Journal of Public and Nonprofit Affairs
Vol. 6, No. 3

Implications of the Coronavirus on Sales Tax Revenue and Local Government Fiscal Health

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The outbreak of COVID—19 has raised considerable alarm about public health and safety. The response to the outbreak, however, has also brought concern regarding its impact on local governments in the United States. Local governments have been a primary respondent in the fight against the COVID—19 disease, but the response has also reduced income from a key source of revenue, sales tax. Using North Carolina counties as a case study, we explore the shock to sales and use tax revenue faced by local governments from COVID—19; we, then, estimate its impact on county fiscal health. Our results show that while many local governments were financially struggling before the outbreak, the drop in sales tax revenue severely threatens their ability to provide continued response to the virus as well as their ability to remain solvent.

Keywords: COVID—19, Sales Tax, Fiscal Health, County Government

In December 2019, an outbreak of severe acute respiratory syndrome coronavirus (SARS–CoV–2) began in China's Hubei Providence (Wu et al., 2020). Those exposed to the virus are frequently sickened with the Coronavirus Disease 19 (COVID—19). As a highly contagious virus, with a fatality rate that reached 12% in the early days of the outbreak (Mizumoto & Chowell, 2020), concern began to emerge regarding the virus's spread around the world (Bogoch, Watts, Thomas-Bachli, Huber, Kraemer, & Khan, 2020).

By January 19, 2020, the first case of the virus in the United States (US) was reported in Snohomish County, Washington (Holshue et al., 2020). By March 27, 2020, the number of cases in the United States exceeded 100,000; and, by July 21, 2020, the number of cases exceeded 3,858,600 (Center for Systems Science and Engineering, 2020).

Despite growth in the outbreak and the declaration of a global pandemic by the World Health Organization, federal response in the US has been slow and disorganized. With no cohesive guidance from the federal government and a lack of coordinated efforts by states, many local governments have been left to respond to the crisis on their own. Although the majority of public attention has been placed on the capacity that the healthcare industry has to respond to the crisis, the outbreak has important implications for the fiscal health of local governments.

Fiscal health refers to the ability of a government to balance its financial obligations with its available revenue streams (Leiser & Mills, 2019; Maher & Nollenberger, 2009; McDonald, 2015). Prior to the outbreak, many local governments were already financially unhealthy

McDonald, B. D. & Larson, S. E. (2020). Implications of the Coronavirus on sales tax revenue and local government fiscal health. *Journal of Public and Nonprofit Affairs, 6*(3), 377-400. https://doi.org/10.20899/jpna.6.3.377-400

(Gorina, Maher, & Joffe, 2018). During the outbreak, not only are local governments around the country faced with an increase in demand for public services, but the stay-at-home orders issued to flatten the curve of the virus and the associated economic downturn threaten the financial capacity of local governments to remain solvent and continue their response. Although it is too early to know the full extent of the outbreak's effect on local governments, anecdotal evidence is showing that many cities and counties are now facing severe fiscal stress due to the virus, with some on the verge of bankruptcy (Gavin, 2020; Keith, 2020; Slattery & Shahrigian, 2020).

To better understand the implications surrounding the outbreak of COVID—19 in the US, we explore the implication behind lost sales tax revenue due to social distancing measures on local government fiscal health. For most local governments, sales and use taxes are a key source of revenue. Nationally, sales taxes account for about 24% of local governments' revenue, though the dependence can vary wildly. The County of Durham, North Carolina (NC), for example, receives approximately 29% of its annual revenue from sales taxes (County of Durham, 2019). Rockland County, NY, however, receives about 57% of its revenue from sales tax (Wilson, 2020).[1] The outbreak of COVID—19 has threatened the stability of this revenue stream, with some beginning to forecast significant declines in the near future (New York State Association of Counties, 2020; Saunders & Nida, 2020).

In the context of the pandemic, understanding a government's financial position allows us to understand its continued ability to provide core programs and services as well as COVID—19 related programs in the face of decreasing sales tax revenue. Using NC counties as a case study, we forecasted the fiscal year 2020 revenue and expenditure data for these counties under the assumption that no outbreak occurred. These forecasts were then adjusted at intervals of five percent up to 50% forecasted sales tax revenue loss beginning with March 1, 2020.

We conducted a second series of forecasts based on different durations of the outbreak to estimate the impact on the fiscal health of counties in fiscal year 2021. The analysis shows that NC counties are likely to face significant fiscal stress over the next year. Even with modest reductions in sales tax revenue, the number of counties in the state facing a fiscal health crisis is expected to increase 42.9% in the next several months. This dramatic rise not only raises concerns about the ability of local governments to provide core services, but also about their ability to continue their response to the COVID—19 outbreak.

COVID—19 and Sales Tax Revenue

The outbreak of COVID—19 has created considerable instability in the US economy. This instability is impacting the sales tax revenues of local governments in several important ways. First, the uncertainty regarding the economic climate has changed the purchasing behavior of individuals. The prevailing assumption is that the US will enter into a recession in response to the outbreak (Muro, Maxim, & Whiton, 2020). However, uncertainty about how long the outbreak will last contributes to uncertainty about how long and deep the recession will be.

This uncertainty impacts the behavior of individuals, as research in behavioral economics has shown that individuals respond cautiously when their economic future is unknown (Mian & Sufi, 2010; Parker, Souleles, Johnson, & McClelland, 2013). Cautious behavior leads individuals to forgo large, big-ticket, purchases as well as purchases of other nonessential items. This change in purchasing behavior can be seen in several areas including automotive, furniture, general household items, and clothing sales (Thomas, 2020; Wayland, 2020).

News media reports have suggested that one area that has not suffered from the change in buying behaviors nationally is home improvement projects. However, in a comparison of April 2019 to April 2020 monthly gross taxable sales at hardware stores within the state of NC,

taxable sales only increased $138,101 between the two years (or 0.02% of gross taxable sales collected within the state for April 2020). With fewer purchases being made, less revenue is being collected by local governments.

While sales of most items have decreased, grocery sales have significantly increased as individuals rush to stores in fear of items selling out. There may be some hope that the tax revenue from grocery sales can replace the lost revenue from the sale of other items, but groceries are frequently taxed at lower rates than other items. In the early days of the outbreak, a rush on household essentials led to sellouts of items such as toilet paper and sanitizer as well as perishables such as eggs, milk, and bread. This surge in spending is likely temporary as stores have begun reporting a leveling off of so called "panic buying," suggesting that individuals have built their stockpile and/or adjusted to life amidst COVID—19 (Kline, 2020).

Even if the surge was to remain, the opportunity to replace the loss in sales tax revenue from nonessential items with an increase in revenue from food related purchases is unlikely. In NC, for example, counties receive an average of 84.9% of their sales tax revenue from nonessential items and only 15.1% from food related purchases (Saunders & Nida, 2020). This suggests that even a small drop in revenue from the sale of nonessential items requires a significant increase in grocery sales to regain the loss. A tradeoff is further complicated in that a benefit of sales tax is that the tax can be structured to remove its regressive nature by exempting food and other household basics. To illustrate this, we can look at states, such as NC, where food is taxed at a reduced rate of only 2% (NC Department of Revenue, 2020), and Indiana (IN), which fully exempts groceries from sales tax (IN Department of Revenue, 2019).

Second, to combat the spread of COVID—19, many local and state governments have imposed stay-at-home orders (Adolph et al., 2020; McDonald, Goodman & Hatch, 2020). These orders have restricted access to businesses deemed as "nonessential." This typically includes most businesses involved in sales except for grocery, pharmacy, and home improvement supply stores. Many stores and businesses have even elected to reduce hours or close their physical locations in order to minimize spread of the virus to their employees and customers; and, they have done so regardless of whether a stay-at-home order has been put in place. Whether closure of business by choice or by force, the impact is the same: fewer businesses that individuals can patron resulting in a decrease in tax revenues.

There may be some opportunity for local governments to regain sales tax revenue lost by sheltering in place; however, these opportunities may be short lived. On March 17, 2020, Amazon announced they were limiting shipments of nonessential products to their warehouses in response to the outbreak. These limits were put in place in order to focus the distribution of key, COVID—19 related products (Kim, 2020). Medical professionals also recommended that individuals avoid nonessential orders to minimize the spread of the virus and to allow for delivery of essential items to those unable to leave their homes (Torres, 2020). This suggests that the availability to purchase goods online may be hindered; and, consumers may be incentivized not to switch to online purchasing as a replacement for the bulk of their purchases.

Ultimately, then, the likelihood that revenue from online orders will be able to replace the revenue from in-person purchases is low. This can be seen in a comparison of monthly gross sales data for NC between May 2019 and May 2020. Total gross taxable sales within the state for May 2020 decreased $92,377,782 from May 2019. This suggests that online sales were not offsetting the revenue that is normally collected from suppliers to in-person only businesses, such as beauty shops, barbershops, and supply dealers.

Finally, the pandemic has impacted sales tax revenue by changing how individuals engage with services that are included in the tax. This includes occupancy taxes, which are levied as a sales tax on stays at hotels, motels, and similar lodging establishments, short term lease and rental

taxes, which are imposed on the lease or rental of motor vehicles, among others. During periods of economic uncertainty, sales tax revenue decreases as engagements in these types of activities is typically reduced. When under a stay-at-home order, such as the orders imposed by many state and local governments during COVID—19, the opportunity to engage the taxable services becomes restricted. This further limits the opportunity for a local government to collect sales tax on the exchange (Stradling, 2020).

The Relationship between Sales Tax and Fiscal Health

Understanding the impact of COVID—19 on sales tax revenue is important for two reasons. One, this revenue is a key resource for local governments; and, two, financial resources are central to the capacity of a government to provide or expand its programs and services (Hendrick, 2004; Honadle, Costa, & Cigler, 2004; Jacob & Hendrick, 2013; Maher, Ebdon, & Bartle, 2020).[2] A government is considered fiscally healthy if it has enough resources to meet its obligations (Leiser & Mills, 2019). Alternatively, if a government does not have enough resources available, then it will experience fiscal stress.

