.1%	-7.0%
Room Tax	LocalTourism	2020-01-01	-9.2%	-8.1%	-7.0%
Sales & Use Tax	Nevada	2020-01-01	-7.0%	-7.0%	-7.0%
Sales & Use Tax	Clark County	2020-01-01	-7.0%	-7.0%	-7.0%
Sales & Use Tax	Washoe County	2020-01-01	-7.0%	-7.0%	-7.0%
Consolidated Tax	Nevada	2020-01-01	-26.7%	-26.7%	-26.7%
Consolidated Tax	Clark County	2020-01-01	-26.7%	-26.7%	-26.7%
Consolidated Tax	Washoe County	2020-01-01	-26.7%	-26.7%	-26.7%
Modified Business Tax	Nevada	2020-01-01	-7.6%	-7.6%	-7.6%
Marijuana Taxes	Nevada	2020-01-01	0.0%	0.0%	0.0%

#### Table II-4: Results Percent Change Relative to No-Pandemic Matrix, by Scenario: Year-End 2020

Source: RCG Economics



Figure II-1: Nevada Real GDP Forecasts (2020 Dollars), by Scenario: 2014 - 2021

**Explanation:** Figure II-1 shows several data series. The solid black line represents historical GPD data from Q1, 2005 to Q1, 2020. The solid gray line provides the results of RCG's "No-Pandemic" scenario, a forecast that assumes that the pandemic had never occurred. The solid blue line provides the results from our Most-Likely-Case scenario, the most-likely outcome based on RCG's research. The dotted green line represents the Best-Case scenario. In this case, the factors included in the model generally see relatively optimistic outcomes. The dotted red line illustrates our Worst-Case scenario, where the model's factors have been given relatively poor outcomes.

Note: Gray bars denote recessions. Sources: RCG Economics, Bureau of Economic Analysis



Sources: RCG Economics, Bureau of Economic Analysis





Sources: RCG Economics, Bureau of Economic Analysis

### THE FUTURE BEYOND THE PANDEMIC: NEVADA'S PLAN FOR RECOVERY & RESILIENCE: ECONOMIC FORECAST Figure II-5: Nevada Professional, Scientific and Technical Services Real GDP Forecasts (2020 Dollars), by Scenario: 2014 - 2021 \$10.0 — No Pandemic ••••• Worst Case —— Most-Likely Case ••••• Best Case Actual -\$9.5 \$9.0 GDP (Billions) \$8.5 \$8.0 \$7.5 \$7.0 2017 2019 2014 2015 2018 2020 2021

Date

2016

Sources: RCG Economics, Bureau of Economic Analysis



Sources: RCG Economics, Bureau of Economic Analysis

# THE FUTURE BEYOND THE PANDEMIC: NEVADA'S PLAN FOR RECOVERY & RESILIENCE: ECONOMIC FORECAST Figure II-7: Nevada Taxable Sales Forecasts (Nominal), by Scenario: 2014 – 2021

2018

Date

2019

2020

2022

2017

2016

2015

\$12

\$11

2014

Sources: RCG Economics, Nevada Department of Taxation



Figure II-8: Clark County Taxable Sales Forecasts (Nominal), by Scenario: 2014 – 2021

Sources: RCG Economics, Nevada Department of Taxation





Sources: RCG Economics, Nevada Legislative Counsel Bureau





Sources: RCG Economics, Bureau of Labor Statistics



Sources: RCG Economics, Bureau of Labor Statistics



Figure II-13: Nevada Headline Unemployment Rate Forecasts, by Scenario: 2014 - 2021

Sources: RCG Economics, Bureau of Labor Statistics



Figure II-14: Las Vegas MSA Headline Unemployment Rate Forecasts, by Scenario: 2014 – 2021

Sources: RCG Economics, Bureau of Labor Statistics





Sources: RCG Economics, Bureau of Labor Statistics



Figure II-16: Nevada Initial Unemployment Insurance Claims Forecasts, by Scenario: 2014 – 2021

Sources: RCG Economics, Nevada Department of Employment, Training & Rehabilitation





Sources: RCG Economics, Nevada Department of Employment, Training & Rehabilitation






Sources: RCG Economics, Nevada Legislative Counsel Bureau



Sources: RCG Economics, Nevada Gaming Control Board

# THE FUTURE BEYOND THE PANDEMIC: NEVADA'S PLAN FOR RECOVERY & RESILIENCE: ECONOMIC FORECAST Figure II-22: Clark County Gaming Tax Forecasts (Nominal), by Scenario: 2014 – 2021



Sources: RCG Economics, Nevada Gaming Control Board





Sources: RCG Economics, Nevada Gaming Control Board





Sources: RCG Economics, Nevada Legislative Counsel Bureau





Sources: RCG Economics, Nevada Department of Taxation



Sources: RCG Economics, Nevada Department of Taxation





Sources: RCG Economics, Nevada Department of Taxation





Sources: RCG Economics, Nevada Department of Taxation



Sources: RCG Economics, Nevada Department of Taxation



Figure II-32: Washoe County Consolidated Tax Forecasts (Nominal), by Scenario: 2014 - 2021

Sources: RCG Economics, Nevada Department of Taxation



Sources: RCG Economics, Nevada Department of Taxation



Sources: RCG Economics, Nevada Department of Taxation

### **Rcg**economics

### **III. METHODOLOGY**

#### A. BACKGROUND

In this section, RCG discusses both medical and economic background information about the "novel coronavirus", which is the source of the 2020 health and economic pandemics facing the world, nation and Nevada. Certain biological traits of this virus directly affect the inputs of our economic analysis and are, therefore, important to discuss in some detail herein.

#### **Novel Coronavirus and Economic Lockdown**

On December 31, 2019, Chinese authorities informed the World Health Organization ("the WHO") of an outbreak of pneumonia of unknown origin in Wuhan, Hubei Province.<sup>10</sup> Just a few weeks later, on March 11, 2020, WHO concluded that the rapidity and breadth of the spread of this disease constituted a global pandemic.<sup>11</sup> This disease is named COVID-19, based on established naming conventions. It is caused by Severe Acute Respiratory Syndrome Coronavirus 2 ("SARS-CoV-2"), a novel or "new" coronavirus.<sup>12</sup> As of July, it appears that a newer, more virulent strain of SARS-CoV-2 has replaced the original virus and become the dominant strain circulating around the world.<sup>13</sup>

Following the WHO's declaration of the pandemic, as well as the closure of several school districts across the country in the preceding days,<sup>14</sup> economic dominos started immediately falling. The result has been an economic downturn without precedent in modern times.<sup>15</sup>

In the United States ("U.S."), the private sector initiated a series of events that quickly escalated into nationwide state-level lockdown orders. Hours after the WHO's declaration, the National Basketball Association announced

<sup>&</sup>lt;sup>10</sup> https://www.who.int/csr/don/05-january-2020-pneumonia-of-unkown-cause-china/en/

<sup>&</sup>lt;sup>11</sup> https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11march-2020

<sup>&</sup>lt;sup>12</sup> https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it

<sup>&</sup>lt;sup>13</sup> Korber B, Fischer WM, Gnanakaran S, Yoon H, Theiler J, Abfalterer W, Hengartner N, Giorgi EE, Bhattacharya T, Foley B, Hastie KM, Parker MD, Partridge DG, Evans CM, Freeman TM, de Silva TI on behalf of the Sheffield COVID-19 Genomics Group, McDanal C, Perez LG, Tang H... Tracking changes in SARS-CoV-2 Spike: evidence that D614G increases infectivity of the COVID-19 virus, Cell (2020). DOI: 10.1016/j.cell.2020.06.043 , <u>www.cell.com/cell/fulltext/S0092-8674(20)30820-5</u> <sup>14</sup> https://www.edweek.org/ew/section/multimedia/map-coronavirus-and-school-closures.html

<sup>&</sup>lt;sup>15</sup> https://www.economist.com/britain/2020/04/11/covid-19-causes-britains-fastest-economic-contraction-on-record

that it was suspending its season.<sup>16</sup> The National Hockey League announced it was doing the same the next day.<sup>17</sup> In the following days, states all over the country began shutting down non-essential businesses.<sup>18</sup> On March 19, California became the first to issue a statewide lockdown order.<sup>19</sup>

In Nevada, on March 10—a day before the WHO's declaration—MGM Resorts International ("MGM") announced that it would be shutting down their Strip buffets within days.<sup>20</sup> A few days later, on March 15, MGM also announced that it would be shutting down all its Las Vegas properties on March 17.<sup>21</sup> On March 17, Nevada Governor Sisolak announced the closure of all non-essential businesses, including hotel-casino resorts.<sup>22</sup> Governor Sisolak extended these closures and issued a stay-at-home order on April 1.<sup>23</sup>

#### **Timeline of Nevada COVID-19-Related Major Events**

Below follows a timeline of major governmental declarations relevant to Nevada COVID-19 policy, according to the Nevada Independent<sup>24</sup> and Nevada Health Response<sup>25</sup> as well as other sources where noted. This timeline does not include private-sector announcements.

- March 11: WHO declares a pandemic
- March 13: President Donald Trump announces a national state of emergency
- March 15: Governor Sisolak issues Directive closing schools and non-essential government facilities as well as ordering essential government services to transition to online and phone services to the greatest extent possible
- March 18: Governor Sisolak issues Directive 002 closing nonessential businesses statewide, including Strip
  resorts
- March 22: Governor Sisolak announces a COVID-19 response task force
- March 24: Governor Sisolak issues Directive 007 limiting indoor and outdoor gatherings to 10 people

<sup>18</sup> <u>https://www.aljazeera.com/news/2020/03/emergencies-closures-states-handling-coronavirus-200317213356419.html</u>

<sup>&</sup>lt;sup>16</sup> https://www.nba.com/article/2020/03/11/nba-suspend-season-following-wednesdays-games

<sup>&</sup>lt;sup>17</sup> <u>https://www.nhl.com/news/nhl-coronavirus-status/c-316155530</u>

<sup>&</sup>lt;sup>19</sup> <u>https://www.gov.ca.gov/wp-content/uploads/2020/03/3.19.20-attested-EO-N-33-20-COVID-19-HEALTH-ORDER.pdf</u>

<sup>&</sup>lt;sup>20</sup> <u>https://www.rgj.com/story/news/2020/03/10/nevada-coronavirus-concerns-las-vegas-strip-resort-casino-buffets-close/5014422002/</u>

<sup>&</sup>lt;sup>21</sup> <u>https://vegas.eater.com/2020/3/15/21181058/mgm-resorts-closes-vegas-properties-march-16</u>

<sup>&</sup>lt;sup>22</sup> https://www.cnbc.com/2020/03/18/nevada-to-close-casinos-ban-dining-out-to-stem-coronavirus-spread.html

<sup>&</sup>lt;sup>23</sup> <u>https://thenevadaindependent.com/article/sisolak-extends-covid-19-shutdown-until-end-of-april-urges-residents-to-shelter-in-place</u>

<sup>&</sup>lt;sup>24</sup> <u>https://thenevadaindependent.com/article/timeline-a-look-at-nevadas-fight-against-coronavirus-and-the-road-to-reopen-the-economy</u>

<sup>&</sup>lt;sup>25</sup> https://nvhealthresponse.nv.gov/news-resources/governor-directives-and-declarations/

