COVID-19 and Gradual Adjustment in the Tourism, Hospitality, and Related Industries

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Abstract

In this Note, we take up the problem of post COVID-19 gradual adjustment in the industry as well as whether and to what extent opening with limited capacity might be feasible. We find that (i) re-opening gradually requiring only non-negative profits is quite feasible but (ii) re-opening requiring the same level of profit as in the pre COVID-19 period is considerably more difficult, and seems feasible by re-opening at capacity near 33%. Lower capacities would require governmental subsidies which could vary considerably from hotel to hotel.

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1. Introduction

The global pandemic of COVID-19 hit hard the hotel and airline industries among other sectors of the economy. Major airlines like Virgin, Flybe, Trans States Airlines, Compass Airlines etc., have collapsed and the tourism and hospitality sectors face severe financial problems as demand has, practically, fallen to an absolute minimum. This is despite the fact that President Trump has signed a stimulus bill of $58 billion in aid for airlines — $29 billion in payroll grants for workers, and $29 billion in loans for the airlines.

Travel, globally generates 330 million jobs or 10% of all employment on Earth. As a commentator noted: "Not every airline, not every hotel, not every tour company, and not every attraction will make it. Nor, obviously, will a lot of other companies that have absolutely nothing to do with travel other than their employees previously traveled to do their jobs, pouring billions of dollars into the global travel industry. That evaporated spending will generate not only unprecedented losses for travel companies this year, but diminished financial performance for several years to come. Leisure travelers, especially in those in the financial middle and lower classes who are most likely to experience significant financial pain because of the pandemic and resulting near-shut down of economies, simply won't be able to afford to travel as much. Thus, they will spend less - perhaps even nothing - on leisure travel over the next few years." (Read, 2020) As Marriott begins furlough, the hotel industry seeks $150 billion in bailout (The Real Deal, 2020/03/18).

In this Note, we take up the problem of gradual reopening in the industry as well as whether and to what extent it might be feasible. We focus on three different scenarios.

Scenario 1: Model when hotels must have the same profits as pre-COVID-19

Suppose that hotels plan a gradual opening with the assumption that profit before (Π_{before}) and after (Π_{after}) are the before and after COVID-19 profits, respectively.

Let us denote TR as total revenue, TC as total (variable) cost, and K asfixed costs[3]. Therefore, we have:

$$\Pi_{before} = TR - TC - K. \quad (1)$$

After COVID-19, let us assume that hotels re-open at $h\%$ (say $h = 0.5$ or 0.8) capacity.The re-opening implies the same fixed costs as before, and a denotes the associated factor. Therefore, we have:

$$\Pi_{after} = h \cdot TR - a \cdot TC - K, \quad (2)$$

To have the same profit before and after COVID-19, we should have

$$\frac{TR}{TC} = \frac{1-a}{1-h}. \quad (3)$$

The return-to-dollar $\frac{TR}{TC} = g$ is at its pre-COVID level. Therefore, we have:

$$a = 1 - g(1-h). \quad (4)$$

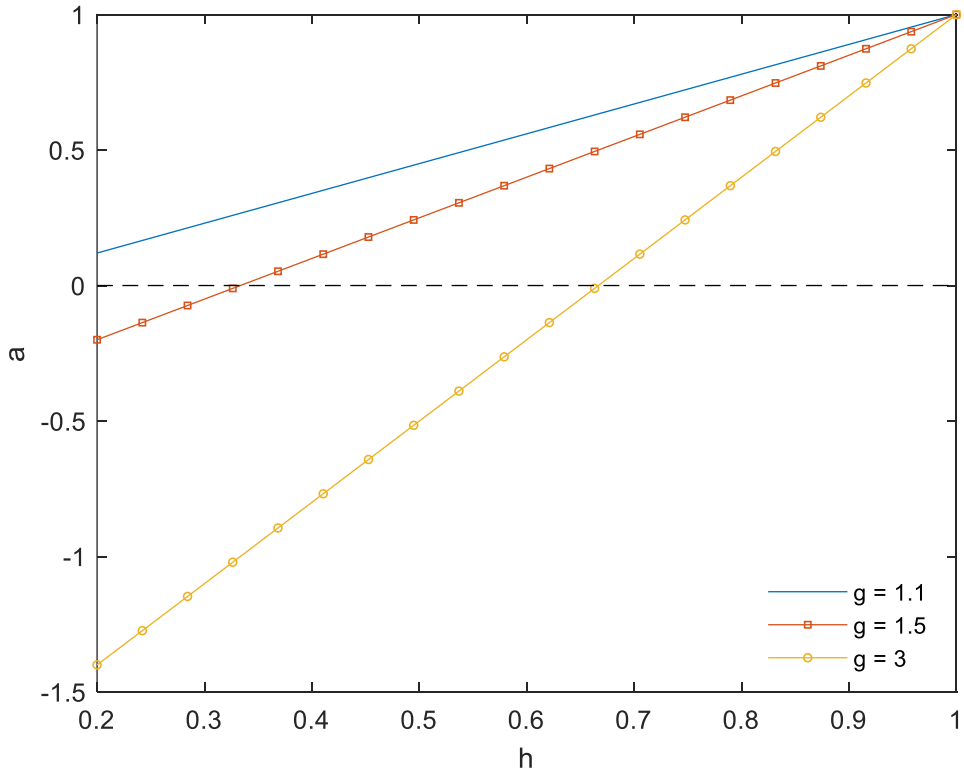
To have *at least the same profit as before*, the relevant condition is: $a \leq 1 - g(1-h)$. For this upper bound to be positive, it is clear that it must be the case that:

$$h \geq 1 - \frac{1}{g}. \quad (5)$$

For example, with a return-to-dollar equal to 2 (as shown in previous work, e.g. Assaf and Tsionas, 2018), h should be greater than 0.5 but when the return-to-dollar is 3, then h should exceed $\frac{2}{3}$.

[3] This analysis applies to airlines and other major sectors of the economy.

Figure 1. Relation between a and h



The relation between a and h in (4) is shown in Figure 1 for different values of g. With larger values of h, it is necessary that a becomes greater. With $g = 1.1$ only, we have h nearly 9% so re-opening is possible in a gradual way starting from 9%. With a return-to-dollar around 1.5 gradual re-opening should start from 33.3% so, *the return-to-dollar is critical in any attempt of gradual re-opening*. Even with g =1.5 opening at capacity lower than 33.3% implies a negative value of a which means that the hotel should be subsidized. In the absence of subsidies opening at lower capacity is simply not possible. With $g = 3$ it is not possible to re-open at capacities less than about 65%.

Scenario 2: A model when non-negative profits are only required

If, instead of requiring that hotels make at least the same profits as before, we only require non-negative profits, a different picture emerges. So, the problem is to require simply that hotels make nonnegative profits post COVID. This means $\Pi_{after} \geq 0$

which implies $hg - a \geq \frac{K}{TC}$.[4] With constant-returns-to-scale, we have $h = a$ so the requirement of positive profits post COVID is that $h(g-1) \geq \frac{K}{TC}$. With $g \leq 1$ this is never possible so, a hotel that was not profitable before it is unlikely to reopen. If $g > 1$ (again, under constant-returns-to-scale) then profitable re-opening at capacity h requires $g \geq 1 + \frac{K}{h\,TC}$ which depends on the ratio of fixed costs to total (variable) costs.

Without constant-returns-to-scale, the condition is

$$hg - a \geq \frac{K}{TC}. \qquad (6)$$

If we multiply and divide the right-hand-side by TR we end up with the general condition:

$$\frac{K}{TR} \leq h - \frac{a}{g},$$

which means that the ratio of fixed costs to revenues should be low enough, and lower than the bound $h - \frac{a}{g}$. Apparently, this bound must be positive which implies $\frac{a}{h} \leq g$. This is, essentially, a condition on returns to scale, viz. the relationship between a and h.

From the available sample, we take the profit rate $\pi = \frac{\Pi_{before}}{TC}$ from EBIT divided by total costs.

Therefore, $\frac{K}{TR} = g - 1 - \pi$. This follows because $\Pi_{before} = TR - TC - K$. Dividing through by TC we have $\pi = g - 1 - \frac{K}{TC}$ so $\frac{K}{TC} = g - 1 - \pi$.

Then, from equation (1) we should have

[4] Claims are often made that fixed costs in the hotel industry are substantial relative to variable costs. But once a hotel is built, from the relation $\Pi = TR - TC - K$ we have: $\frac{K}{TC} \equiv c = g - 1 - \pi$ where $\pi = \frac{\Pi}{TC}$ is the rate of profit. Therefore, $\pi = g - 1 - c$. If we assume $0 \leq \pi \leq 1$, we obtain $g - 1 \geq c \geq g - 2$. With $g = 2$, it turns out that $c \leq 1$ so, it is not higher than variable costs. With $g = 3$ then c would be between 1 and 2.

$$hg - a \geq g - 1 - \pi$$

which implies

$$a \leq (h-1)g + 1 + \pi \equiv a^*.$$

Since $\pi = g - 1$ this simplifies to

$$a \leq hg \equiv a^* \tag{7}$$

Overall, this implies that opening gradually starting at h=25% to 50% should be feasible. Of course, this requires a judgment on what values of a^* are reasonable but under constant returns-to-scale ($a = h$) it requires only that the return-to-dollar is greater than one which is, of course, the case for the majority of hotels in the US pre COVID-19.