The fiscal condition of government is best understood by looking at it across four dimensions: a) their ability to meet immediate financial obligations, b) their ability to meet financial obligations over a fiscal year, c) the their ability to meet long term financial obligations, and d) their ability to provide a base level of programs or services as required by law (see Jacob & Hendrick, 2013; McDonald, 2018; McDonald, Decker, & Johnson, forthcoming). Understanding the financial condition of government allows for an understanding of where a government is financially in terms of meeting the needs and demands of its residents, while also meeting its future demands.

A central component of fiscal health is the availability of revenue. As Honadle, Costa, and Cigler (2004) noted, a good tax is one that offers stability to a local government's revenue system. Historically, local governments have relied on property tax revenue due to its predictable and stable nature (see Carroll, 2009; Mikesell, 2017). This has allowed local governments to budget and spend with a level of assurance about what revenue they will have. Throughout the 1970s, 1980s, and 1990s, however, the dependency of local governments on property taxes resulted in a series of tax revolts that often led to in state legislation, which imposed tax and expenditure limitations that limited a local government's ability to raise revenue or expand their base using property taxes (Stallman, Maher, Deller, & Park, 2017).

In response to the imposition of tax and expenditure limitations, local governments have frequently sought to diversify their revenue streams using sales taxes (Hoene, 2004). Sales taxes are frequently perceived as an attractive tax form because they are not restricted to residents and can be designed to be less regressive by exempting necessities, such as food. Accordingly, both cities and counties have come to rely upon sales tax as their second largest form of income, accounting for around 10% of their annual revenue (Bland, 2013). This reliance also makes governments susceptible to economic cycles and other shocks (Suyderhoud, 1994). In periods of uncertainty, the behavior of households adjusts (Hurd & Rohwedder, 2010). One such adjustment is a change in spending patterns. Economic hardship can leave a household with less disposable income to spend, but the uncertainty of the future can also result in an avoidance of household spending and an increase in household saving. Regardless of why sales decline, a change in sales leads to a change in sales tax revenue.

Ultimately, a change in sales tax revenue influences the fiscal health of government. The capacity to provide programs and services, and to meet other obligations that underlie fiscal health, is partially a function of the revenue available to the government. It takes resources to provide services. When revenue begins to fall, the capacity of government also begins to decline. An example of this can be seen in the operating ratio, which reflects a government's

efficiency. It is measured by dividing total revenue by total expenditures. To avoid becoming fiscally stressed, a government would need to decrease expenditures to compensate for the loss in sales tax revenue. Given the expanding demand placed on local governments during the COVID—19 crisis, expenditures are likely increasing while sales tax revenue is decreasing. Ultimately, this trend will place local governments in fiscal stress.

Sales Taxes in NC

To understand the impact of COVID—19 on the fiscal health of local governments, we rely on a case study of local governments in NC. The state has a population of 10.5 million people across 100 counties (US Census Bureau, 2019). The local governments in the state depend heavily on this levy as a source of revenue (with the median county receiving about 28% of its general revenue from sales taxes (Saunders & Nida, 2020)). Currently, all counties levy at a rate of at least a 2% sales tax above the base (NC Center for County Research, 2015).

NC also allows for several local option sales taxes. The three main local option sales taxes, with the largest impact on local governments in NC, are Articles 39, 40, and 42. Established as the first local options sales tax in 1971, Article 39 allows for a levy of 1% of eligible sales and is allocated using point of delivery. Point of delivery allocation means that the taxation rate is determined based on the delivery of the good to the consumer (often the physical location of the retail establishment). Articles 40 and 42, established in 1983 and 1986 respectfully, provided the county with an additional 0.5% levy.

Structurally, the state has established a base tax rate of 4.8%, on which counties may expand on the state base and their own base with local options sales taxes to a cap of 7.5%. The proceeds of qualifying county area sales tax levies are then shared with their municipalities. As of April 1, 2019, the average sales and use tax levied by a county in the state was 6.9%, with only two counties levying the maximum rate of 7.5% (NC Department of Revenue, 2019a).

The treatment of purchases for the purposes of sales taxation varies based on the type of goods being sold. The state, for instance, exempts the purchase of medical devices from all sales tax. General groceries are unique in that they forgo the state base and any adopted local option sales tax to be taxed at the county base rate of 2% (NC Department of Revenue, 2020). Conversely, non-qualifying food (which includes prepared food and beverages in restaurants), dietary supplements, food from vending machines, soft drinks, and candy is taxed at the full state and local sales tax rate. As noted in a previous example, in fiscal year 2018–2019, the average county in NC had a local sales and use tax base that consisted of 15.1% food sales and 84.9% of nonfood sales (Saunders & Nida, 2020). The dependence on revenue from taxing groceries, however, varies since some local governments received significantly less. Currituck County, for example, received only 6.5% of its sales tax revenue from the sale of groceries (NC Department of Revenue, 2019b). Due to the small dependence on sales of food in grocery stores within the state as a source of sales tax revenue (only 15% for the average county for the previous fiscal year), the vast majority of counties in NC depend on the sale of items at the full state and local combined sales tax rates as their source of revenue.

Considering the timing of the impact of decreases in sales and use tax revenue, the inter-county allocation method of sales and use taxation should be analyzed. NC employs two different inter-county allocation methods for sales taxes that were collected under a local levy, point of delivery allocation and per capita allocation (NC Center for County Research, 2015). The point of delivery allocation method credits the county in which the goods are delivered; generally, in this case, the point of delivery is the point of sale of the goods from the vendor to the consumer. Per capita allocation suggests that the allocation will be based on the most recent state-certified population estimates focusing on the percentage of the county's population as a percentage of the state total. Local sales taxes allocated under the per capita

method can benefit large counties that are attempting to defer from border spillover shopping (Afonso, 2016; Shon, 2017).

An important feature of NC's sales tax structure is that it has three different filing schedules based on monthly tax liability (NC Center for County Research, 2015). If the tax liability to the entire state is less than $100 per month, the filer can file sales and use tax revenue collected quarterly. If the monthly tax liability is more than $100, but less than $20,000, the vendor must file monthly with the NC Department of Revenue. If the monthly liability is more than $20,000, the vendor must file monthly with prepayment of the next month's tax liability. Since the exact amount of a subsequent month's liability is unknown, the prepayment can amount to 65% of one of three options: the amount due for the current month, the amount of tax due for the month of prefiling in the previous year, or the average monthly amount due from the preceding year (NC Department of Revenue, 2020). The vendor can select the form of prepayment; however, the vendor is still responsible for the remainder of the entire collection in the subsequent month regardless of prepayment choice.

The timing of the distribution of sales tax revenue to the counties is dependent on the sequence of timing from the point of sale to the time that the county receives the tax revenue. NC currently experiences a lag of approximately three months from the point of sale until a county has the money in hand (NC Department of Revenue, 2019c). For example, if the taxable sale occurred in March, the vendor would file with the NC Department of revenue in April. The Department of Revenue would take the month of May to calculate the distribution based on the allocation strategies. Changes would then be made to amended returns and the distribution would be arranged.

The county would receive the sales tax revenue from a sale that occurred in March or before June 15th. Despite the delay in receiving the revenue, the modified accrual basis of accounting used by local governments allows for the revenue to be recognized when it is considered measurable and likely to be received in the near future (typically within three months). This allows for budgeting of the revenue and the county can spend the revenue shortly after the initial taxable transaction takes place. Continuing the same example, while the county might not receive the money in hand until June, they have a reasonable understanding of how much revenue they will receive in April. This allows them to begin utilizing the revenue at that time.

Data and Methods

Financial data for our analysis were obtained from the NC Department of State Treasurer for fiscal years 2008–2019 for all counties in the state. Variables of interest included total revenue and total expenditures over the fiscal year. Reporting of this data to the NC Department of State Treasurer contains no penalty for nonreporting. Thus, creating an imbalanced panel of data. For purposes of this analysis, we were able to capture 92 of the state's 100 counties. County financial data were matched with population data from the NC State Demographer's Office for every county in each year that they we included in the study.

In analyzing the impact of COVID—19 on county sales and use tax revenues and the overall fiscal health of NC counties, we first forecasted values of the financial data for fiscal years 2020 and 2021 (using fiscal year 2019 as our baseline). To forecast fiscal year 2020, we adjusted the 2019 sales and use tax revenues and expenditures by a growth rate of 4.5%, based on estimates from NC's general fund revenue forecast (Fiscal Research Division, 2019), the NC League of Municipalities (Saunders & Nida, 2020), the Bureau of Economic Analysis (2019), and the National Retail Foundation's growth in retail sales during calendar year 2019 (National Retail Foundation, 2019). The one exception to this was the general sales tax revenue, which we based on the sales tax growth percentage for the first half of fiscal year 2020 and the historical second half sales tax trends from fiscal year 2019.