- March 27: President Trump signs the CARES Act<sup>26</sup>
- March 29: Governor Sisolak issues Directive 008, a statewide moratorium on residential and commercial evictions
- April 1: Governor Sisolak issues Directive 010, extending previous orders as well as enacting a statewide stay-at-home order
- April 1: Governor Sisolak issues Directive 012 activating the Nevada National Guard to assist with the state's response to the COVID-19 pandemic
- April 4: Federal government approves Nevada's request for a major disaster declaration, paving the way for federal financial assistance
- April 8: Governor Sisolak issues Directive 013, extending the statewide lockdown order to golf courses and religious establishments
- April 21: Governor Sisolak announces a framework for reopening the state, largely following White House guidelines
- April 29: Governor Sisolak issues Directive 016 to extend the stay-at-home order while some restrictions are lifted
- April 30: Governor Sisolak releases the "Nevada United Roadmap to Recovery" amid plans to reopen state economy under "Phase 1" restrictions
- May 7: Governor Sisolak issues Directive 018 enacting Phase 1 of the economy reopening plans
- May 11: Governor Sisolak declares a fiscal emergency
- May 18: Interim Finance Committee transfers the \$401 M balance of the rainy-day fund to the state general fund<sup>27</sup>
- May 28: Governor Sisolak issues Directive 021 enacting Phase 2 of the economy reopening plans
- June 10: Governor Sisolak issues Directive 023 to ease restrictions on youth sports and to empower local governments to increase restrictions to limit the spread of COVID-19 as they see necessary
- June 22: State releases the "Nevada COVID-19 Outbreak Management Strategy and Concept of Operations" to develop an operations surge strategy to prevent the spread of COVID-19
- June 24: Governor Sisolak issues Directive 024 mandating the use of masks in public spaces
- June 25: Governor Sisolak issues Directive 025 easing restrictions on evictions
- July 8: Governor Sisolak convenes a special session of the Nevada Legislature to address the state budget<sup>28</sup>

<sup>&</sup>lt;sup>26</sup> https://apnews.com/2099a53bb8adf2def7ee7329ea322f9d

<sup>&</sup>lt;sup>27</sup> Lochhead C. May 18, 2020. "State drains rainy day fund to deal with coronavirus." Las Vegas Review-Journal.

https://www.reviewjournal.com/news/politics-and-government/nevada/state-drains-rainy-day-fund-to-deal-with-coronavirus-2030861/

<sup>&</sup>lt;sup>28</sup> <u>https://www.leg.state.nv.us/Session/31st2020Special/Docs/Proclamation.pdf</u>

- July 10: Governor Sisolak issues Directive 027, which reverts to Phase 1 bars that serve food in counties with elevated levels of disease transmission and again shutters bars that do not serve food
- July 21: Clark County School District announces most classes will be held online to start the fall 2020 semester<sup>29</sup>
- July 28: Governor Sisolak issues Directive 028 to provide guidelines to county school districts on the reopening of schools
- July 31: Governor Sisolak convenes a second special session of the Nevada Legislature to address several issues<sup>30</sup>
- September 17: Nevada COVID-19 panel allows reopening of bars in Clark & Elko counties<sup>31</sup>

#### Information on SARS-CoV-2

There is building evidence that COVID-19 may be a vascular disease with respiratory symptoms rather than a respiratory disease.<sup>32</sup> This helps explain why the disease can cause widespread blood clotting as well as damage in other parts of the body.<sup>33</sup>

According to the U.S. Center for Disease Control ("CDC"), the virus is mainly spread via the exchange of contaminated respiratory droplets in close quarters.<sup>34</sup> Furthermore, the WHO has stated that the virus appears to be airborne, meaning that it can linger in small droplets suspended in the air over long periods and still infect people.<sup>35</sup> Additionally, Dr Roger Shapiro of the CDC and the Harvard T.H. Chan School of Public Health said that the virus is easier to spread indoors than outdoors.<sup>36</sup> Another study supported this assertion and found that spread was swift within an office building in South Korea, easily spreading within a cluster of infected individuals.<sup>37</sup> In the case of a Seoul call center, only 97 out of 811 employees have been infected. However, 94 out of those 97 worked on the same floor.

<sup>32</sup> Smith DG. 2020, June 30. Coronavirus May Be a Blood Vessel Disease, Which Explains Everything. Retrieved July 17, 2020, from <a href="https://elemental.medium.com/coronavirus-may-be-a-blood-vessel-disease-which-explains-everything-2c4032481ab2">https://elemental.medium.com/coronavirus-may-be-a-blood-vessel-disease-which-explains-everything-2c4032481ab2</a>
 <sup>33</sup> Matacic C. 2020, June. Blood vessel attack could trigger coronavirus' fatal 'second phase'. Science. doi:10.1126/science.abd1296. <a href="https://www.sciencemag.org/news/2020/06/blood-vessel-attack-could-trigger-coronavirus-may-be-a-blood-vessel-attack-could-trigger-coronavirus-may-be-a-blood-vessel-attack-could-trigger-coronavirus-may-be-a-blood-vessel-attack-could-trigger-coronavirus-may-be-a-blood-vessel-attack-could-trigger-coronavirus-may-be-a-blood-vessel-attack-could-trigger-coronavirus-</a>

 <sup>&</sup>lt;sup>29</sup> Appleton A. July 21, 2020. Clark County School Board OKs online-only start to fall semester. Accessed Aug. 3.
 <u>https://www.reviewjournal.com/local/education/clark-county-school-board-oks-online-only-start-to-fall-semester-2078235/</u>
 <sup>30</sup> https://www.leg.state.nv.us/Session/32nd2020Special/Docs/Proclamation.pdf

<sup>&</sup>lt;sup>31</sup> https://apnews.com/article/virus-outbreak-las-vegas-reno-nevada-elko-8b67bf34fdc1802da93968c044fdf484

doi:10.1126/science.abd1296. https://www.sciencemag.org/news/2020/06/blood-vessei-attack-could-trigger-coronaviru fatal-second-phase

<sup>&</sup>lt;sup>34</sup> <u>https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-covid-spreads.html</u>

<sup>&</sup>lt;sup>35</sup> <u>https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions</u>

 <sup>&</sup>lt;sup>36</sup> https://www.hsph.harvard.edu/news/features/coronavirus-covid-19-press-conference-with-roger-shapiro-05-06-20/
 <sup>37</sup> Park SY, Kim YM, Yi S, Lee S, Na BJ, Kim CB, et al. Coronavirus disease outbreak in call center, South Korea. Emerg Infect Dis. 2020 Aug [date cited]. https://doi.org/10.3201/eid2608.201274

Infections appear to be driven by people showing mild,<sup>38</sup> unnoticed symptoms,<sup>39</sup> which include the majority of those infected.<sup>40</sup> Additionally, they may be contagious prior to showing symptoms.<sup>41</sup> One major means of spread for the virus appears to be through "superspreader events." According to Scientific American, "between 10 and 20 percent of infected people are responsible for 80 percent of the coronavirus's spread."<sup>42</sup>

In terms of the dangers that the disease poses to people, little is yet known about the disease. Mortality rates published thus far compare deaths to confirmed cases, but this does not produce accurate measurements of real mortality rates because it is unknown how many people have actually been infected, as most cases are mild and do not require medical attention. However, one fact that has come to light is that older people are at a vastly higher risk of death than younger people. The CDC reported that eight out of 10 deaths related to COVID-19 occur in people aged 65 years and older. Additionally, the CDC has also found that the rate of hospitalizations of those aged 85+ is more than 150 times greater than for the least hospitalized age group, 5 – 17-year-olds (see Figure III-1).

Additionally, there are many other shortcomings regarding the scientific community's understanding of COVID-19. For example, it is possible that long-term immunity to one strain of SARS-COV-2 might not prevent another strain from causing reinfection with COVID-19.<sup>43</sup> It is also possible that recovery from COVID-19 only confers partial immunity or no immunity at all, meaning that someone can be re-infected with the disease after some period.<sup>44 45</sup> Additionally, there may be life-long complications from secondary effects of COVID-19.<sup>46</sup> These possibilities have helped to stoke fears regarding the virus, despite the apparent relatively low mortality rate.<sup>47</sup>

These fears at an individual-level, however, are addressed by economic theory. "Cumulative prospect theory", a framework within behavioral economics, predicts that people tend to overweight probabilities associated with

<sup>45</sup> https://www.who.int/news-room/commentaries/detail/immunity-passports-in-the-context-of-covid-19

<sup>&</sup>lt;sup>38</sup> BMJ 2020;368:m1165. <u>https://www.bmj.com/content/368/bmj.m1165</u>

<sup>&</sup>lt;sup>39</sup> <u>https://www.who.int/docs/default-source/coronaviruse/transcripts/who-audio-emergencies-coronavirus-press-conference-08jun2020.pdf?sfvrsn=f6fd460a\_0</u>

<sup>&</sup>lt;sup>40</sup> BMJ 2020;369:m1375. <u>https://www.bmj.com/content/369/bmj.m1375</u>

<sup>&</sup>lt;sup>41</sup> https://www.health.harvard.edu/diseases-and-conditions/if-youve-been-exposed-to-the-

coronavirus#:~:text=We%20know%20that%20a%20person,start%20to%20experience%20symptoms.

<sup>&</sup>lt;sup>42</sup> <u>https://www.scientificamerican.com/article/how-superspreading-events-drive-most-covid-19-spread1/</u>

<sup>&</sup>lt;sup>43</sup> Reed, Sylvia E. The Behaviour of Recent Isolates of Human Respiratory Coronavirus In Vitro and in Volunteers: Evidence of Heterogeneity Among 229E-Related Strains. Journal of Medical Virology 13: 179-192 (1984).

<sup>&</sup>lt;sup>44</sup> Callow KA, Parry HF, Sergeant M, Tyrrell DA. The time course of the immune response to experimental coronavirus infection of man. Epidemiol Infect. 1990; 105(2): 435–446. doi:10.1017/s0950268800048019. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2271881/

<sup>&</sup>lt;sup>46</sup> University of Miami Health News. 2020, July 1. What are the Long-Term Effects of COVID-19? Retrieved July 17, 2020, from <a href="https://news.umiamihealth.org/en/what-are-the-long-term-effects-of-covid-19/">https://news.umiamihealth.org/en/what-are-the-long-term-effects-of-covid-19/</a>

<sup>&</sup>lt;sup>47</sup> <u>https://coronavirus.jhu.edu/data/mortality</u> (Accessed 22, 2020)

unlikely negative outcomes. This phenomenon is part of the "fourfold pattern of risk."<sup>48</sup> For this reason, there are many people who face a small risk of death from COVID-19 but that assign a greater subjective assessment of their health risk. The same theory is applicable to financial risks as well, which helps to explain some of the backlash to the state-level lockdown orders.

Despite, the low fatality risks, it is important to note that the coronavirus is still dangerous, especially to older people, in part because so little is known about it. What is known, however, is that the COVID-19 pandemic is already the fourth deadliest event in U.S. history compared to wars and previous pandemics (see Figure III-2).

#### Mitigating the Outbreak

#### **Government Strategies**

The main goal of government policies thus far appears to be reducing or eliminating the spread of COVID-19 through public policy interventions until the availability of a safe and effective vaccine.<sup>49</sup> Some governments have tried to prioritize the economy in a tradeoff with accepting higher mortality rates. However, according to the BBC, for example, this strategy has generally failed to stave off economic challenges in Sweden.<sup>50</sup> There appears to be no, either-or choice relative to saving the economy or saving lives.