Scenario 3: Operation no matter what

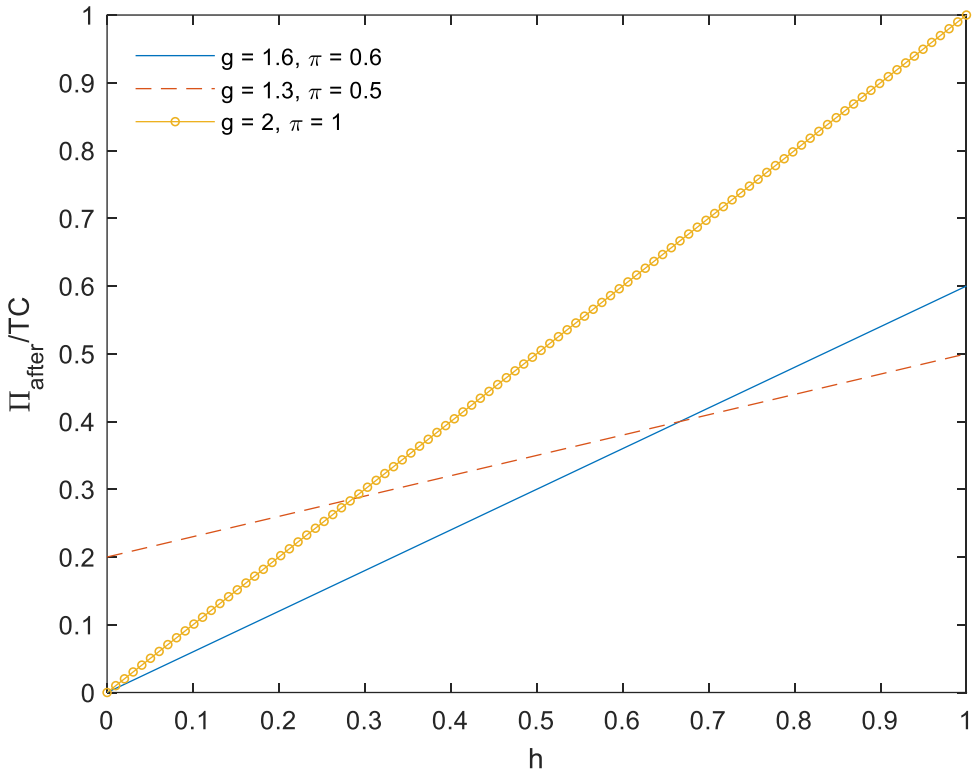
Suppose hotels are *required* to operate at capacity h.[5] The ratio of fixed costs to variable costs, $c = \frac{K}{TC}$ pre COVID-19 was shown to be $c = g - 1 - \pi$. Therefore

$$\frac{\Pi_{after}}{TC} = (h-1)g + 1 - a + \pi. \tag{8}$$

In this expression both g and π refer to the pre COVID-19 period. Under constant returns to scale ($a = h$) the relation in (8) is shown in Figure 2 for typical values of g and π.

[5] This is not, necessarily, a legal requirement.

Figure 2. Relation between h and $\frac{\Pi_{after}}{TC}$



From Figure 2, it turns out that the majority of hotels would have positive profits as well as satisfactory profit rates even at relatively low values of h. To conclude, gradual re-opening of the industry seems quite feasible even under the assumption that capacity is restored only to 30%. Of course, currently the industry faces severe problems as it is likely that many hotels will go in furlough seeking bailouts but as COVID-19 sets back, gradual re-opening with the necessary precautions does not appear infeasible.

A general dynamic analysis

Suppose we consider the post COVID rate of profit

$$\pi_{After} \equiv \frac{\Pi_{after}}{TC} = hg - a - \frac{K}{TC} = (h-1)g + 1 + \pi_{Before} - a.$$

Taking differentials we obtain

$$\mathrm{d}\pi_{After} = \mathrm{d}h \cdot g + \mathrm{d}\pi_{Before} - \mathrm{d}a + (h-1)\mathrm{d}g.$$

Define, generically, $\dot{x} = \frac{dx}{x}$. We obtain

$$\pi_{After}\dot{\pi}_{After} = g\{h(\dot{h} + \dot{g}) - g\} - a\dot{a}.$$

If $\dot{g} = 0$ the formula simplifies to

$$\dot{h} = \frac{a\dot{a} + \pi_{After}\dot{\pi}_{After}}{gh}.$$

If $\dot{\pi}_{After}$ is close to zero in the immediate adjustment period, we obtain

$$\dot{h} = \frac{a}{gh}\dot{a}. \tag{9}$$

Therefore, the relationship between $\dot{h}$ and $\dot{a}$ is "linear" with a "coefficient" equal to $\frac{a}{gh}$ which (under constant returns-to-scale, $a = h$) can be simplified to

$$\dot{h} = \frac{1}{g}\dot{a}. \tag{10}$$

If g is close to 1.5, $1/g$ is $\frac{2}{3}$ so, we have $h \simeq \frac{2}{3}\dot{a}$. This implies that *capacity expansion should be slower than the increase in costs* by a factor of, roughly, $\frac{2}{3}$. Therefore, this analysis justifies some conservatism in expanding capacity in the post COVID period.

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