Table 1. Variable Definitions

Variable	*Measurement*
Operating Ratio	Ratio of total revenue to total expenditures
Revenues per Capita	Ratio of total revenue to population
Taxes per Capita	Ratio of total taxes to population
Surplus(Deficit) per Capita	Ratio of total revenue minus total expenditures to population
Total Tax Dependency	Ratio of total tax revenue to total revenue
Sales Tax Dependency	Ratio of sales tax revenue to total revenue

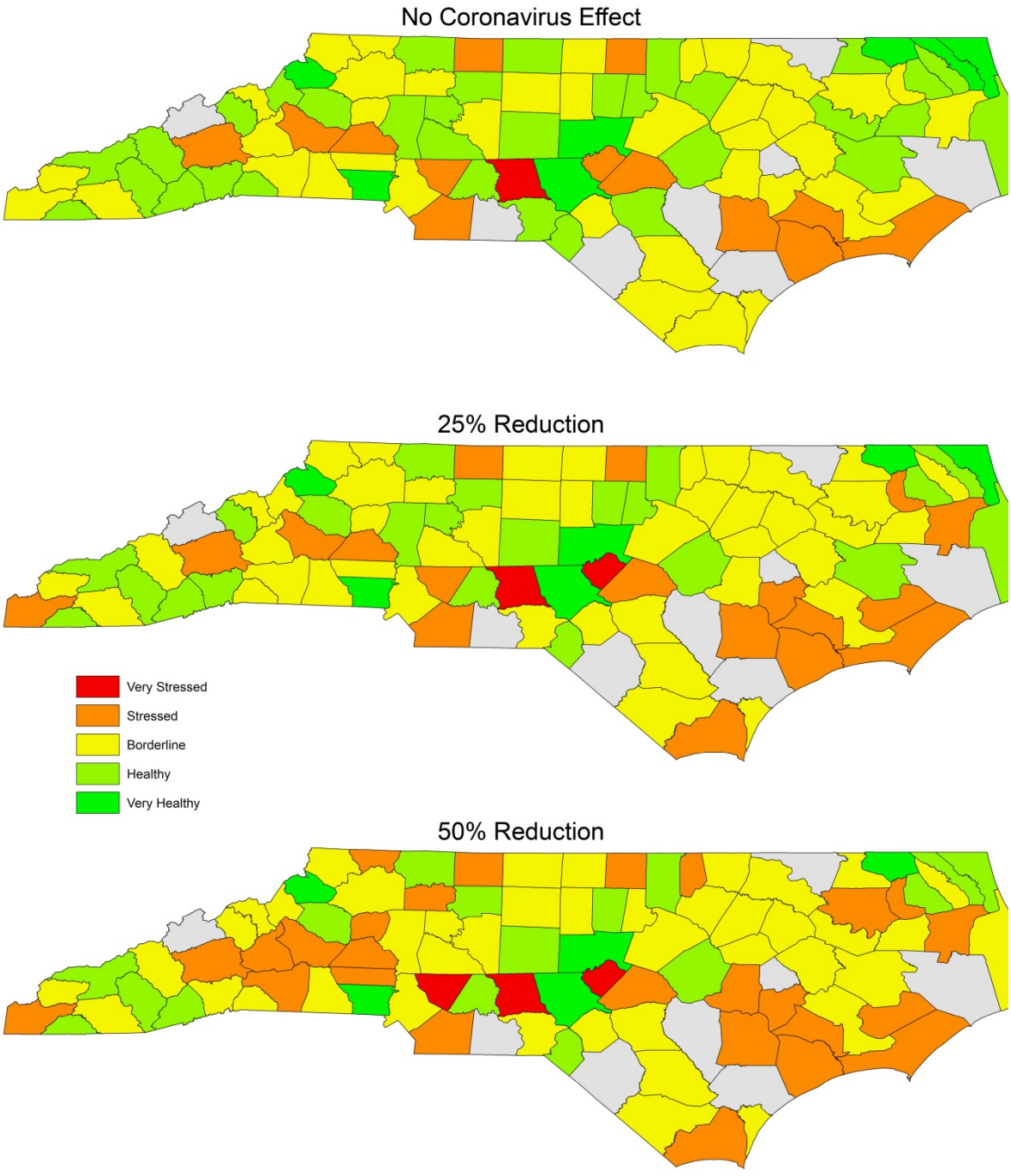
Using the forecasted financial data, we selected a target starting impact date of March 1, 2020. This allowed us to capture COVID—19's impact on sales tax revenue for 122 of the 366 days in the fiscal year. We then conducted simulations that demonstrated a loss of total sales tax revenue, total sales and service revenue, occupancy tax revenue, prepared food tax, amusement licensing tax, gross short term rental tax, and transportation tax.[3] These "sales tax based" revenues were then adjusted from the baseline 2020 revenue estimates at intervals of five percent up to 50% for each of the 122 days of impact. Given that the exact impacts of the stay at home order and COVID—19 on "sales tax based" revenue streams were unknown, we calculated five percent intervals to allow for a variety of potential outcomes. We then adjusted total revenue down for the calculated changes to previously identified variables.

Considering the focus of our study (that is, the impact of COVID—19 on the fiscal health of local governments), we considered six measures of fiscal health. These measures were: operating ratio, surplus (deficit) per capita, revenues per capita, taxes per capita, total tax dependency, and sales tax dependency.[4] Table 1 provides an overview of the variables and their measurements. All six of the measures were calculated at the baseline growth model for fiscal year 2020, as well as each of the simulated losses for the 122 days COVID—19 was assumed to impact sales and use tax revenues.

One concern regarding the pandemic is the uncertainty of its duration. Indeed, at least one estimate predicts that containing the pandemic will require up to 18 months of social distancing and stay-in-place orders (Jiang, Deng, Zhang, Cai, Cheung, & Xia, 2020). As a result, we also considered the possible impact of the virus and its impact on sales tax revenue on the fiscal health of counties in NC for fiscal year 2021. To simulate the pandemic's impact, we created a hypothetical baseline assuming that the pandemic did not happen and had no impact on 2021 taxation and expenditures. We applied a conservative 3.6% increase to the forecasted values from fiscal year 2020. This underlies the Bureau of Economic Analysis' (2020) GDP predicted growth rates prior to COVID—19. It should be noted that by selecting a conservative growth rate, which assumes the absence of COVID—19, may underestimate the virus on sales and use tax revenues; and, thus, may ultimately impact our measures of fiscal health. However, our goal was to err in the side of caution of our estimation technique.

Since the duration of COVID—19's impact on sales and use tax revenue collection in fiscal year 2021 is not yet clear, we constructed four different scenarios: 1.) the impact of the virus continues through the first quarter of fiscal year 2021, 2.) the impact of the virus extends through the first half of fiscal year 2021, 3.) the impact of the virus extends through three quarters of fiscal year 2021, and 4.) the impact of the virus on sales tax revenue extends through the duration of fiscal year 2021. We considered each of these scenarios in addition to the possibility of multiple occurrences of COVID—19 in fall 2020 or winter 2020. Should the virus reoccur, this will require the continuation of shelter-in-place orders. This could also result in the possibility of a recession over the duration of fiscal year 2021. A recession would result in a declines in sales and use tax revenue collections over the entire 12 months. Similar to our approach with fiscal year 2020, we calculated measures of fiscal health at five percent intervals starting at a baseline of no impact and ending at 50% impact of the measured duration on sales and use tax revenue.

Figure 1. Impact of COVID—19 on Fiscal Health, FY 2020 Projections



Results

Fiscal Year 2020

This study explores the impact of COVID—19 on the fiscal health of local governments by way of sales tax revenue. Beginning with the impact of COVID—19 on sales and use tax revenue for the last four months of fiscal year 2020, the results for NC are severe.

Based on our simulations, counties in NC will face increasing fiscal stress due to the effect of the COVID—19 outbreak. The size of the impact varies based on how much revenue each county loses. Anecdotally, officials for many local governments in NC that we have spoken with have estimated that the best case scenario is a 20% to 25% decline in sales tax revenue for the remainder of the fiscal year (see also Gracia, 2020). Their worst case scenario is a 50% loss.

Using our baseline forecast, which assumes no outbreak effect, we explore the best and worst case scenarios. Figure 1 presents the simulated fiscal health of counties in our study for fiscal year 2020. To streamline our reporting of the findings, the baseline was compared to a best case scenario of 25% sales tax revenue loss and a worst case scenario of 50% loss. Massachusetts experienced over a 50% state tax revenue loss over the month of April 2020 compared to April 2019. This suggests that this worst case scenario is possible.[5] In addition, the unique nature of shelter in place orders makes it difficult to fully predict the changes in sales tax revenue loss for a Municipality. By comparison, it should be noted that similar conditions were not present during the Great Recession or the 2001 Recession. Therefore, we present a variety of potential outcomes.

To add context to Figure 1, we defined counties as *very healthy* if they had an operating ratio of 1.20 or more. This would indicate that their resources considerably exceed needs in the county. *Healthy* counties, we defined, as those possessing an operating ratio of 1.05 to 1.20. If a county had an operating ratio between 0.95 and 1.05, we defined these as *borderline*. Borderline counties had the presence of fiscal stress or the possibility of fiscal stress in the near future. *Fiscally stressed* counties, we defined, as those with an operating ratio between 0.80 to 0.95. Finally, any county with an operating ratio of 0.80 or below, we defined as *very stressed*.

Even with no impact of COVID—19 on sales and use tax revenue over the time period, one county appears to already be *very stressed*, and 13 counties appear to be *stressed*. A 25% reduction in sales tax revenue over the remainder of fiscal year 2020 increases the number of counties that are *very stressed* to two and the number of *stressed* counties increases to 18. These represent increases of 100% and 38.4%, respectively. Our results also show a 16% increase in the number of *borderline* counties. When considering the worst case scenario of 50% reduction in sale tax revenues for the remainder of fiscal year 2020, the number of *very stressed* or *stressed* counties at the end of the fiscal year increases to 29. This is double the number of *fiscally stressed* counties.

One consideration is what this decline means for the counties in real terms. We find that the average difference between the baseline and the best case scenario (i.e., a 25% loss in sales tax revenue over the final third of fiscal 2020) is a loss of $38.09 per person in total revenue. Given the average county in NC has a population of 105,083, this produces an estimated decline in total revenue of $4,002,794 due to COVID—19 changes in sales and use tax revenue collection. Although some may consider this to be small when compared to the overall size of county budgets, it is important to consider what a loss in funding means for a community. For example, a decline of $4,002,794 is equal to the salaries of approximately 38 sheriff deputies or 78 teachers in the average county. For the worst case scenario, we find that there would be a difference of $76.18 per person in total revenue, with an estimated decline in revenue of

$8,005,587. For perspective, this decline would be equal to the salaries of approximately 77 sheriff deputies or 156 teachers in the average county.