The strategies used thus far to accomplish the goal of controlling the spread of COVID-19 range from simple to complicated. As mentioned previously, encouraging the use of masks has become the primary method of attempting to mitigate spread until vaccination becomes possible. However, the success of that method hinges on widespread adoption. Other methods include, for example, temperature checks. However, Dr Anthony Fauci, Director of the National Institute of Allergy and Infectious Diseases, has said that temperature checks are not a reliable method of screening people for COVID-19. In fact, the White House has stopped employing the method entirely.<sup>51</sup>

<sup>&</sup>lt;sup>51</sup> <u>https://abcnews.go.com/Health/coronavirus-updates-us-records-56000-cases-1500-additional/story?id=72344689&cid=social\_twitter\_abcn</u>



<sup>&</sup>lt;sup>48</sup> Tversky A, Kahneman D. 1992. Advances in prospect theory: Cumulative representation of uncertainty. J Risk Uncertainty 5, 297–323. <u>https://doi.org/10.1007/BF00122574</u>

<sup>&</sup>lt;sup>49</sup> WHO. COVID-19 Strategy Update. April 14, 2020. <u>https://www.who.int/publications-detail/strategic-preparedness-and-response-plan-for-the-new-coronavirus</u>

<sup>&</sup>lt;sup>50</sup> https://www.bbc.com/news/business-53664354

Additionally, there may be more elaborate policies available to stave off economic contraction and help reopen the economy, such as contact tracing<sup>52</sup> and "immunity passports." Contact tracing is a form of surveillance. There are several methods of accomplishing this, but the more technically savvy methods require residents to install an application ("app") on their mobile phones. The app tracks all those who have come near another person with the app installed. When someone tests positive for a disease, the contact tracing app notifies any individual that came into proximity to that person in the previous days. Ideally, persons notified will practice heightened social distancing for some time and get tested for the disease. However, contact tracing must be adopted by about 60 percent of a population to be effective. As of mid-April, the most-used contact tracing app is in Iceland and even they had only achieved a 40 percent adoption rate.<sup>53</sup> Additionally, the success of such a program relies on quick and accurate viral testing, which is not yet available.<sup>54</sup>

Another method of controlling the spread of the disease is via the use of "immunity passports." This would allow for the identification of people that have already been infected with SARS-COV-2 and developed an immunity to COVID-19. Ideally, this would also permit a subset of the population to behave "normally," leaving a share of the economy unencumbered by the pandemic. However, for this to succeed, two things must be true. First, accurate serology testing must be made widely available. Second, recovery from COVID-19 must confer immunity in most cases. Unfortunately, neither the availability of accurate serology tests<sup>55 56</sup> nor immunity after initial infection<sup>57</sup> are a given.

Studies regarding SARS<sup>58</sup> and MERS,<sup>59</sup> both coronaviruses, show that antibodies dissipated after around two years. However, the same may not be true for SARS-CoV-2. One study, for example, shows that not all people that recovered from COVID-19 had measurable levels of antibodies,<sup>60</sup> though this does not necessarily mean that those

<sup>&</sup>lt;sup>52</sup> https://www.theatlantic.com/ideas/archive/2020/04/contact-tracing-could-free-america-from-its-quarantinenightmare/609577/

<sup>&</sup>lt;sup>53</sup> https://www.economist.com/science-and-technology/2020/04/15/app-based-contact-tracing-may-help-end-coronaviruslockdowns

<sup>&</sup>lt;sup>54</sup> Kretzschmar ME, Rozhnova G, Bootsma MCJ, van Boven M, van de Wijgert JHHM, Bonten MJM. Impact of delays on effectiveness of contact tracing strategies for COVID-19: a modelling study. July 16, 2020. doi:

https://doi.org/10.1016/S2468-2667(20)30157-2 https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(20)30157-2/fulltext

<sup>&</sup>lt;sup>55</sup> Bastos ML, Tavaziva G, Abidi SK, Campbell JR, Haraoui L-P, Johnston JC, Lan Z, Law S, MacLean E, Trajman A, Menzies D, Benedetti A, Khan FA. Diagnostic accuracy of serological tests for COVID-19: systematic review and meta-analysis, BMJ (2020). DOI: 10.1136/bmj.m2516 , www.bmj.com/content/370/bmj.m2516

<sup>&</sup>lt;sup>56</sup> <u>https://covidtestingproject.org/</u>

<sup>&</sup>lt;sup>57</sup> https://www.scientificamerican.com/article/what-immunity-to-covid-19-really-means/

<sup>&</sup>lt;sup>58</sup> Wu LP, Wang NC, Chang YH, et al. Duration of antibody responses after severe acute respiratory syndrome. Emerg Infect Dis. 2007;13(10):1562–1564. doi:10.3201/eid1310.070576. <u>https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2851497/</u>

<sup>&</sup>lt;sup>59</sup> Payne DC, Iblan I, Rha B, et al. Persistence of Antibodies against Middle East Respiratory Syndrome Coronavirus. Emerging Infectious Diseases. 2016; 22(10):1824-1826. doi:10.3201/eid2210.160706. <u>https://wwwnc.cdc.gov/eid/article/22/10/16-0706\_article</u>

<sup>&</sup>lt;sup>60</sup> medRxiv. "Neutralizing antibody responses to SARS-CoV-2 in a COVID-19 recovered patient cohort and their implications." <u>https://doi.org/10.1101/2020.03.30.20047365</u>

people did not develop or are losing immunity to the disease.<sup>61</sup> In some good news, research is beginning to show that infection does lead to immunity for most people, at least in the short-term, due to T-cell memory,<sup>62</sup> even for those with mild or asymptomatic cases.<sup>63</sup> It even appears possible that some people may gain immunity to SARS-CoV-2 without having ever been infected, due to cross-immunity gained by infection with other coronaviruses.<sup>64</sup> Nevertheless, as of August 2020, it was also starting to appear likely that neither of these policies will become realistic to enact any time soon, or before widespread vaccination becomes available. For this reason, RCG will assume that mitigation policies of this scope will not come to fruition.

#### **Individual Actions**

Despite the difficulties in mitigating the effects of the virus to the economy, reducing the spread of the virus may be as easy as widespread use of masks. A recent study has found that there is likely a connection between widespread use of masks and lower levels of virus spread.<sup>65</sup> Another study in Nature found that "surgical face masks could prevent transmission of human coronaviruses and influenza viruses from symptomatic individuals."<sup>66</sup> A 2020 British study shows that the public wearing masks at all times may reduce the reproduction number of the virus to less than one and mitigate spread of the virus without lockdowns.<sup>67</sup>

YouGov polling has found that countries with high rates of mask adoption are generally correlated with lower levels of spread.<sup>68</sup> In Asia, China, India and Singapore all have mask adoption rates of over 80 percent, as do France, Italy and Spain in Europe. Germany is slightly behind at over 60 percent. The UK, which lags far behind at around 20 percent, is also experiencing a significant surge in cases.

<sup>65</sup> Wong SH, Teoh JYC, Leung C-H, Wu WKK, Yip BHK, Wong MCS and Hui DSC. 2020. COVID-19 and Public Interest in Face Mask Use. Am. J. of Resp. and Critical Care Med. 0(ja) <u>https://doi.org/10.1164/rccm.202004-1188LE</u>

<sup>&</sup>lt;sup>61</sup> <u>https://www.nytimes.com/2020/07/31/opinion/coronavirus-antibodies-immunity.html</u>

<sup>&</sup>lt;sup>62</sup> Le Bert, N., Tan, A.T., Kunasegaran, K. et al. 2020. SARS-CoV-2-specific T cell immunity in cases of COVID-19 and SARS, and uninfected controls. Nature 584, 457–462. <u>https://doi.org/10.1038/s41586-020-2550-z</u>

<sup>&</sup>lt;sup>63</sup> Sekine T, Perez-Potti A, Rivera-Ballesteros O, Strålin K, Gorin J-B, Olsson A, Llewellyn-Lacey S, Kamal H, Bogdanovic G, Muschiol S, Wullimann DJ, Kammann T, Emgård J, Parrot T, Folkesson E, Karolinska COVID-19 Study Group, Rooyackers O, Eriksson LI, Henter J-I, Sönnerborg A, et. al. 2020. Robust T cell immunity in convalescent individuals with asymptomatic or mild COVID-19. Cell. August 14, 2020. DOI: <u>https://doi.org/10.1016/j.cell.2020.08.017</u>.

<sup>&</sup>lt;sup>64</sup> Mateus J, Grifoni A, Tarke A, Sidney J, Ramirez SI, Dan JM, Burger ZC, Rawlings SA, Smith DM, Phillips E, Mallal S, Lammers M, Rubiro P, Quiambao L, Sutherland A, Yu AD, Da Silva Antunes R, Greenbaum J, Frazier A, et. al. 2020. Selective and cross-reactive SARS-CoV-2 T cell epitopes in unexposed humans. August 4, 2020. DOI: 10.1126/science.abd3871.

<sup>&</sup>lt;sup>66</sup> Leung NHL, Chu DKW, Shiu EYC, et al. 2020. Respiratory virus shedding in exhaled breath and efficacy of face masks. Nat Med 26, 676–680. <u>https://doi.org/10.1038/s41591-020-0843-2</u>

<sup>&</sup>lt;sup>67</sup> Stutt ROJH, Retkute R, Bradley M, Gilligan CA, Colvin J. 2020. A modelling framework to assess the likely effectiveness of facemasks in combination with 'lock-down' in managing the COVID-19 pandemic. Proc. R. Soc. A 476: 20200376. http://dx.doi.org/10.1098/rspa.2020.0376

<sup>&</sup>lt;sup>68</sup> https://yougov.co.uk/topics/health/articles-reports/2020/06/04/covid-19-britons-still-wont-wear-face-masks

As a case study, Slovakia, which has successfully encouraged the widespread use of masks, builds upon this evidence with extraordinarily low caseloads and death counts, as of writing. In Slovakia, the new government that came to power in March quickly put into place policies mandating mask use by all senior government officials to set an example for the populace. It also launched a marketing campaign that destigmatized wearing masks.<sup>69</sup> Their work appeared to have paid off. As of mid-July, the country of about 5.5 million had fewer than 2,000 confirmed cases and only 28 deaths, according to Johns Hopkins. Norway and Finland—where mask use has been nearly non-existent according to YouGov—with nearly identical total populations compared to Slovakia, have seen 9,000 and 7,300 cases and 250 and 330 deaths, respectively. However, the country lifted the mask requirements in early June<sup>70</sup> and as of early-November has had a large spike in cases and deaths.

While wearing masks is likely part of the equation for reducing the spread of COVID-19, there are still many unknowns regarding how to control the spread of the virus. For example, scientists are still unsure of why in some European countries with low mask adoption spread has been more limited than in the U.S. since the lockdowns have been lifted.<sup>71</sup> Still, masks appear to be the single best method for reducing the spread of the virus.