A similarly bleak picture emerges when considering the surplus (deficit) per capita. Assuming no impact of COVID—19 on sales tax revenue collection, 30 of the 92 counties that we considered were already running a deficit per capita. If counties lose 25% of sales tax revenue since March 1, 2020, due to COVID—19 impacts, the number of counties that would be running a deficit increases by 20% to 36. If counties lose 50% of their normal sales tax revenue, of the 92 counties in this study, 51 would be running a deficit by the end of fiscal year 2020.

On average, counties will experience a budgetary deficit of $4.19 per person. For the average county, this would result in a budgetary deficit for the end of fiscal year 2020 of $439,880.

Considering the level of tax dependency of NC counties, we find that changes in the sales tax base of counties influences their dependence on taxation for revenue. For total tax dependence, this influence appears to be minimal, increasing by 0.4% with the highest simulated reduction. Their dependence on sales tax revenue, however, decreases by 12.5%. This shift suggests that local governments may become more dependent on other revenue streams; and they may need to explore revenue diversification strategies.

Fiscal Year 2021 Results

In order to consider impacts of COVID—19 on fiscal year 2021 sales tax revenues and subsequent impacts on the fiscal health of counties in NC, we considered several simulations to reflect variable impact durations. The first scenario examines whether the impact of the virus extends only through the end of the first quarter. In this scenario, the overall fiscal health of local governments begins to suffer. Based on a 25% decline, NC can expect to see a 43% increase in *fiscally stressed* or *very stressed* counties. Based on a 50% decline, the number of counties considered *fiscally stressed* increases to 78.6%. Figure 2 displays the classifications for *healthy* and *stressed* counties for this scenario.[6]

This picture of fiscal health becomes bleaker the longer the pandemic lasts. Figures 3, 4, and 5 display the fiscal health of NC counties under an increasingly long outbreak. If the outbreak lasts until December, a 25% or a 50% reduction in sales tax revenue over the first six months of fiscal year 2021 will result in either a 78.6% or a 185.7% increase in the number of *fiscally stressed* counties, respectively. Compared the findings displayed in Figure 2, these figures show that should the impact of COVID—19 extend beyond the first quarter of fiscal year 2021 and into the second quarter, the number of stressed counties would dramatically increase from 21 to 34 in the worst case scenario.

Considering the more conservative 25% reduction over the six month period, 40 of the 92 counties would be operating with a deficit at the end of fiscal year 2021 (i.e., with an operating ratio of 1.01). This suggests that there could be small surpluses in revenue over expenditures. In this scenario, Figure 3 highlights that only 23 of the 92 counties would be classified as being *healthy* or *very healthy* at the end of fiscal year 2021.

Similar significant increases in the number of fiscally stressed counties would be seen if the pandemic extends through the third quarter (see Figure 4) or through the entirety of fiscal year 2021 (see Figure 5). The most concerning finding is the number of unstable local governments that would exist should the loss in sales tax revenue due to COVID—19 extend through all of fiscal year 2021. If any county in the state experiences a 50% reduction in sales tax revenue over the entire year, the probability of ending the year with a *healthy* or *very healthy* operating ratio is extremely small.

Figure 2. Impact of COVID—19 on Fiscal Health, First Quarter of FY 2021 Projections

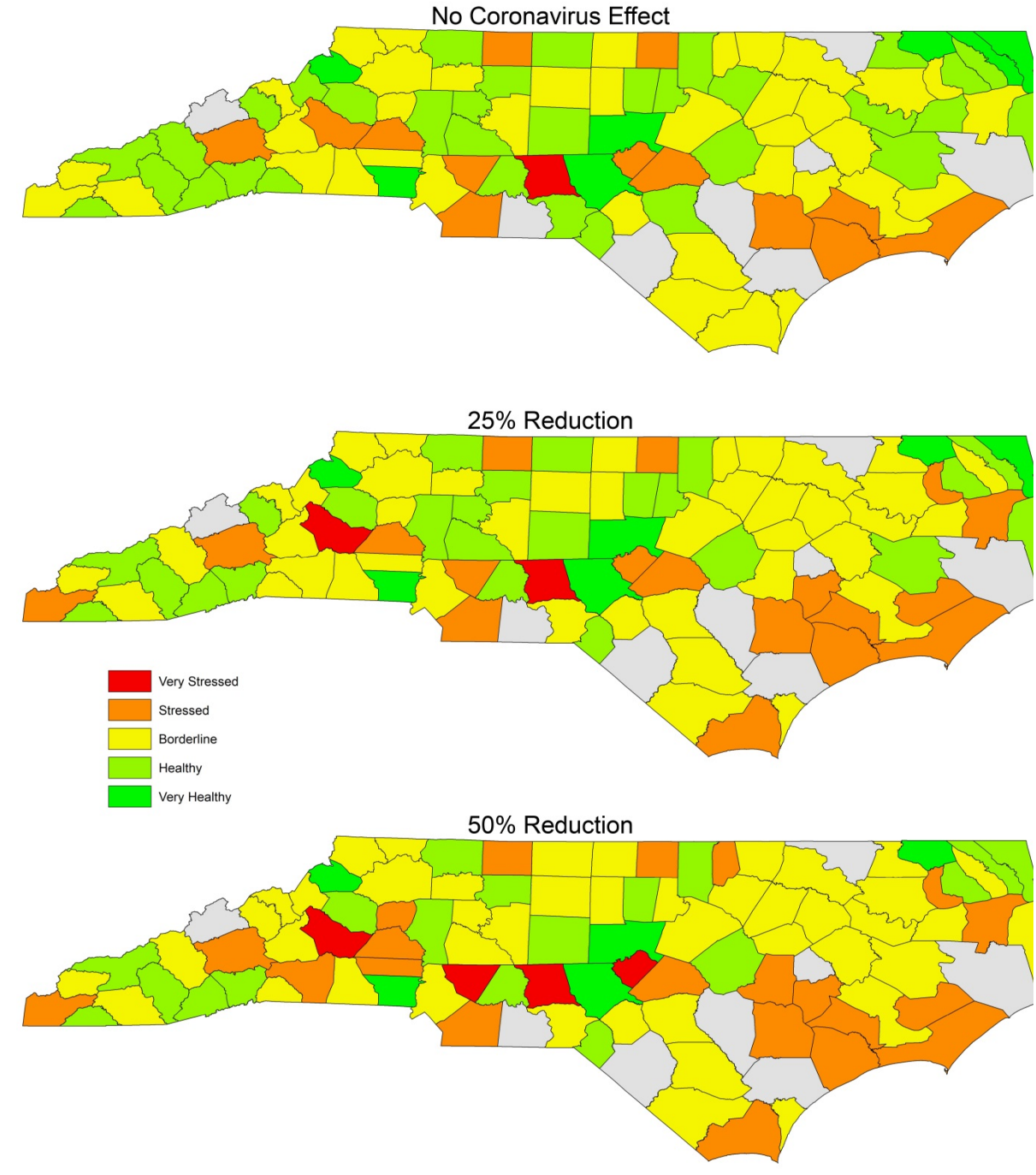


Figure 3. Impact of COVID—19 on Fiscal Health, First Half of FY 2021 Projections

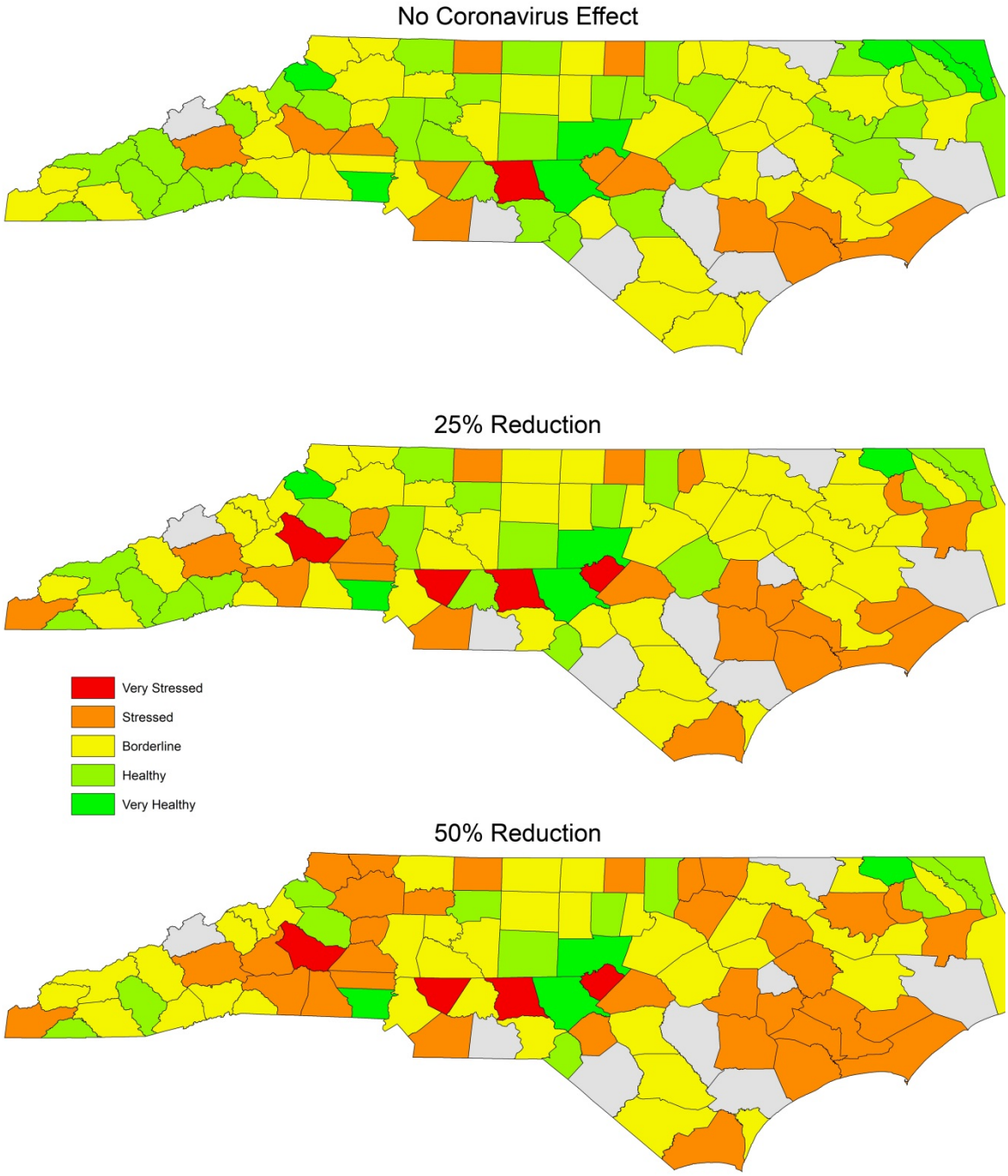


Figure 4. Impact of COVID—19 on Fiscal Health, Three Quarters of FY 2021 Projections