Unfortunately, in the U.S., wearing masks has become politicized.<sup>72</sup> This is less surprising considering record polarization<sup>73</sup> in a presidential election year. Generally, Republican lawmakers have been less supportive of mask mandates,<sup>74</sup> though many have strongly suggested that their constituents should choose to wear them.<sup>75</sup> President Trump and several other lawmakers, however, had been critical of wearing masks for months. The President even went so far as to ridicule his election rival former Vice President Joe Biden for wearing one.<sup>76</sup> There was some renewed hope for mask adoption as in mid-July, President Trump donned a mask publicly for the first time and urged others to do the same.<sup>77</sup> However, that insistence was short-lived and hostility to masks has since regained momentum.<sup>78</sup>

According to the same YouGov polling discussed above, U.S. mask adoption is hovering close to 70 percent, but infections in the U.S. remain high and are rising. However, this apparent majority of mask-wearers could be

 <sup>&</sup>lt;sup>69</sup> <u>https://www.theatlantic.com/international/archive/2020/05/slovakia-mask-coronavirus-pandemic-success/611545/</u>
 <sup>70</sup> <u>https://www.reuters.com/article/us-health-coronavirus-slovakia-travel/slovakia-to-allow-travel-from-16-more-countries-</u>

ease-mask-rules-idUSKBN23G1EN

<sup>&</sup>lt;sup>71</sup> https://www.washingtonpost.com/world/2020/06/05/coronavirus-infections-havent-spiked-since-europe-loosenedlockdowns-there-are-many-theories-about-why/

<sup>&</sup>lt;sup>72</sup> https://www.politico.com/news/2020/05/01/masks-politics-coronavirus-227765

<sup>&</sup>lt;sup>73</sup> <u>https://nymag.com/intelligencer/2020/01/partisan-polarization-reaching-record-levels.html</u>

<sup>&</sup>lt;sup>74</sup> https://www.politico.com/news/2020/05/13/masks-republican-senators-doug-jones-254559

<sup>&</sup>lt;sup>75</sup> <u>https://thehill.com/homenews/senate/504365-rubio-everyone-should-just-wear-a-damn-mask</u>

<sup>&</sup>lt;sup>76</sup> <u>https://www.washingtonpost.com/politics/2020/06/25/trumps-dumbfounding-refusal-encourage-wearing-masks/</u>

<sup>&</sup>lt;sup>77</sup> <u>https://www.politico.com/news/2020/07/14/trump-urges-americans-to-wear-masks-361836</u>

<sup>&</sup>lt;sup>78</sup> <u>https://health.clevelandclinic.org/how-one-doctor-addresses-doubts-from-anti-maskers/</u>

misleading because mask adoption varies widely across states<sup>79</sup> and political affiliation<sup>80</sup> and, for this reason, there are swaths of the nation with low mask usage.

Providing further evidence of polarization driving mask adoption, a Gallup poll released in early July found that "majorities in each of these subgroups [women, Democrats, Northeasterners and households with annual incomes under \$36,000]—as well as education and age groups—say they wear a mask in public at least very often," with one exception—Republicans.<sup>81</sup> It should, therefore, not be surprising that the U.S. fall surge of COVID-19 cases has occurred predominantly in Republican-leaning states, though is not limited to those states.<sup>82</sup>

#### Seasonal Effects in Infection Spread & Severity

According to the National Institute of Health, there may be a seasonal component to the spread of SARS-CoV-2. However, it is too early to tell until more research is done, most of which will likely not be released until late summer or after.<sup>83</sup> However, a recent study found that the novel virus displays seasonal behaviors common to an average respiratory virus.<sup>84</sup> Additionally, an August 2020 study showed a relationship between case load and temperature in Brazil.<sup>85</sup> The authors found that there also appears to be a threshold temperature of about 79 degrees Fahrenheit above which there is no decline in virus spread. This helps account for the lack of a slowdown in spread during the U.S. summer, particularly in warmer southern states.

The Centre for Evidence-Based Medicine found evidence to support the idea that larger initial viral loads infections that begin with a greater number of viruses—may lead to more severe forms of COVID-19 and a higher risk of death.<sup>86</sup> This may be related to seasonal effects as well, based on research that showed that the SARS-CoV-2 virus is weak to sunlight and higher temperatures.<sup>87</sup> If fewer viruses survive in the air, then initial viral loads will probably be lower on average.

 <sup>&</sup>lt;sup>79</sup> <u>https://today.yougov.com/topics/politics/articles-reports/2020/05/08/states-are-more-and-less-likely-adopt-face-masks</u>
 <sup>80</sup> Tong S. Minnesota Public Radio. <u>https://www.marketplace.org/2020/07/28/behavioral-scientists-pandemic-decisions-why-we-make-them/</u>

<sup>&</sup>lt;sup>81</sup> https://news.gallup.com/poll/315590/americans-face-mask-usage-varies-greatly-demographics.aspx

<sup>&</sup>lt;sup>82</sup> <u>https://apnews.com/article/7aa2fcf7955333834e01a7f9217c77d2</u>

<sup>&</sup>lt;sup>83</sup> https://directorsblog.nih.gov/2020/06/02/will-warm-weather-slow-spread-of-novel-coronavirus/

<sup>&</sup>lt;sup>84</sup> Sajadi MM, Habibzadeh P, Vintzileos A, Shokouhi S, Miralles-Wilhelm F, Amoroso A. Temperature, Humidity, and Latitude Analysis to Estimate Potential Spread and Seasonality of Coronavirus Disease 2019 (COVID-19). JAMA Netw Open. 2020;3(6):e2011834. doi:10.1001/jamanetworkopen.2020.11834

 <sup>&</sup>lt;sup>85</sup> Prata DN, Rodrigues W, Bermejo PH. Temperature significantly changes COVID-19 transmission in (sub)tropical cities of Brazil. Science of The Total Environment. 2020; Volume 729, 138862. <u>https://doi.org/10.1016/j.scitotenv.2020.138862</u>
 <sup>86</sup> <u>https://www.cebm.net/covid-19/sars-cov-2-viral-load-and-the-severity-of-covid-19/</u>

<sup>&</sup>lt;sup>87</sup> Ahmed I. U.S. govt reveals details of sunlight study on virus. Medical Xpress, April 29, 2020. https://medicalxpress.com/news/2020-04-govt-reveals-sunlight-virus.html

The severity of the disease may vary based on various factors as well. For example, weather may not affect only the rate of spread, as discussed above, but how severe the disease may be. For this reason, Dr Fauci has suggested that events such as professional athletics should end their seasons prior to the start of fall.<sup>88</sup> Dr Robert Redfield, the director of the CDC, issued the same concerns regarding COVID-19 come fall.<sup>89</sup> These fears appear to be warranted. As of December 2020, recent spikes throughout the northern hemisphere confirm the suspicions that there is a seasonal component to the spread of COVID-19.

#### **B. CURRENT STATE OF PANDEMIC**

The major determinants regarding the future economic situation in the U.S. and Nevada in the wake of the pandemic are COVID-19 case load and deaths.<sup>90</sup> Comparing the most recent data on infections and deaths across nations and states over time better informs the assumptions within the main model. RCG has also developed three scenarios used in the model that describe the Best-Case, Most-Likely-Case and Worst-Case outcomes relative to the Nevada economy.

#### **COVID-19 Statistics**

In this section, RCG analyzes various statistics concerning COVID-19, comparing the U.S. to other nations as well as comparing Nevada to other states. This said, it can be difficult to make comparisons between geographic areas for various reasons. There are inconsistencies in the availability of viral tests, their accuracy and the way COVID-19 cases and deaths are defined in general.<sup>91</sup>

It must be noted that the data collected on the number of infections generally include only cases confirmed via viral testing, typically done using a nose swab.<sup>92</sup> Because most people have mild symptoms, most do not opt to get tested. For this reason, serology studies have suggested significantly higher rates of infection than discovered through viral testing.<sup>93</sup>

 <sup>&</sup>lt;sup>88</sup> https://www.latimes.com/sports/dodgers/story/2020-06-16/anthony-fauci-says-mlb-season-shouldnt-extend-into-october
 <sup>89</sup> https://www.webmd.com/lung/news/20200812/redfield-this-fall-could-be-the-worse-weve-seen

<sup>&</sup>lt;sup>90</sup> RCG has not examined hospitalizations because they could not be fairly compared across geographies. Additionally, we assume that hospitalizations and deaths are correlated and that deaths will grow at a faster rate beyond some threshold of occupied hospital beds.

<sup>&</sup>lt;sup>91</sup> <u>https://coronavirus.jhu.edu/testing/testing-faq/overview</u>

<sup>&</sup>lt;sup>92</sup> <u>https://www.cdc.gov/coronavirus/2019-ncov/testing/diagnostic-testing.html</u>

<sup>&</sup>lt;sup>93</sup> Havers FP, Reed C, Lim T, et al. Seroprevalence of Antibodies to SARS-CoV-2 in 10 Sites in the United States, March 23-May 12, 2020. JAMA Intern Med. Published online July 21, 2020. doi:10.1001/jamainternmed.2020.4130

Another complication is that these data are changing day-to-day. The data presented herein are as of August 31, 2020. However, for the purposes of the Study, the exact and most recent figures below are not as important as the trends and patterns they depict. This is why RCG has discussed the data herein at a high level as they are relevant to the trends that inform the scenario inputs in the model.

National trends and policy directly affect Nevada. Therefore, it is important to first discuss these statistics at the national level. In terms of case load, the U.S. is one of the later hit developed nations. However, once cases in the U.S. started to climb, the country quickly overtook other countries in confirmed cases, and it has since built a substantial, unfortunate lead (see Figure III-3). This noted, as the third most populous nation in the world, total case load in the U.S. might be somewhat misleading. Accordingly, it is also important to examine cases per 100,000 persons.<sup>94</sup> But, even in this indicator, the U.S. fares poorly. Among all countries, the U.S. is eighth in cases per 100,000 as of August 31.

This is made worse when considering that five out of the top 10 nations are essentially high-density city-states, such as Qatar, Bahrain and San Marino (see Figure III-4). Compared to countries with a population of at least 50 million, the U.S. case load saw a slightly delayed increase relative to other Western nations. Nevertheless, since then, the virus has spread quickly and largely unimpeded, despite state-wide lockdowns in March and April. The rate of increase slowed during May and June, but then once again started accelerating, though looked to have slowed down a bit in August (see Figure III-5). At the end of August, in cases per 100,000 persons, the U.S. was essentially tied in first with Brazil, though a hair behind as the U.S. (1,827 cases per 100,000) was overtaken in the final days of August by Brazil (1,852 per 100,000). In a distant third and fourth came Colombia and South Africa, out of the 29 high-population nations (see Figure III-6).

The U.S. also led the world in total deaths (see Figure III-7). In terms of deaths per 100,000 persons, the U.S. was 11th globally (see Figure III-8). Notable countries doing worse than the U.S. in this metric are Belgium, the United Kingdom, Spain, Chile, Italy, Brazil and Sweden. Compared only to countries with a population of at least 50 million, U.S. deaths per 100,000 are steadily climbing (see Figure III-9). If current trends hold, the U.S. will soon overtake both Italy and the United Kingdom. On the other hand, other countries are doing even worse in containing recent deaths. Brazil overtook the U.S. in this metric in August and Mexico is likely to do so in September. At the end of August, among high-population countries, the U.S. had the fourth highest death toll per 100,000 in the world, 56 deaths per 100,000 (see Figure III-10). This rate compared poorly relative to countries like Germany (11 deaths per 100,000 persons), Japan (1.0) and South Korea (0.6), one of the first countries hit by

<sup>&</sup>lt;sup>94</sup> Because medical researchers (as with JHU's Coronavirus Research Center) tend to report indicators as per 100,000 persons rather than per capita, the case load and death charts herein do the same.