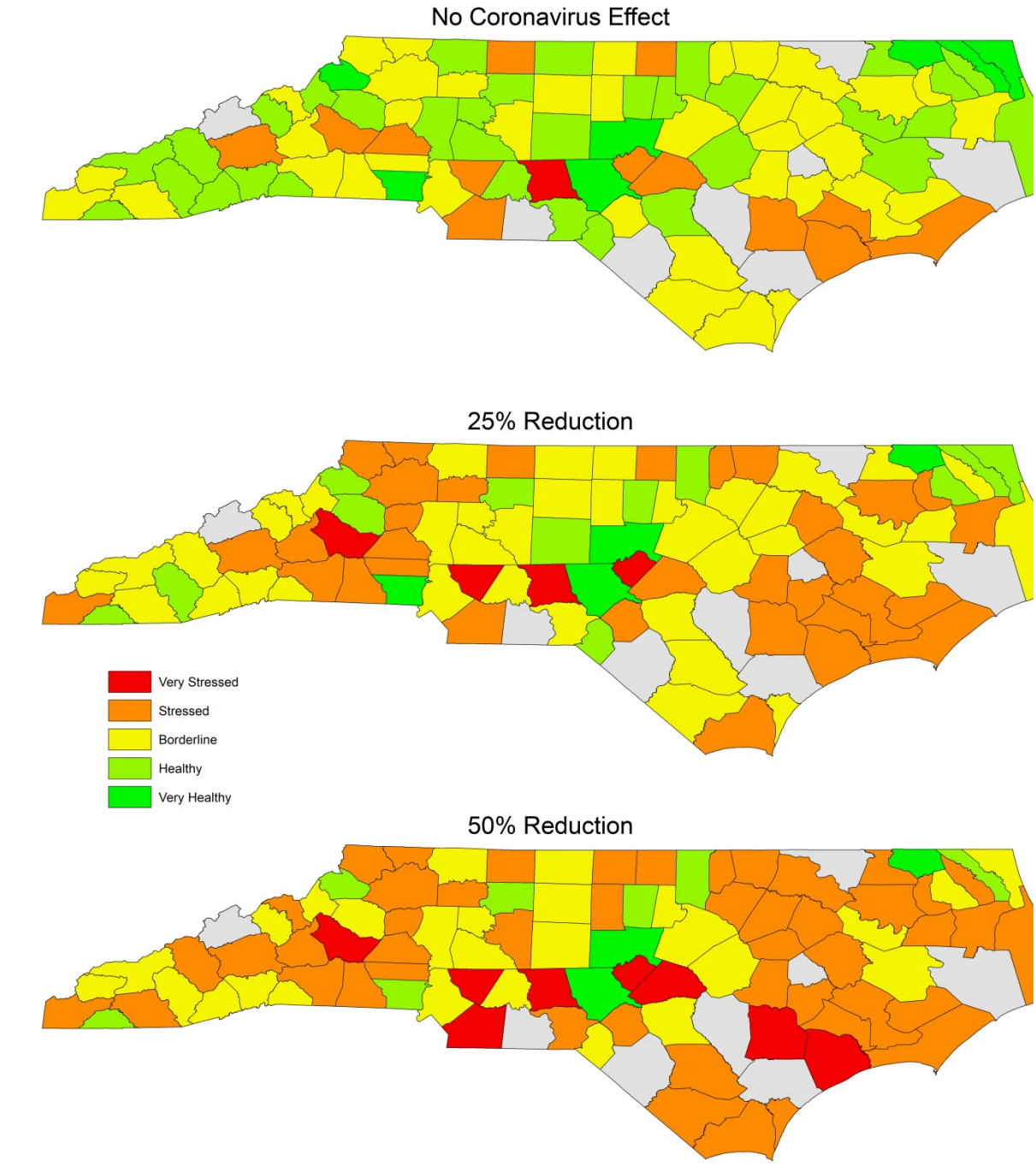
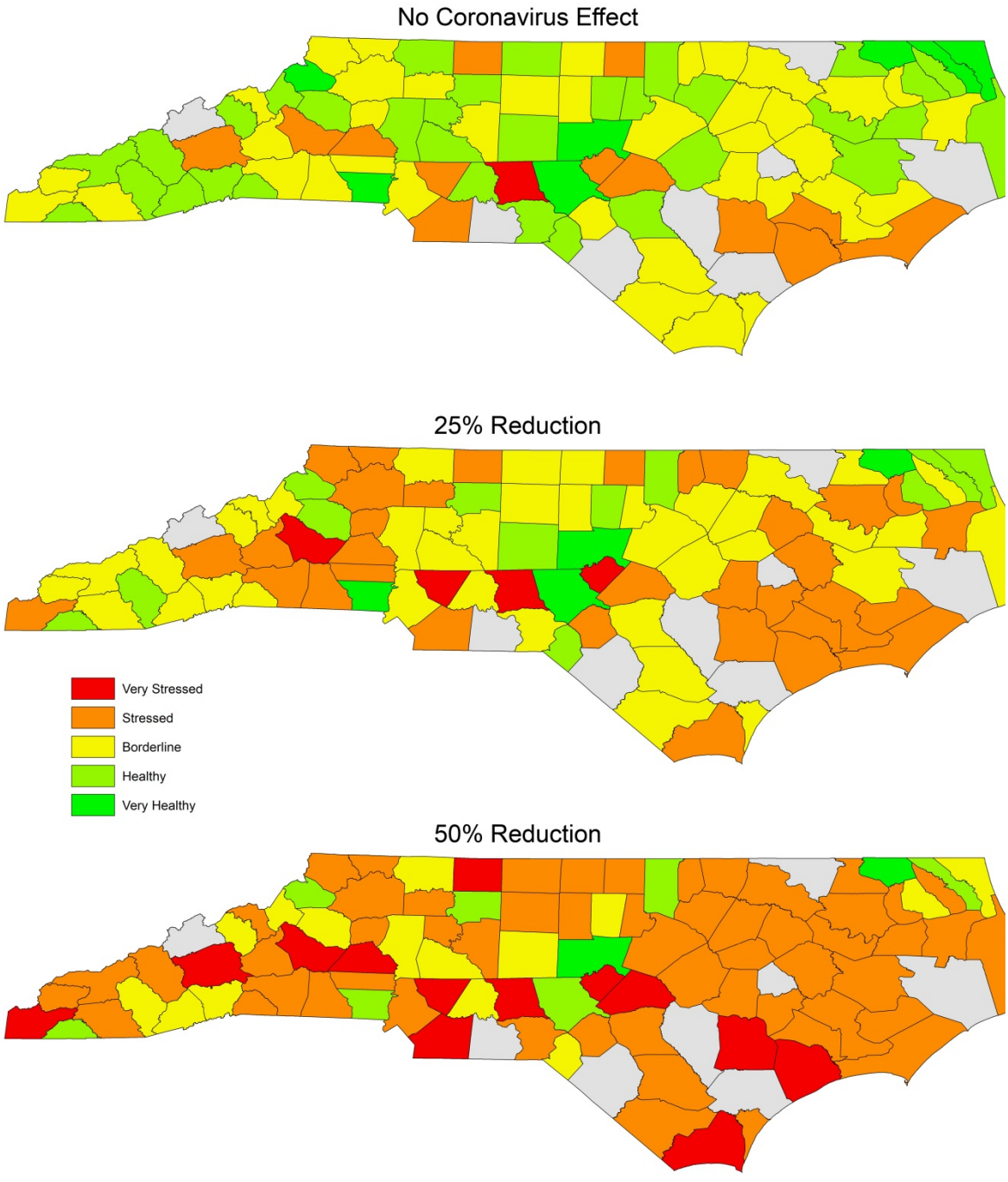


Figure 5. Impact of COVID—19 on Fiscal Health, FY 2021 Projections



In this scenario, 13 counties would end fiscal year 2021 as *very stressed* (i.e., with an operating ratio of 0.8 or less). Only one county would end the year as fiscally *healthy* (i.e., with an operating ratio between 1.05 and 1.20) or *very healthy* (i.e., with an operating ratio of 1.20 or above). Even with the more conservative 25% reduction in sales taxes over the fiscal year, rural areas in the upper northwest corner of the state as well as those in the southeastern costal region, would end the fiscal year in some form of distress. The counties in the southeastern coastal region are the same counties that were directly impacted by Hurricane Matthew in 2016.

To provide more insight on the different scenarios for fiscal year 2021, Table 2 defines the impact of COVID—19 on the six measures of fiscal health over the simulated duration of impact (i.e., first quarter, first two quarters, first three quarters, and the entire duration of the 2021 fiscal year). The total revenue that would be lost per capita with a 25% loss of sales and use tax revenue (compared to baseline) would increase to $30.84 at one quarter of impact. With two quarters of impact this would increase to $61.67. With three quarters of impact this would increase to $91.84; and, over the entire fiscal year this would increase to $122.34.

A similar loss would occur with total taxes per capita. At a 25% loss of sale and use tax revenue, $17.48 per capita would be lost (when compared to the baseline of a one quarter impact). At three quarters of impact , $52.07 of total tax revenue per capita would be lost; and, if losses in revenues lasted the entire fiscal year, $69.36 of total tax revenue, on average, per capita would be lost.