COVID-19. By any measure, the U.S. has done a poor job responding to the pandemic compared to other nations, and it has negatively affected the economy, according to officials at the Federal Reserve.<sup>95</sup>

Within the U.S., it was useful for the purposes of the Study to compare Nevada to the rest of the nation in terms of COVID-19 statistics. At the state-level, relative to case load, Nevada appears to be middle-of-the-pack (see Figure III-11). However, as a state with a moderately-sized population, that does not convey much information. The states are better compared per 100,000 persons. In this case, caseloads in Nevada appear to be among the fastest growing (see Figure III-12) and Nevada is one of the worst performing states overall as well (see Figure III-13). As of August, Nevada sits at ninth out of 52, including Washington DC and Puerto Rico (see Figure III-14).

In terms of COVID-19-related deaths, Nevada is ranked further down relative to other states (see Figure III-15). Relative to every 100,000 persons, it appears that the deaths per 100,000 persons outpaces most other states (see Figure III-16). However, Nevada appears to lie near the middle of states overall (see Figure III-17). At the end of August, Nevada is 21st out of 52 states and territories in this metric, just in the upper half of the rankings (see Figure III-18). The country's hardest hit region has been the Northeast. New Jersey and New York are the hardest hit states with Massachusetts and Connecticut coming in at three and four. The first state outside of this region was in fifth, Louisiana.

Unfortunately, CDC research suggests that COVID-19 deaths are being undercounted, based on death counts and expected mortality during the peak infection period in New York City.<sup>96</sup> COVID-19-associated deaths are also likely being undercounted relative to the flu, as annual flu deaths are based on statistical analysis rather than recorded cause of death.<sup>97 98</sup> However, RCG has assumed that these biases are occurring all over the country and, therefore, do not skew Nevada COVID-19 deaths counts relative to other states.

Generally, the data relative to the U.S. and Nevada indicate that as of August, the U.S. is doing a poor job of containing the pandemic compared to other countries, while at the state-level, Nevada is doing a mediocre job of containing the virus compared to other states. However, luckily, despite the high rate of spread of the disease, Nevada has been thus far spared from a relatively high death toll.

<sup>&</sup>lt;sup>95</sup> Condon C and Saraiva C. Fed Officials Blame U.S. Failures on Virus for Sapping Recovery. August 12, 2020.

https://www.bloomberg.com/news/articles/2020-08-12/fed-s-rosengren-says-failure-to-contain-virus-hurting-recovery <sup>96</sup> Preliminary Estimate of Excess Mortality During the COVID-19 Outbreak — New York City, March 11-May 2, 2020. MMWR Morb Mortal Wkly Rep 2020;69:603-605. DOI: <u>http://dx.doi.org/10.15585/mmwr.mm6919e5</u>

<sup>&</sup>lt;sup>97</sup> CDC. How CDC Estimates the Burden of Seasonal Influenza in the U.S. <u>https://www.cdc.gov/flu/about/burden/how-cdc-estimates.htm</u>

<sup>&</sup>lt;sup>98</sup> Walker AS, Jones LW and Gamio L. June 19, 2020. Is the Coronavirus Death Tally Inflated? Here's Why Experts Say No. <u>https://www.nytimes.com/interactive/2020/06/19/us/us-coronavirus-covid-death-toll.html</u>

Additionally, there has been some evidence that people have been heeding mitigation advice. One study showed that infection rates fell dramatically after an initial surge in regions all over the world.<sup>99</sup>

#### **C. ECONOMIC MODEL DESIGN**

Modeling the economic situation relative to the pandemic is a difficult task. First, basic univariate methods are likely to fail because the pandemic presents an economic shift. Second, there are simply not enough data to forecast economic variables analytically in a multivariate model. There are several variables that are helpful to the model, but not enough post-pandemic observations to estimate the variables' coefficients with any certainty. Another complication is that psychological/behavioral and sociological effects are driving much of the response to the pandemic and associated economic outcomes. That makes it even more difficult to measure and predict. For this reason, RCG chose to take a less rigidly statistical approach to modeling economic outcomes relative to the pandemic. The model is based on applying what we think are reasonable assumptions, backed by data and the economic and medical literature, relative to certain drivers that shift a baseline level of GDP. The purpose of this section is to describe these assumptions based on the sources cited throughout the Study.

The model that drives the Study's results has been performed in a series of steps. The first step defines the scenarios based on certain driver variables. Those variables are driven by assumptions that underlie three scenarios. Next, RCG applied those variables to drive decreases to a baseline GDP forecast that assumes the pandemic never occurred. Finally, the finalized GDP forecast has been used to forecast various indicators of interest.

Based on the information discussed below, RCG created three scenarios for the Nevada economic forecasts produced in the Study, in addition to a hypothetical fourth "No-Pandemic" scenario, the baseline GDP forecast. These scenarios should provide a reasonable range of economic outcomes with which the Client can make more informed decisions relative to the Nevada economy over the course of the next several quarters. The scenarios are:

- No-Pandemic
- Best-Case
- Most-Likely-Case
- Worst-Case

<sup>99</sup> Atkeson A, Kopecky K, Zha T. 2020. Four Stylized Facts about COVID-19. NBER Working Paper No. 27719, August 2020. DOI: 10.3386/w27719. <u>https://www.nber.org/papers/w27719</u>

As the name suggests, the No-Pandemic scenario assumes that the pandemic never occurred. The Best-Case scenario presented an optimistic case of the economic outcomes stemming from COVID-19. The Most-Likely-Case scenario represents a most-likely outcome, based on the research discussed, while the Worst-Case scenario reflects a pessimistic view of events.

Basing this model on a baseline forecast that assumes that the pandemic did not occur carried the implied assumption that the structure of the post-pandemic economy changed only relative to factors directly caused by the pandemic. This means that if the economy returns to normal today (i.e. COVID-19 is cured and everybody returns to work), GDP will return to its pre-pandemic level and trend. This may not have been an ideal assumption but based on the economy's initial bounce back after the lockdown, it appears to be a reasonable assumption over the short-run.

The forecast horizon of the Study is from approximately Q2, 2020 to Q4, 2021, depending on when the most recent data have been released for each indicator.

#### GDP Model

#### "No-Pandemic" GDP Forecasts

As discussed above, to project inflation-adjusted ("real") GDP and other indicators into the future, RCG required a baseline real GDP forecast for the state. The baseline forecast, in 2020 dollars, estimates Nevada's real GDP assuming the COVID-19 pandemic did not occur (see Figure II-1). This has been compared to the actual values of GDP that did occur in 2020. This is done so that we could later apply certain "change" factors to the baseline that arrive at the actual values thus far and then to project those "change" factors to forecast future GDP. The model includes natural economic growth because the baseline forecast is in real terms. The model is based on data dating to 2014.

The GDP data have been obtained from the Bureau of Economic Analysis ("BEA"). To produce the baseline GDP forecast, RCG employed the Autoregressive Integrated Moving Average ("ARIMA") method.<sup>100</sup> RCG relied on a version of the Hyndman-Khandakar algorithm<sup>101</sup> to produce initial results and then ran several variations of the

<sup>&</sup>lt;sup>100</sup> RCG expects that the series, including the total, will not exhibit seasonal behaviors. That is, in fact, what the results showed. Additionally, we found a differencing value of 1 (ARIMA(0,1,0) model), which is expected and in line with the economic literature.

<sup>&</sup>lt;sup>101</sup> Hyndman, R. J. & Khandakar, Y. (2008). Automatic time series forecasting: The forecast package for R. Journal of Statistical Software, 27(1), 1–22. <u>https://doi.org/10.18637/jss.v027.i0</u>

models in order to choose a reasonable set of findings. RCG double-checked these findings using several visual and analytical tests.<sup>102</sup>

#### **Setting Up Scenarios**

After estimating the baseline, No-Pandemic real GDP, RCG continued estimating GDP under the three scenarios (Worst-Case, Most-Likely-Case and Best-Case). These scenarios are based on the baseline GDP forecasts and three variables:

- Phase Effects,
- Self-Isolation Effects and
- Unemployment Insurance ("UI").

The discussion below described how the three factors have been used relative to the No-Pandemic GDP case to produce the results discussed in the previous section. It should be noted that there is also uncertainty around public policy options. Each potential new future policy will make it more difficult to model the impacts.

#### Length of Pandemic

Before discussing the three main effects, it is necessary to discuss the assumptions regarding the duration of the pandemic. We assume that both phasing and self-isolation will end based on the time to widespread vaccination or herd immunity, whichever occurs first. According to Dr Fauci, the economy will not return to normal—as it was before COVID-19—until there is a vaccine.<sup>103</sup> In terms of time to achieving herd immunity, it is too early to estimate when that might happen. Based on the studies discussed above, there is too much uncertainty relative to what share of the population has been infected. Additionally, the concept of herd immunity may not apply to a novel virus. Per Dr Michael Osterholm, an epidemiologist at the University of Minnesota, it is possible that neither natural disease nor vaccine provide long-term immunity. If this were to be the case, then COVID-19 could be active for decades and simply becomes something that humans must survive.<sup>104</sup> However, because this possibility lies outside of the time horizon of the Study, it is not included in the model.

<sup>102</sup> RCG has used autocorrelation function ("ACF") and partial autocorrelation function ("PACF") plots to confirm that the model of each series is reasonable and does not contain autocorrelation. In addition, it has been necessary to run unit-root tests, Shapiro tests for normality and Ljung-Box tests to rule out the presence of autocorrelation in the models.

<sup>103</sup> C-SPAN (2020, April 6). President Trump with Coronavirus Task Force Briefing. Retrieved from <u>https://www.c-span.org/video/?470990-1/president-trump-coronavirus-task-force-briefing</u> (38:00)

<sup>&</sup>lt;sup>104</sup> <u>https://www.marketwatch.com/story/osterholm-americans-will-be-living-with-the-coronavirus-for-decades-2020-07-</u> 30?siteid=yhoof2&yptr=yahoo



According to the New York Times, there were 126 vaccines in development at the end of August.<sup>105</sup> However, even if a vaccine were ready today, it would take time to produce and distribute that vaccine, although prepurchased vaccines may help speed distribution.<sup>106</sup> Wealthy countries will likely horde doses to inoculate their populations before exporting vaccines.<sup>107</sup> In the case of the U.S., this will speed vaccination relative to less developed nations. Another possible problem is that the global supply chain may not be up to the task of quickly distributing a vaccine worldwide.<sup>108</sup> Still, in light of these variables, according to the USA Today's pandemic science panel, a vaccine should attain widespread attainability by the mid-2021. Additionally, a survey found that a plurality of physicians think that the virus will be under control after June 2021.<sup>109</sup> Furthermore, in early September, Dr Fauci predicted a completed vaccine around the end of the year.<sup>110</sup> However, according to Science, only about 50 percent of Americans plan to get the vaccine when it becomes available, with another 25 percent that are still unsure.<sup>111</sup>

Relative to the research discussed, in the Worst-Case scenario, RCG has assumed that no vaccine will be discovered before 2022, resulting in a prolonged economic emergency. In the Most-Likely-Case, we have assumed widespread availability of a vaccine in July 2021. In the Best-Case, availability will occur in April 2021.