The surplus (deficit) per capita transforms from a surplus per capita to a deficit per capita as the duration of the impact of sales and use tax revenue loss expands from one quarter of fiscal year 2021 to the entire fiscal year. At 25% of sales and use tax revenue loss, the average county shifts from a surplus to a deficit if the duration of the loss is at least three quarters of the 2021 fiscal year. Conversely, if the loss of sales and use tax revenue increases to 50%, the average county in NC would experience a deficit of $49.68 per capita if the duration was only the first half of the fiscal year. If the worst case scenario extends to the entire fiscal year, the average county would have a deficit of $171.01 per capita.

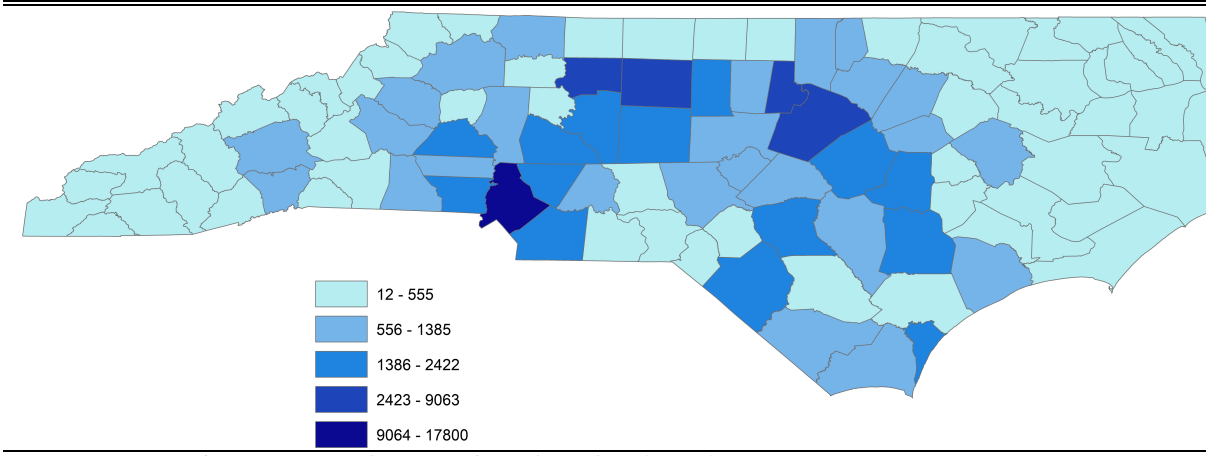
Total tax dependency increases as the duration of the impact of COVID—19 extends into multiple quarters in fiscal year 2021 at both the 25% loss of sales and use tax revenues and 50% reduction of sales and use tax revenue. At a 25% impact during the first quarter, the total tax dependency is 61.8%. If the duration of the impact continues to the first half of the fiscal year, total tax dependency increases to 62.1%. The dependence further increases to 62.9% if the duration of the impact extends throughout the entire fiscal year. Simultaneously, sales tax dependency decreases as the duration of the impact continues. If the impact is only one quarter (and at a 50% percent of sales and use tax collections), counties would be 25.8% dependent on sales tax revenues, on average. If the duration extends to three quarters of the fiscal year, this dependence decreases to 21.8%, on average.

When we consider the number of COVID—19 cases by county as of July 21, 2020 (see Figure 6) and the immediate impact of COVID—19 on sales and use tax revenue for the remainder of fiscal year 2020 (see Figure 1), it is interesting to note that the two counties with the most cases (Mecklenburg and Wake) are also counties that were already *borderline* in terms of their fiscal health. Assuming the worst case scenario of a 50% reduction in sales and use tax revenue into the third quarter of fiscal year 2021, both of these counties would become fiscally *stressed* (see Figure 4). Durham County, which has the third largest number of cases, is considered fiscally *healthy*; however, any decrease in sales tax revenue at or above 30% would move this county to *borderline* status. The potential for these two counties to become fiscally stressed is particularly concerning as this would impact their ability to respond to the pandemic.

Table 2. Impact of COVID—19 on Local Government Revenue, FY 2021

Variable	1st Quarter			2nd Quarter			3rd Quarter			Entire Fiscal Year		
	Baseline	25%	50%	Baseline	25%	50%	Baseline	25%	50%	Baseline	25%	50%
Operating Ratio	1.05	1.03	1.01	1.05	1.01	0.97	1.05	0.99	0.94	1.05	0.97	0.90
Revenues per Capita	---	$30.84	$61.66	---	$61.67	$123.34	---	$91.84	183.67	---	$122.34	$244.67
Taxes per Capita	---	$17.48	$34.96	---	$34.96	$69.93	---	$52.07	$104.13	---	$69.36	$138.72
Surplus (Deficit) per Capita	$73.66	$42.82	$11.99	$73.66	$11.99	$-49.68	$73.66	$-18.18	$-110.01	$73.66	$-48.68	$-171.01
Total Tax Dependency	61.59%	61.84%	62.14%	61.59%	62.14%	63.01%	61.59%	62.51%	64.75%	61.59%	62.99%	72.33%
Sales Tax Dependency	28.00%	26.91%	25.80%	28.00%	25.80%	23.61%	28.00%	24.72%	21.81%	28.00%	23.65%	23.42%

Figure 6. Number of COVID—19 Cases by County, July 21, 2020



Source: Center for Systems Science and Engineering (2020).

Conclusion and Limitations

The outbreak of COVID—19 has caused significant upheaval in the US healthcare system. It has also caused significant change in how individuals engage with society around them, largely in part due to social distancing and stay-in-place orders. Although a great deal of attention has been directed toward understanding the healthcare side of the pandemic, attention should also be directed toward understanding the implications of the virus on local governments. One particular concern is the implication of reduced sales and use tax revenue due to changes in individual behavior on the capacity of local governments to operate. In this study, we used a case study of counties from NC to conduct a series of simulations in an effort to understand the impact of COVID—19 on the fiscal health of local governments.

Our findings show that any impact of COVID—19 on sales and use tax revenue collections for counties in NC has a real impact on the fiscal health of counties in the state. Even if we use a conservative estimate of a 25% reduction in sales and use tax revenue and we assume that the virus will only last for the remainder of fiscal year 2020, the average county in NC would lose over $4 million in revenue. With the more extreme reduction of 50% in sales and use tax revenue, the average county in NC would lose over $8 million. If the outbreak extends into fiscal year 2021, a reduction of sales tax revenue by 25% would result in 40 out of the 92 counties included in our study running a deficit per capita. If that same percent loss extends over the first three quarters, 53 counties would run a deficit per capita. If the counties sustain a 25% loss over the entire fiscal year, 64 of the 92 counties would experience a deficit per capita at the end of fiscal year 2021.

Given that local governments have had to increase spending on programs and services in response to COVID—19 and the expectation that the US will enter into a recession as a result, it is likely that we are underestimating the virus's impact on fiscal health. Local governments can, however, take steps to improve their outcome through the duration of the pandemic. Counties in NC, for example, might look to a better understanding of the day-to-day versus the monthly impact of a decrease in sales and use tax revenues to track the impact of COVID—19 on their revenue sources (given the delay between the point of sale and county receipt of revenues). Counties can also encourage the state to explore the registration of remote vendors under the threshold that took effect on November 1, 2018. With the closure of physical storefronts, many households have turned delivery services. Thus, an increase of foregone sales and use tax revenue could occur through remote transactions by unregistered vendors.
The results of our analysis also point to a preexisting problem in local governments. Figures 1 and 2 highlight the fact that many counties in the state were already fiscally unhealthy or borderline prior to COVID—19. During the Great Recession, states paid considerable attention

to the financial condition of their local governments. In many ways, this attention has wavered, leaving local governments to return to their "old ways." While the financial stress of the outbreak on local governments suggests that states should reengage with local governments to ensure the continuation of services, the impacts of COVID—19 may also encourage local government officials to question their underlying fiscal health even in times of great economic growth.

Although we focused on counties in NC, the problem of declining fiscal health is likely to be a national problem. Reports have emerged of strained resources and budgetary complications from cities, counties, and states alike. Pagano and McFarland (2020) have pointed out that other revenue streams may also be affected, such as the property tax base, which can have short term and long term impacts on local government sustainability.

Unfortunately, there are also limitations of this study. Due to the unique nature of the impact of COVID—19 and stay-at-home orders on sales tax revenues received for counties, we made the assumption that the revenue loss continued at the same level throughout the duration of the impact. We made this assumption in order to streamline impact on the municipality (as this would allow them to consider how long they could sustain a certain level of sales tax revenue loss and continue to be fiscally healthy).

Another limitation of the study is the need to forecast the baselines for fiscal years 2020 and 2021. The counterfactual of how sales and tax revenue collections would continue without the impact of COVID—19 is impossible to identify due to the global nature of the pandemic. Therefore, we engaged in a conservative forecasting approach for both baselines based on prior identifications of growth rates for municipalities in the state.

Finally, holding expenditures constant throughout the scenarios presented represents a final limitation. Data on the potential increases in county expenditures and a possible federal stimulus package to offset some of the municipal expenditures and use of federal disaster relief funds are unclear at the time of publication. Therefore, we held expenditures constant with baseline predicted growth for fiscal year 2020 and 2021. This presents more conservative estimates of the impacts of sales and use tax revenue losses on the fiscal health of municipalities.

The intent of this study was not to provide a definitive understanding of the financial implications of COVID—19 on local governments. The full impact of COVID—19 on local government fiscal health will become clearer over time; and, this will take years to fully understand. Our interest in exploring this issue now, as the outbreak is underway, is to assist local governments in the planning and preparation for the possible impacts that they may begin to see. With this planning and preparation, local governments can begin making adjustments and seeking help from the state to ensure their continued operation.

We also hope that by beginning this discussion, we are able to provide utility to the public budgeting and finance literature by providing a starting point for future research. A number of questions will need to be addressed regarding the impact of COVID—19 on local governments. However, beginning with an understanding of the impacts on sales and use tax revenues allows for an understanding of public response to the outbreak as well. Future research should explore the day-to-day versus the monthly impact of the virus on sales and use tax revenue collections as well as revenue collected from different types of business establishments. Increasing from a monthly to a daily analysis would allow local governments to pinpoint the exact start of the impact and measure the impact with the release of additional information, such as shelter-in-place warnings or facemask guidance from the Centers for Disease Control and Prevention.

Notes

1. Similar variation can be seen in cities, with the City of Durham, NC, for example, receiving approximately 29% of its annual revenue from sales taxes (City of Durham, 2019) and the City of Phoenix, AZ receiving approximately 45% of its revenue from the tax (City of Phoenix, 2019).
2. For a more thorough review of governmental fiscal health, see Gorina, Maher, and Joffe (2018), Levine, Justice, and Scorsone (2013), and McDonald (2017, 2019).
3. Note that occupancy tax revenue, prepared food tax revenue, amusement licensing tax, gross short term rental tax, and transportation tax revenues are not part of total sales tax revenue. Total sales tax revenue uniquely includes revenue from general sales, which includes groceries.
4. Tax dependency is defined as how dependent a government is on a source of revenue, as measured by the share of total revenue that is received from the source of interest.
5. To present a more detailed finding of the results for the entire scenario of potential sales tax revenue losses, Table A1 in the appendix provides an overview of COVID—19's impacts on the six measures of fiscal health for each of the five percent increases in sales tax revenue loss.
6. Complete results of the various scenarios are in the appendix, Table A2.

Disclosure Statement

The authors declare that there are no conflicts of interest that relate to the research, authorship, or publication of this article.

References

Afonso, W. (2016). The equity of local sales tax distributions in urban, suburban, rural, and tourism rich counties in North Carolina. *Public Budgeting & Finance*, *44*, 691-721. https://doi.org/10.1177/1091142115588976

Aldoph, C., Amano, K., Bang-Jenson, B., Fullman, N., & Wilkerson, J. (2020). Pandemic politics: Timing state-level social distancing responses to COVID-19. *Journal of Health Politics, Policy and Law*. https://doi.org/10.1215/03616878-8802162

Anderson, R. M., Heesterbeek, H., Klinkenberg, D., & Hollingsworth, T. D. (2020). How will country-based mitigation measures influence the course of the COVID—19 epidemic? *The Lancet*, *395*, 931-934. https://doi.org/10.1016/s0140-6736(20)30567-5

Bland, R. L. (2013). *A budgeting guide for local government*. Washington, DC: International City/County Management Association.

Bogoch, I. I., Watts, A., Thomas-Bachli, A., Huber, C., Kraemer, M. U. G. & Khan, K. (2020). Potential for global spread of a novel coronavirus from China. *Journal of Travel Medicine*, *27*. https://doi.org/10.1093/jtm/taaa011

Bureau of Economic Analysis. (2019). *Regional economic accounts*. Washington, DC: U.S. Department of Commerce.

Bureau of Economic Analysis. (2020). *National income and product accounts*. Washington, DC: U.S. Department of Commerce.

Carroll, D. A. (2009). Diversifying municipal government revenue structures: Fiscal illusion or instability? *Public Budgeting & Finance*, *29*, 27-48. https://doi.org/10.1111/j.1540-5850.2009.00922.x

Center for Systems Science and Engineering. (2020). Coronavirus COVID—19 global cases. *Johns Hopkins University*. Retrieved April 2, 2020, from https://coronavirus.jhu.edu/map.html

City of Durham. (2019). *Comprehensive annual financial report: Fiscal year ended June 30, 2019*. Durham, NC: City of Durham.

City of Phoenix. (2019). *Comprehensive annual financial report: For fiscal year ended June 30, 2019*. Phoenix, AZ: City of Phoenix.

County of Durham. (2019). *Comprehensive annual financial report: Fiscal year ended June 30, 2019*. Durham, NC: County of Durham.

Fiscal Research Division. (2019). *North Carolina general fund revenue consensus forecast*. Raleigh, NC: North Carolina General Assembly.

Garcia, T. (2020). Home improvement projects are underway during COVID—19 with millennials spending the most, says Bank of America. *MarketWatch*. Retrieved July 21, 2020, from https://www.marketwatch.com/story/home-improvement-projects-are-underway-during-covid-19-with-millennials-spending-the-most-says-bank-of-america-2020-06-24

Gorina, E., Maher, C., & Joffe, M. (2018). Local fiscal distress: Measurement and prediction. *Public Budgeting & Finance*, *38*, 72-94. https://doi.org/10.1111/pbaf.12165

Hendrick, R. (2004). Assessing and measuring the fiscal health of local governments: Focus on Chicago suburban municipalities. *Urban Affairs Review*, *40*, 78-114. https://doi.org/10.1177/1078087404268076

Hoene, C. (2004). Fiscal structure and the post-proposition 13 fiscal regime in California's cities. *Public Budgeting & Finance*, *24*, 51-72. https://doi.org/10.1111/j.0275-1100.2004.00347.x

Holshue, M. L., DeBolt, C., Lindquist, S., Lofy, K. H., Wiesman, J., Bruce, H., Spitters, C., Ericson, K., Wilkerson, S., Tural, A., Diaz, G., Cohn, A., Fox, L., Patel, A., Gerber, S. I., Kim, L., Tong, S., Lu, X., Lindstrom, S., … Pillai, S. K. (2020). First case of 2019 novel coronavirus in the United States. *New England Journal of Medicine*, *382*, 929-936. https://doi.org/10.1056/nejmoa2001191

Honadle, B. W., Costa, J. N., & Cigler, B. A. (2004). *Fiscal health for local governments: An introduction to concepts, practical analysis, and strategies*. London, UK: Elsevier.

Hurd, M. D. & Rohwedder, S. (2010). *Effects of the financial crisis and great recession on American households (NBER Working Paper No. 16407)*. Cambridge, MA: National Bureau of Economic Research.

Indiana Department of Revenue. (2019). *Information bulletin #29: Sales tax*. Indianapolis, IN: Indiana Department of Revenue.

Jacob, B. & Hendrick, R. (2013). Measuring and predicting local government fiscal stress: Theory and practice. In H. Levine, J. B. Justice, & E. A. Scorsone (Eds.), *Handbook of local government fiscal health* (pp, 11-41). Burlington, MA: Jones and Bartlett Learning.

Jiang, F., Deng, L., Zhang, L., Cai, Y., Cheung, C. W., & Xia, Z. (2020). Review of the clinical characteristics of coronavirus disease 2019 (COVID—19). *Journal of General Internal Medicine, 35*, 1545-1549. https://doi.org/10.1007/s11606-020-05762-w

Keith, C. (2020). It's going to hurt: Struggling PA. towns brace for financial gut punch from the coronavirus. *The Philadelphia Inquirer*. Retrieved April 2, 2020, from https://www.inquirer.com/health/coronavirus/spl/pennsylvania-towns-cities-finances-distress-coronavirus-20200321.html

Kim, E. (2020). Amazon to stop accepting all products other than medical supplies and household staples to its warehouses amid coronavirus crisis. *Business Insider*. Retrieved April 2, 2020, from https://www.businessinsider.com/coronavirus-amazon-suspends-all-non-essential-shipments-to-warehouses-2020-3

Kline, D. B. (2020). Costco, Walmart, Target finally see coronavirus sales traffic fall. *The Motley Fool*. Retrieved April 2, 2020, from https://www.fool.com/investing/2020/04/01/costco-walmart-target-finally-see-coronavirus-sale.aspx

Leiser, S. & Mills, S. (2019). Local government fiscal health: Comparing self-assessments to conventional measures. *Public Budgeting & Finance*, *39*, 75-96. https://doi.org/10.1111/pbaf.12226

Levine, H., Justice, J. B., & Scorsone, E. A. (2013). *Handbook of local government fiscal health*. Burlington, MA: Jones and Bartlett Learning.

Maher, C. S., Ebdon, C., & Bartle, J. R. (2020). Financial condition analysis: A key tool in the MPA curriculum. *Journal of Public Affairs Education*, *26*, 4-10. https://doi.org/10.1080/15236803.2020.1717321

Maher, C. S. & Nollenberger, K. (2009). Revisiting Kenneth Brown's '10-point test.' *Government Finance Review*, *25*(5), 61-66.

McDonald, B. D. (2015). Does the charter form improve the fiscal health of counties? *Public Administration Review*, *75*, 609-618. https://doi.org/10.1111/puar.12389

McDonald, B. D. (2017). *Measuring the fiscal health of municipalities (Working Paper No. WP17BM1)*. Cambridge, MA: Lincoln Institute of Land Policy.

McDonald, B. D. (2018). Local governance and the issue of fiscal health. *State and Local Government Review*, *50*, 46-55. https://doi.org/10.1177/0160323x18765919

McDonald, B. D. (2019). The challenges and implications of fiscal health. *South Carolina Journal of International Law and Business*, *15*(2), 78-99.

McDonald, B. D., Decker, J. W., & Johnson, B. A. M. (2020). You don't always get what you want: The effect of financial incentives on state fiscal health. *Public Administration Review*. Advanced online publication. https://doi.org/10.1111/puar.13163

McDonald, B. D., Goodman, C., & Hatch, M. E. (2020). Tensions in state-local intergovernmental response to emergencies: The case of COVID-19. *OSF Preprints*. https://doi.org/10.31219/osf.io/cnzt6

Mian, A. & Sufi, A. (2010). The great recession: Lessons from microeconomic data. *American Economic Review*, *100*, 51-56. https://doi.org/10.1257/aer.100.2.51

Mikesell, J. L. (2017). *Fiscal administration* (10th ed.). New York, NY: Cengage.