#### **Phase Effects**

Phase effects refer to negative modifiers to GDP that will be caused by government-mandated business lockdowns. These lockdowns shutter businesses and effectively halt economic activity. They appear to help limit the spread of COVID-19.<sup>112</sup> RCG produced a timeline of the phased lockdowns based on Governor Sisolak's state of emergency directives. The governor has since stated that he plans on moving away from a "phased" system of lockdowns.<sup>113</sup> However, because the phases in this model have been used as a vehicle to develop a rate of active

110 https://www.youtube.com/watch?v=sP0kwLBzERA

 <sup>&</sup>lt;sup>105</sup> <u>https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html</u> (Accessed August 31, 2020)
 <sup>106</sup> U.S. Department of Health & Human Services. Trump Administration collaborates with Moderna to produce 100 million doses of COVID-19 investigational vaccine. August 11, 2020. <u>https://www.hhs.gov/about/news/2020/08/11/trump-administration-collaborates-with-moderna-produce-100-million-doses-covid-19-investigational-vaccine.html</u>
 <sup>107</sup> <u>https://www.nature.com/articles/d41586-020-01063-8</u>

 <sup>&</sup>lt;sup>108</sup> <u>https://www.bloomberg.com/news/articles/2020-07-25/the-supply-chain-to-save-the-world-is-unprepared-for-a-vaccine</u>
 <sup>109</sup> The Physicians Foundation. 2020 Survey of America's Physicians COVID-19 Impact Edition: A Survey Examining How
 COVID-19 is Affecting and is Perceived by the Nation's Physicians: PART ONE OF THREE: COVID-19's Impact on Physicians' Practices and Their Patients. <u>http://physiciansfoundation.org/wp-content/uploads/2020/08/20-1278-Merritt-Hawkins-2020-Physicians-Foundation-Survey.6.pdf</u>

<sup>&</sup>lt;sup>111</sup> <u>https://www.sciencemag.org/news/2020/06/just-50-americans-plan-get-covid-19-vaccine-here-s-how-win-over-rest</u>

<sup>&</sup>lt;sup>112</sup> Friedson AI, McNichols D, Sabia JJ, Dave D. 2020. Did California's Shelter-in-Place Order Work? Early Coronavirus-Related Public Health Effects. NBER Working Paper No. 26992, April 2020. DOI: 10.3386/w26992. https://www.nber.org/papers/w26992

<sup>&</sup>lt;sup>113</sup> Sadler J. Nevada scraps phased reopening plan, takes new approach. Las Vegas Sun. July 27, 2020. https://lasvegassun.com/news/2020/jul/27/nevada-scraps-phased-reopening-plan-new-approach/

jobs in Nevada, rather than directly employ the phases as variables, our methodology in this regard should be appropriate. Additionally, if hospitalizations begin to spike in the fall, the governor may return to the phasing structure.

There have been five official phases of reopening described by the state government. We refer to these phases as: Phase 0, Phase 1, Phase 2, Phase 3 and Phase 4, ranging from lockdown to back-to-normal. These phases have been intended to be rolled out based on certain milestones relative to COVID-19 case-loads. However, the New York Times reported that few states that had planned to lift their lockdowns or had already done so by early May had met the White House guidelines for reopening.<sup>114</sup> Nevada was in this group, as are most states.<sup>115</sup>

RCG uses definitions herein for the lockdown phases' inactive jobs, by industry, from the Governor's Office of Economic Development ("GOED"). This information reflected which sectors' businesses could remain open during each phase. Phase 0 referred to a total lockdown. Only those businesses deemed "essential" could remain open. RCG employed the GOED definitions to estimate weighted averages for the share of active workers in each two-digit NAICS<sup>116</sup> industry. In Phase 0, businesses accounting for slightly more than 70 percent of workers could remain open (see Table III-1).<sup>117</sup> In every successive phase, more businesses will likely be able to open. Phase 4 represented a "normal" economy—no mandated business closures, meaning after the pandemic has ended. Additionally, RCG added a sixth phase to the mix. Through the July 10, 2020 Directive 027, the Governor declared that bars and taverns not licensed to serve food may only offer pick-up and delivery service. RCG assumes that these establishments will not open at all based on this restriction and referred to this altered version of Phase 2 as Phase 1.5.

The following explanation provided a sample of the method employed relative to the phasing. In the case of Phase 0, there will likely be a significant dampening effect on GDP. About 30 percent of jobs will be potentially inactive during Phase 0 (this is a lower-bound for the share of active jobs because not all locked down businesses will potentially lay-off all their workers). Research has shown that every one percent decline in GDP correlates to about a one percentage-point increase in the unemployment rate.<sup>118</sup> Assuming that a one percentage-point

<sup>&</sup>lt;sup>114</sup> <u>https://www.nytimes.com/interactive/2020/05/07/us/coronavirus-states-reopen-criteria.html</u>

<sup>&</sup>lt;sup>115</sup> <u>https://www.vox.com/2020/5/28/21270515/coronavirus-covid-reopen-economy-social-distancing-states-map-data</u> <sup>116</sup> NAICS refers to the North American Industry Classification System, the industry organization system for industry-related economic data used by North American government statistics bureaus, such as the BEA. Two-digit NAICS codes refer to industry super-sectors—the highest level of industry classification.

<sup>&</sup>lt;sup>117</sup> As a note, this assumes that these jobs will be available again post-lockdown. The historical share may be correct but that could change if one industry is disproportionally affected post-pandemic. For example, if only 70 percent of tourism jobs come back, but all other industries return to pre-Covid levels, then the share of active workers in each industry will change. <sup>118</sup> Chien Y. 2020. "How Bad Can It Be? The Relationship between GDP Growth and the Unemployment Rate". Federal Reserve Bank of St. Louis Economic Research Economic Synopses, 2020, No. 16.

increase in the unemployment rate roughly corresponds to a one percent decline in nonfarm jobs, there should be a 1:1 relationship between percent change in jobs and percent change in GDP.<sup>119</sup> However, because this represents a lower-bound and because there is wiggle room in this particular analysis, since RCG had to manually estimate variable effects—an unavoidable drawback to the problem of a lack of data—we applied a 25 percent modifier to the 30 percent change in jobs to obtain the change in GDP. This has resulted in an approximately eight percent dampening effect relative to the No-Pandemic forecasted GDP on days where Nevada was in Phase 0 lockdown. We have repeated this method for each phase and estimated a weighted average of this effect based on the number of days that each phase will potentially be in effect over the course of a quarter.

Following the steps above, RCG designed three scenarios for future phasing to correspond to the model's three scenarios (see Table III-2). The phase timelines concerning historical data have been produced based on the Governor's directive dates. The three scenario future timelines have been based on research discussed above. Reopening the economy will be an iterative process. In fact, large events, such as concerts, nightclubs, bars and sporting events, may not reopen to the public until fall 2021.<sup>120</sup>

In the Worst-Case, RCG assumes that infections, hospitalizations and deaths will surge in the fall through earlyspring, leading to another Phase 1 shutdown, then reopening slightly to Phase 1.5, before returning to Phase 2 through 2021. In the Most-Likely-Case, RCG assumes that there will be a minor surge of cases in the fall and winter of 2020, but that the state would remain in Phase 2 throughout for economic reasons. The state would then move to Phase 3 in April before completely reopening in September 2021. In the Best-Case, RCG assumes that the state will move to a Phase 3 reopening in December 2020, with widespread vaccination and Phase 4 following in April 2021.

#### Self-Isolation Effects

The second effect included in the model is the "Self-Isolation" effect. People are generally risk averse, which should lead to an increased propensity to shelter at home for many people, which is independent of governmentmandated lockdowns. This self-isolation is most likely to lead to a reduction in spending that negatively affects GDP. In short, lockdowns take away the ability for people to participate in the economy, whereas, with self-

<sup>&</sup>lt;sup>119</sup> RCG's model assumes that employment is an exogenous variable to GDP. This assumption becomes stronger as more periods are forecasted. However, because the forecast horizon is relatively short, we think this is reasonable. <sup>120</sup> https://www.nytimes.com/2020/04/10/magazine/coronavirus-economy-debate.html



https://research.stlouisfed.org/publications/economic-synopses/2020/04/16/how-bad-can-it-be-the-relationship-between-gdp-growth-and-the-unemployment-rate

isolation, people choose to limit their activity in the economy.<sup>121</sup> RCG expects that over the course of the pandemic, self-isolation will likely pose the bigger cumulative threat to economic growth.

In calibrating our model, we assume three timelines (one for each scenario) relative to the effects of self-isolation on the economy (see Table III-3). These dampening effects represent percentages of lost economic activity starting as of certain dates. A 0.1 effect refers to a 10 percent decline in GDP relative to the No-Pandemic baseline. For example, relative to the Most-Likely-Case, RCG assumes a dampening effect of 0.09 starting in mid-March, rising to 0.12 in April 2020 through April 2021, then dropping to 0.08 in May 2021, to 0.05 in July 2021 before dropping to zero by the end of 2021.

RCG has arrived at these dampening effect figures by trial and error. Based on the phasing effects discussed above and the effects of unemployment benefits discussed below, these dampening effect due to self-isolation best fit the data.

There is a complication that could elongate this downward pressure on the economy. There is evidence suggesting that even if an effective vaccine were to be released in the middle of 2021, many people will decline vaccination. This is likely to cause the pandemic to go on longer than anticipated. A pair of recent polls, one by Pew Research<sup>122</sup> and one by the Associated Press,<sup>123</sup> show that approximately 50 percent of Americans definitely plan on getting vaccinated and about 75 percent say that they will probably get vaccinated. That is close to the currently assumed threshold of 70 percent that the Mayo Clinic has reported as necessary to stem the spread of the virus.<sup>124</sup> It is very possible that due to low rates of vaccination, the virus continues to spread and to dampen economic growth due to continued self-isolation among vulnerable populations, particularly the elderly.

Additionally, any vaccine created is likely to produce less than 100 percent immunity. This could limit the severity of the disease but possibly not the spread. Dr. Drew Weissman of the University of Pennsylvania told Fortune that "If the best COVID-19 vaccine is only 50 percent effective, 'that's still to me a great vaccine."<sup>125</sup> While a 50 percent-effective vaccine will do much to stem COVID-19, the continuing transmission will likely lead to a lengthening in people's fear of the virus and, therefore, a longer-lasting propensity to self-isolate.

<sup>124</sup> https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/herd-immunity-and-coronavirus/art-20486808
 <sup>125</sup> https://fortune.com/2020/06/28/coronavirus-vaccine-protection-trials-effective/

<sup>&</sup>lt;sup>121</sup> This effect should also be influenced by consumer demand more broadly and shifting budget constraints. There is a chance that people will not necessarily choose to self-isolate but will have to as a result of exogenous budget/employment factors. Nevertheless, whatever the reason for self-isolation, it is still likely to have the same relative impact and be captured in the model.

<sup>&</sup>lt;sup>122</sup> <u>https://www.pewresearch.org/fact-tank/2020/05/21/most-americans-expect-a-covid-19-vaccine-within-a-year-72-say-they-will-get-vaccinated/</u>

<sup>&</sup>lt;sup>123</sup> https://apnews.com/dacdc8bc428dd4df6511bfa259cfec44
Based on the above, in the Worst-Case scenario, RCG assumes a 10 percent hit to GDP through September, then rising to 15 percent in the fall and lasting throughout the forecast horizon in this scenario. In the Most-Likely-Case, we assume that this effect decreased to 7.5 percent in April but will then increase back up to 10 percent in October, before returning to 7.5 percent in the spring. It will then decline to five percent with the introduction of the vaccine in July 2021 through the remainder of the year. In the Best-Case scenario, RCG assumes that the self-isolation effect decreased to five percent in April and will go to one percent in July 2021 through the end of 2021.

In general, in the Worst-Case scenario, RCG assumes that self-isolation will increase due to heightened fears of venturing outside caused by hypothetically increased deaths in the fall. In the Most-Likely-Case, RCG assumes that self-isolation remains at summer 2020 levels in the fall and winter due to a modest increase in deaths and then declines further over the course of 2021, eventually to zero by the end of the year. We also assume that some propensities to self-isolate will remain after widespread distribution of a vaccine because polls show that many people are not planning vaccinations right away. This will likely lead to lingering infections and, therefore, fear of infection. In the Best-Case scenario, we assume a small amount of lingering fear starting in the summer due to only small levels of continuing transmission of COVID-19 following an April vaccine.<sup>126</sup>

#### Unemployment Insurance ("UI")

The third major variable in the model is unemployment insurance. With the large number of unemployed workers in the state, a significant portion of personal income comes from these payments. There are two components: state UI and federal UI. The federal UI is meant to enhance state UI benefits and hold households over during the pandemic.

To estimate these monies, RCG has collected data from the Nevada Department of Employment, Training and Rehabilitation ("DETR") on the number of unemployment claims as well as the payment amounts. RCG then made various assumptions about the number of unemployed persons that will be receiving these benefits as well as the amounts they are likely to receive through the end of 2021. We assume there will be no change to the weekly historical claim payment, which was \$369 per week in July 2020.<sup>127</sup> Again, there are three scenarios describing these outcomes. All dollar amounts are in 2020 dollars to match our GDP forecast.

First, RCG developed assumptions relative to the number of unemployed persons collecting UI benefits. Generally, we assume that the number of those receiving benefits will remain at the levels of the most current data, about

 <sup>&</sup>lt;sup>126</sup> As a note, to some extent, the self-isolation effect could be different between tourism-centric and other industries.
 <sup>127</sup> <u>http://nvlmi.mt.gov/Portals/197/UI%20Monthly%20Claims%20Press%20Release/Dashboards/UIMonthlyDashboard.html</u>

232,200 claims per month in the state.<sup>128</sup> This will continue until widespread distribution of a vaccine, at which time people should start finding employment again. This assumes that the labor market is in steady-state, as of October 2020. Then, because all these levels are relative to a baseline GDP, it is necessary to subtract out the standard unemployment benefits that will occur in normal times. We then assume that the number of those accepting UI benefits will decline linearly until reaching the levels estimated for the end of 2021 in the three scenarios (see Table III-4). This assumes the number of workers at the end of 2021 controls in part for the speed of the recovery. We also have assumed that people will go back to work when called in or upon finding a new job, which should happen in a timely manner despite receiving UI benefits.<sup>129</sup>

For the Worst-Case, because RCG assumes that there will be no vaccine available before the end of 2021, total persons receiving UI benefits remained at their October level throughout the forecast horizon. In the Most-Likely-Case, RCG assumes total UI claims will drop to 100,000 average monthly claimants by the end of 2021. This assumes that the state will regain about two-thirds of its jobs relative to October 2020. In the Best-Case, we assume that unemployment claims will return to 20,000 monthly claimants, approximately their pre-recession levels.

Relative to the amount of the UI benefits, RCG assumes that the state UI benefits will remain unchanged compared to what they had been in July 2020. For the federal enhanced UI benefits, which may have started for some as early as late March,<sup>130</sup> RCG used a different set of assumptions for each scenario (see Table III-5). In the Worst-Case, we assume that gridlock in Washington DC will continue to keep new enhanced benefits from taking effect.<sup>131</sup> In the Most-Likely-Case, we assume enhanced benefits of \$300 per week will begin as of January 24, 2021. Recent reports indicate that lawmakers may not strike a deal until the next Congress begins. We have also assumed that these enhanced funds will decrease to \$200 per week in April 2021 with benefits coming to an end in June 2021. In the Best-Case scenario, we have assumed that enhanced benefits will resume at \$600 per week in January 2021, declining to \$400 per week in April 2021 and continuing through the end of 2021.

Those UI benefits should also continue to benefit the economy through the "multiplier effect," which accounts for future spending of those same monies. To account for this effect, we applied a multiplier of 1.29, based on household spending induced effects in the most recent IMPLAN input-output<sup>132</sup> model for Clark County.

<sup>129</sup> Faberman J, Ismail AH. How Do Unemployment Benefits Relate to Job Search Behavior? Federal Reserve Bank of Chicago, Chicago Fed Letter, No. 441, June 2020. <u>https://www.chicagofed.org/publications/chicago-fed-letter/2020/441</u>

<sup>&</sup>lt;sup>132</sup> IMPLAN is a widely used economic input-output model. For more information, visit www.implan.com.



<sup>&</sup>lt;sup>128</sup> RCG assumes that all jobs have the same relative impact on GDP, though this is not strictly true.

<sup>&</sup>lt;sup>130</sup> https://www.reviewjournal.com/business/nevada-jobless-to-receive-600-weekly-benefit-retroactively-2003673/

<sup>&</sup>lt;sup>131</sup> https://thehill.com/homenews/senate/512314-mcconnell-not-certain-there-will-be-a-fifth-coronavirus-package

#### **Model Limitations**

The purpose of the model is to capture the major effects of various behaviors and policies to produce reasonable estimates of GDP through 2021. RCG believes that the model is successful in this respect. However, there are factors at play that are only implicitly included or, in some cases, left out altogether.

One major limitation of this model is discussed above. Because there are not enough data available, RCG estimates the effects of the model manually. At the time of writing, there are only two state-level data points collected relative to the pandemic. Therefore, there is more than one solution to the hypothetical econometric formula estimated.

In the case of federal stimulus stemming from the CARES Act, some policies are included implicitly, while others have explicitly not been included. For example, RCG did not include the \$1,200 direct individual stimulus. Data on the personal saving rate show that saving in April spiked to an unprecedented 33.5 percent.<sup>133</sup> This suggests that households are aware of the possibility of dire financial outcomes over the course of the pandemic and are putting aside funds to hold them over if necessary. In fact, a recent Forbes analysis has found that as much as 40 percent of households are saving all the funds they received from the one-time payment.<sup>134</sup> Money saved today is money spent tomorrow, so to speak. Therefore, because RCG assumes that all UI benefits will be spent immediately, we chose to be conservative with respect to the stimulus checks and assume that none of it will be immediately spend. We think this is a reasonable assumption because in our Most-Likely-Case and Best-Case scenarios, UI monies amount to far more than the stimulus checks, and also because there is still so little information available about how all these monies have been used. This assumption linking UI to the stimulus should offset changes in the saving rate.

In the case of the Paycheck Protection Program ("PPP")—a program that dispenses loans meant to incentivize small businesses to keep their workers<sup>135</sup>—those monies have been not included in the model explicitly. However, because RCG used assumptions relative to the number of unemployed workers in the model, we did make implicit assumptions regarding the program.

There are several other provisions in the CARES Act. However, we assume that they will have relatively small effects on GDP. Furthermore, by definition, business-to-business transactions do not directly affect GDP.<sup>136</sup> Of

<sup>&</sup>lt;sup>136</sup> <u>https://www.bea.gov/help/faq/1197</u>



<sup>&</sup>lt;sup>133</sup> <u>https://fred.stlouisfed.org/series/PSAVERT</u>

<sup>&</sup>lt;sup>134</sup> https://www.forbes.com/sites/jimwang/2020/06/25/how-are-americans-spending-stimulus-checks/#c861e81e3117

<sup>&</sup>lt;sup>135</sup> <u>https://www.sba.gov/funding-programs/loans/coronavirus-relief-options/paycheck-protection-program</u>

course, these transactions do affect GDP indirectly. Still, we assume that there will be no major disruptions to business aside from those related to the pandemic.

Another limitation stemmed from lag effects caused by the economic crisis. For example, as spending declines, future revenues to the state and municipalities should decline as well. The secondary effects of these declines on future GDP is difficult to estimate in terms of both magnitude and timing and have been not included in the model.

The final major limitation discussed here concerns tourism. Tourism is a major component of the Nevada, particularly the Southern Nevada, economy. The Great Recession showed that tourism demand in Las Vegas lags economic growth nationwide,<sup>137</sup> especially relative to California. Economic research suggests that is generally true for North America.<sup>138</sup> This lag effect is not included in the model explicitly, though it is considered relative to the model's final UI claim levels in Q4, 2021.

#### **GDP Forecast Result**

As of this August, there were only two data points for state-level GDP available that included the pandemic with which to calibrate our model. For this reason, we have been able to obtain estimate very close to the actual Q1 and Q2, 2020 GDP estimates for Nevada. However, because our methodology is straightforward and contains two scenarios capturing the most extreme outcomes as well as a most-likely scenario, we believed that the results provided herein represented a reasonable set of outcomes for Nevada GDP through 2021. Nevertheless, as more data come in, RCG could revisit the underlying assumptions and update the forecast. The Q3, 2020 state-level GDP data are scheduled for release in December 2020, with Q4 set for March 2021.<sup>139</sup>

#### **Indicator Models**

In addition to the forecast of real GDP, RCG has also produced projections for a set of economic and fiscal indicators ("the Indicators") for Nevada, the Las Vegas Metropolitan Statistical Area ("MSA") and the Reno-Sparks MSA. In this section, RCG describes the data and methodology used to develop these additional forecasts. The following list includes the metrics and geographies for which they have been analyzed.

- Industry-level GDP

   Nevada
- Taxable retail sales

   Nevada

<sup>137</sup> <u>https://www.reviewjournal.com/business/las-vegas-lags-u-s-economic-strides/</u>

 <sup>138</sup> Çağlayan E, Şak N, Karymshakov K. 2012. Relationship Between Tourism and Economic Growth: A Panel Granger Causality Approach. Asian Economic and Financial Review 2(5):591-602. <u>https://ideas.repec.org/a/asi/aeafrj/2012p591-602.html</u>
 <sup>139</sup> <u>https://www.bea.gov/data/gdp/gdp-state</u>



- Clark County
- Washoe County
- Total Nonfarm Employment
  - o **Nevada**
  - Las Vegas MSA
  - Reno-Sparks MSA
- Unemployment rate
  - o Nevada
  - Las Vegas MSA
  - Reno-Sparks MSA
- Unemployment Insurance Claims
  - Nevada
  - Visitor Volume
    - Nevada
    - Las Vegas MSA
    - Reno-Sparks MSA
- Property Tax
  - o Nevada
  - o Local Government & School Districts
- Room Tax
  - o Nevada
  - Local Tourism
  - o CCSD
- Gaming Tax
  - o **Nevada**
  - Clark County
  - o Washoe County
- Sales & Use Tax ("SUT")
  - $\circ$  Nevada
  - Clark County
  - Washoe County
- Consolidated Tax ("CTX")
  - $\circ$  Nevada
  - o Clark County
  - o Washoe County
- Modified Business Tax Collections
  - o Nevada
  - Marijuana Tax Collections
    - Nevada

RCG has employed a single method to forecast the Indicators to maintain conformity and consistency across the measures.<sup>140</sup> RCG used the ARIMA with Exogenous Input ("ARIMAX") model.<sup>141</sup> This model projects an indicator based on its relationship with outside variables. In this case, RCG has used either real GDP or nonfarm employment, as forecasted above, as the exogenous input.<sup>142</sup> The employment forecast below is itself determined based on the GDP model, but because it behaves differently, we believe that it makes for a better exogenous variable in certain situations. We expect GDP and employment to be a good explanatory variables because both are generally a function of various economic indicators. Therefore, they should move together with or inversely relative to those Indicators. The model enables us to measure how real GDP or employment move with each of the Indicators in the past, and then uses these variables' forecasts to predict how the Indicators should change over the forecast horizon.