Mizumoto, K. & Chowell, G. (2020). Estimating risk of death from 2019 novel coronavirus disease, China, January–February 2020. *Emerging Infectious Diseases*, *26*. https://doi.org/10.3201/eid2606.200233

Muro, M., Maxim, R., & Whiton, J. (2020). *The places a COVID—19 recession will likely hit hardest*. Washington, DC: Brookings Institute.

National Retail Foundation. (2019). *NRF says 'state of the economy is sound' and forecasts retail sales will grow between 3.8 and 4.4 percent*. Washington, DC: National Retail Foundation.

New York State Association of Counties. (2020). *Coronavirus economic impact: County sales tax revenue projections*. Albany, NY: New York State Association of Counties.

North Carolina Center for County Research. (2015). *Basics of North Carolina local option sales taxes*. Raleigh, NC: North Carolina Center for County Research.

North Carolina Department of Revenue. (2019a). *Sales and use tax rates effective April 1, 2019*. Raleigh, NC: North Carolina Department of Revenue.

North Carolina Department of Revenue. (2019b). *Sales and use distribution–December 2019*. Raleigh, NC: North Carolina Department of Revenue.

North Carolina Department of Revenue. (2019c). *Sales tax distribution and closeout schedule*. Raleigh, NC: North Carolina Department of Revenue.

North Carolina Department of Revenue. (2020). *Sales and use tax*. Raleigh, NC: North Carolina Department of Revenue.

Pagano, M. A. & McFarland, C. K. (2020). When will your city feel the fiscal impact of COVID—19? *Brookings Institute*. Retrieved April 1, 2020, from https://www.brookings.edu/blog/the-avenue/2020/03/31/when-will-your-city-feel-the-fiscal-impact-of-covid-19/

Parker, J. A., Souleles, N. S., Johnson, D. S., & McClelland, R. (2013). Consumer spending and the economic stimulus payments of 2008. *American Economic Review*, *103*, 2530-2553. https://doi.org/10.1257/aer.103.6.2530

Saunders, C. & Nida, C. (2020). *Projections for state-collected local government tax revenue*. Raleigh, NC: North Carolina League of Municipalities.

Shon, J. (2017). State–local sales tax, spillover, and economic activity: Examining county governments in the US. *Local Government Studies*, *43*, 429-450. https://doi.org/10.1080/03003930.2017.1300148

Slattery, D. & Shahrigian, S. (2020). New York leaders grapple with economic impact of coronavirus. *New York Daily News*. Retrieved April 2, 2020, from https://www.nydailynews.com/news/politics/ny-city-budget-20200310-woptaudbfrg5zgpvaomcf5lvfy-story.html

Stallman, J. I., Maher, C. S., Deller, S. C., & Park,S. (2017). Surveying the effects of limitations on taxes and expenditures: What do/don't we know. *Journal of Public and Nonprofit Affairs*, *3*, 197-222. https://doi.org/10.20899/jpna.3.2.197-222

Stradling, R. (2020). As coronavirus keeps people home, North Carolina gas and sales tax revenues plummet. *The News and Observer*. Retrieved April 3, 2020, from https://www.newsobserver.com/news/politics-government/article241708981.html

Suyderhoud, J. P. (1994). State–local revenue diversification, balance, and fiscal performance. *Public Finance Review*, *22*, 168-194. https://doi.org/10.1177/109114219402200202

Thomas, L. (2020). Millennials are the 'worried' generation and changing spending habits most amid coronavirus outbreak, study shows. *CNBC*. Retrieved April 2, 2020, from https://www.cnbc.com/2020/03/05/millennials-worry-changing-spending-most-amid-coronavirus-study.html

Torres, M. (2020). Why you shouldn't order nonessential packages during the coronavirus pandemic. *Huffington Post*. Retrieved April 2, 2020, from https://www.huffpost.com/entry/non-essential-packages-coronavirus-pandemic_l_5e7b8fbfc5b62a1870d67f24

US Census Bureau. (2020). Quick facts: North Carolina. *U.S. Department of Commerce*. Retrieved July 21, 2020, from https://www.census.gov/quickfacts/NC

Wayland, M. (2020). Coronavirus tanks GM, Fiat Chrysler's first quarter auto sales as pandemic shutters dealerships. *CNBC*. Retrieved April 2, 2020, from https://www.cnbc.com/2020/04/01/autos-us-vehicle-sales-in-march-and-1q-2020.html

Wilson, D. M. (2020). Coronavirus: Expected slump in sales tax revenues raise worries for governments. *Rockland/Westchester Journal News*. Retrieved April 1, 2020, from https://www.lohud.com/story/news/2020/03/17/sales-tax-slump-coronavirus-by-county-local-governments/5066567002/

Wu, F., Zhao, S., Yu, B., Chen, Y., Wang, W., Song, Z., Hu, Y., Tao, Z., Tian, J., Pei, Y., Yuan, M., Zhang, Y., Dai, F., Liu, Y., Wang, Q., Zheng, J., Xu, L. Holmes, E. C., & Zhang, Y. (2020). A new coronavirus associated with human respiratory disease in China. *Nature*, *579*: 265-269. https://doi.org/10.1038/s41586-020-2008-3

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Appendix

Table A1. Impact of COVID—19 on Local Government Revenue, FY 2020

Variable	Baseline	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Operating Ratio	1.05	1.04	1.04	1.03	1.03	1.02	1.02	1.01	1.01	1.00	1.00
Revenues/Capita		$7.62	$15.24	$22.86	$30.47	$38.09	$45.71	$53.33	$60.95	$68.57	$76.18
Taxes/Capita		$4.19	$8.37	$12.56	$16.74	$20.93	$25.11	$29.30	$33.49	$37.67	$41.86
Surplus (Deficit)/Capita	$72.00	$64.38	$56.76	$49.14	$41.52	$33.91	$26.29	$18.67	$11.05	$3.43	$-4.19
Total Tax Dependency	59.99%	60.01%	60.03%	60.06%	60.08%	60.10%	60.13%	60.15%	60.18%	60.20%	60.23%
Sales Tax Dependency	26.39%	26.08%	25.76%	25.44%	25.11%	24.79%	24.45%	24.12%	23.78%	23.44%	23.10%

Table A2. Impact of COVID—19 on Local Government Revenue, FY 2021

Variable	Quarter 1										
	Baseline	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Operating Ratio	1.05	1.04	1.04	1.04	1.03	1.03	1.02	1.02	1.02	1.01	1.01
Revenues/Capita		$6.17	$12.33	$18.50	$24.67	$30.84	$37.00	$43.17	$49.34	$55.50	$61.16
Taxes/Capita		$3.50	$6.99	$10.49	$13.99	$17.48	$20.98	$24.47	$27.97	$31.47	$34.96
Surplus (Deficit)/Capita	$73.66	$67.49	$61.32	$55.16	$48.99	$42.82	$36.66	$30.49	$24.32	$18.16	$11.99
Total Tax Dependency	61.59%	61.64%	61.69%	61.74%	61.79%	61.84%	61.90%	61.95%	62.01%	62.08%	62.14%
Sales Tax Dependency	28.00%	27.78%	27.56%	27.34%	27.13%	26.91%	26.69%	26.47%	26.24%	26.02%	25.80%
Variable	Quarter 2										
	Baseline	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Operating Ratio	1.05	1.04	1.03	1.02	1.02	1.01	1.00	0.99	0.99	0.98	0.97
Revenues/Capita		$12.33	$24.67	$37.00	$49.34	$61.67	$74.00	$83.34	$98.67	$111.01	$123.34
Taxes/Capita		$6.99	$13.99	$20.98	$27.97	$34.96	$41.96	$48.95	$55.94	$62.94	$69.93
Surplus (Deficit)/Capita	$73.66	$61.32	$48.99	$36.66	$24.32	$11.99	$-0.35	$-12.68	$-25.01	$-37.35	$-49.68
Total Tax Dependency	61.59%	61.69%	61.79%	61.90%	62.01%	62.14%	62.28%	62.43%	62.60%	62.79%	63.01%
Sales Tax Dependency	28.00%	27.56%	27.13%	26.69%	26.24%	25.80%	25.36%	24.92%	24.48%	24.04%	23.61%
Variable	Quarter 3										
	Baseline	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Operating Ratio	1.05	1.04	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94
Revenues/Capita		$18.37	$36.73	$55.10	$73.47	$91.84	$110.20	$128.57	$146.94	$165.30	$183.67
Taxes/Capita		$10.41	$20.83	$31.24	$41.65	$52.07	$62.48	$72.89	$83.31	$93.72	$104.13
Surplus (Deficit)/Capita	$73.66	$55.29	$36.92	$18.56	$0.19	$-18.18	$-36.54	$54.19	$-73.28	$-91.65	$-110.01
Total Tax Dependency	61.59%	61.73%	61.89%	62.07%	62.27%	62.51%	62.78%	63.11%	63.52%	64.04%	64.75%
Sales Tax Dependency	28.00%	27.35%	26.70%	26.04%	25.38%	24.72%	24.07%	23.43%	22.83%	22.27%	21.81%
Variable	Quarter 4										
	Baseline	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Operating Ratio	1.05	1.03	1.02	1.00	0.99	0.97	0.66	0.94	0.93	0.91	0.90
Revenues/Capita		$24.47	$48.93	$73.40	$97.87	$122.34	$146.80	$171.27	$195.74	$220.20	$244.67
Taxes/Capita		$13.87	$27.74	$41.91	$55.49	$69.36	$83.23	$97.10	$110.97	$124.84	$138.72
Surplus (Deficit)/Capita	$73.66	$49.19	$24.72	$0.26	$-24.24	$-48.68	$-73.14	$-97.61	$-122.08	$-146.55	$-171.01
Total Tax Dependency	61.59%	61.79%	62.01%	62.27%	62.59%	62.99%	63.52%	64.25%	65.37%	67.39%	72.33%
Sales Tax Dependency	28.00%	27.13%	26.26%	25.38%	24.50%	23.65%	22.83%	22.11%	21.60%	21.61%	23.42%