In terms of the dates that have been analyzed and forecasted, a difference between this analysis and the above GDP forecast is that RCG forecasts the series starting with the most recent historical data rather than the last 2019 data point to improve forecasting results (i.e. fewer forecasted data points lead to more precision and accuracy).

A limitation of this model is that in certain cases, because of the extreme circumstances of the pandemic, economic data have been outside of typical ranges. With little historical data on these types of swings, the model may overweight or underweight these swings in some cases. However, this situation is unavoidable regardless of the model type and, furthermore, RCG is comfortable that the results are generally reasonable. A second limitation, that at times can compound with the previous limitation, is that because RCG used a single indicator as the exogenous input, the results of certain forecasts might not necessarily match the original assumptions. Because of this limitation, and since all series are derived from the GDP forecasts, related series' results may not necessarily be compatible. For example, initial UI claims estimates may not align with continued UI claims, potentially resulting in a mismatch. Still, the results appear to be reasonable.

<sup>&</sup>lt;sup>142</sup> "An exogenous variable is a factor in causal modeling or causal system whose value is independent from the states of other variables in the system." (From "The SAGE Encyclopedia of Social Science Research Methods," by Daniel Little, 2004) While this assumption is not strictly true as GDP and employment affect each other, RCG believes it is a weak assumption over the forecast horizon.



<sup>&</sup>lt;sup>140</sup> A second simpler method has been used to estimate future marijuana revenues. This is because the ARIMAX model failed. There are two reasons for this. First, the marijuana market has yet to reach equilibrium because more consumers have been moving from the black market to the legal market. This introduced an outside factor into the formula that RCG has attempted to estimate. However, there are not enough data because the marijuana excise taxes are relatively new, which the second and more important reason the model had issues. Collections began in July 2017 (FY 2018). Instead, RCG has applied the Nevada GDP growth rate to marijuana revenues and applied an extra assumed factor of four percent and two percent for the two years of the forecast, respectively.

<sup>&</sup>lt;sup>141</sup> As above, RCG has tested the model inputs and outputs for each indicator to ensure that the data are stationary, and the output residuals are not auto-correlated and are normally distributed.

Rather than run the model on each geographic subset, RCG has run the model on total Nevada revenues and uses the average share of the subsets relative to the state data since 2014 to calculate those series' values. This is reasonable to do because the shares do not change significantly over that time frame. For each indicator, we have produced results for the same four scenarios as for GDP. Data for the model have been aggregated annually for all tax indicators and quarterly for all economic indicators. GDP sector results have been reported in 2020 dollars. All other monies are reported on a nominal (non-inflation adjusted) basis.

The data for the Indicators come from various sources. RCG has identified and used the sources that show the most complete accounting of each tax, even if those sources provide less detailed information at the sub-state level. We have done this to get the best estimates of total collections. State totals generally reflect total collections in the state rather than the state's share of a tax. All tax results are presented in fiscal years, while economic indicators are presented as quarterly.

Monthly data on employment and unemployment came from the Bureau of Labor Statistics.

Visitor data herein are sourced from the visitor and convention authorities of the Las Vegas and Reno-Sparks areas. We combined these to represent Nevada visitors. These monthly data do not account for total Nevada visitation, but cover about 90 percent. Data for Nevada visitation had not been updated in nearly a year and the Nevada Department of Tourism and Cultural Affairs has suggested basing our estimates on these updated regional aggregates.

RCG has also collected data on the Property Tax (also referred to as the "Ad Valorem Tax") and Room Tax from the Nevada Legislative Counsel Bureau ("NLCB"). The NLCB does not break down collections by geography. Instead, they show allocations to the major revenue recipients aggregated by type, so in the case of the Property Tax: Nevada and Local Government & School Districts. For the Room Tax, the breakdown includes Nevada, Local Tourism and CCSD.

Another tax series that has been collected is the Gaming Tax. Those annual data come from the Nevada Gaming Control Board and cover the state and largest counties. The data include gaming properties with annual revenues of at least \$1 million, so it does not capture all the tax revenues, but it does capture approximately 90 percent.

Taxable sales (monthly), modified business tax revenue (quarterly), marijuana taxes revenues (monthly), SUT (monthly) and CTX (monthly) data come from the Nevada Department of Taxation. Results are presented annually. Due to the way that many of these revenue sources are collected and distributed, it is not feasible to separate them all by county. However, RCG has separated them locally to the extent practical. For taxable sales, we have produced forecasts for Clark and Washoe counties in addition to the state. The modified business tax ("MBT") is

collected by the state and put into the state's general fund. Therefore, while counties and municipalities benefit, they do so based on the many formulas that are used to distribute those funds. Regarding marijuana revenues (derived from a retail excise tax and a wholesale excise tax), we have performed an analysis at the state-level only. Sub-state data have only been published for one year at the time of writing and it is not feasible to run an analysis on so few data, particularly when there are not enough data to perform the state-level analysis, as discussed above.

The SUT and CTX data are provided herein for each county as well as the state. RCG has analyzed these for Nevada, Clark County and Washoe County. Both taxes are comprised of several components. The SUT includes the state sales tax, the Local School Support Tax ("LSST"), Supplemental City-County Relief Tax ("SCCRT"), Basic City-County Relief Tax ("BCCRT") and county-level option taxes. The CTX is comprised of the Liquor Tax, Cigarette Tax, Real Property Transfer Tax ("RPTT") and Government Services Tax ("GST"). RCG has summed the various taxes together for each geography to obtain the totals for the two taxes at each level. As a note, RPTT data are not broken down by county, so the county-level results do not include that tax. Certain SUTs are reported with CTX data. Those had to be separated. These data have been obtained from the Nevada Department of Taxation's ("Taxation") "Statistical" and "Consolidated Tax" reports and aggregated by fiscal year and region.

### **EXHIBITS**

Phase	Share of Active Jobs
Phase 0	0.715
Phase 1	0.785
Phase 1.5	0.929
Phase 2	0.929
Phase 3	0.985
Phase 4	1

Table III-1: Estimated Share of Active Nevada Jobs, by Phase

Sources: Governor's Office of Economic Development, RCG Economics

#### Table III-2: Phase Projections, by Scenario: 9/2020 to 12/2021

Date	Worst-Case	Most-Likely-Case	Best-Case
1/1/2014 - 3/17/2020	Phase4	Phase4	Phase4
3/18/2020 - 5/6/2020	Phase0	Phase0	Phase0
5/7/2020 - 5/27/2020	Phase1	Phase1	Phase1
5/28/2020 - 7/9/2020	Phase2	Phase2	Phase2
7/10/2020 - 9/16/2020	Phase1.5	Phase1.5	Phase1.5
9/17/2020 - 10/31/2020	Phase2	Phase2	Phase2
11/1/2020 - 11/14/2020	-	Phase2	-
11/15/2020 - 11/30/2020	Phase2	-	-
12/1/2020 - 1/31/2021	-	-	Phase3
2/1/2021 - 2/28/2021	Phase1	Phase2	-
3/1/2021 - 3/31/2021	-	-	-
4/1/2021 - 5/31/2021	Phase1.5	Phase3	Phase4
6/1/2021 - 8/31/2021	Phase2	-	-
9/1/2021 - 12/30/2021	-	Phase4	-
12/31/2021	Phase2	Phase4	Phase4

Note: Empty cells denote a continuation of the previous period's phase. Source: RCG Economics

Period	Worst-Case	Most-Likely- Case	Best- Case
1/1/2014-3/17/2020	-0%	-0%	-0%
3/18/2020-3/31/2020	-9%	-9%	-9%
4/1/2020-6/30/220	-12%	-12%	-12%
7/1/2020-10/31/2020	-15%	-	-9%
11/1/2020-4/30/2021	-	-	-
5/1/2021-6/30/2021	-12%	-8%	-6%
7/1/2021-12/30/2021	-	-5%	-1%
12/31/2021	-0%	-0%	-0%

Table III-3: Daily Percent Isolation Reductions in GDP, by Scenario: 3/2020 to 12/2021

Note: Empty cells denote a continuation of the previous period's estimate. Source: RCG Economics

#### Table III-4: Total Monthly UI Benefits Claimants, by Scenario: 11/2020 to 12/2021

	Most-Likely-		
Period	Worst-Case	Case	Best-Case
11/1/2020-2/28/2021	232,165	232,165	232,165
3/1/2021-5/31/2021	232,165	232,165	232,165
6/1/2021-11/30/2021	232,165	232,165	-
12/1/2021	232,165	100,000	20,000

Note: Empty cells denote a a linear decline from the previous period's estimate. Source: RCG Economics

#### Table III-5: Weekly Enhanced Federal UI Benefits, by Scenario: 8/2020 to 12/2021

		Most-	
Period	Worst-Case	Likely-Case	Best-Case
1/5/2014-3/28/2020	\$O	\$O	\$0
3/29/2020-8/1/2020	\$600	\$600	\$600
8/2/2020-8/8/2020	\$0	0	\$0
8/9/2020-1/23/2020	\$O	\$O	\$0
1/24/2020-4/3/2021	-	\$300	\$600
4/4/2021-6/5/2021	-	\$200	\$400
6/6/2021-12/25/2021	-	\$0	-
12/26/2021-12/31/2021	\$0	\$0	\$400

Note: Empty cells denote a continuation of the previous period's estimate. Source: RCG Economics





Figure III-2: U.S. Deaths, by Pandemic or Conflict: 8/31/2020

Sources: U.S. Center for Disease Control, Congressional Research Service, Johns Hopkins University Coronavirus Research Center

# **Rcg**economics





### **Rcg**economics





Source: Johns Hopkins University Coronavirus Research Center







Source: Johns Hopkins University Coronavirus Research Center



Figure III-8: U.S. Deaths per 100,000 Persons Over Time vs All Countries: 1/22/2020 to 8/31/2020



Source: Johns Hopkins University Coronavirus Research Center



Figure III-10: U.S. Deaths per 100,000 Persons vs Most Populous Countries: 8/31/2020



Source: Johns Hopkins University Coronavirus Research Center



Figure III-12: Nevada Case-Load per 100,000 Persons Over Time vs States: 1/22/2020 to 8/31/2020



**Rcg**economics







Figure III-16: Nevada Deaths per 100,000 Persons Over Time vs States: 1/22/2020 to 8/31/2020

Source: Johns Hopkins University Coronavirus Research Center







7219 West Sahara Avenue, Suite 110-A Las Vegas, Nevada 89117 Tel: 702-967-3188 www.rcgecon.com