

LBA: Using synthetic control for Corona brand renovation

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Dear Ms. Kenwood<sup>1</sup>,

Thank you for meeting with me last Friday to discuss the challenges brand "Corona" faces in 2020. In this decision memo, I will

1. restate the problem and hypothesis
2. suggest a statistical method that can help you evaluate your hypothesis, and
3. help you interpret the results of a hypothetical outcome

Hopefully, my work helps to decide if Corona needs brand renovation.

## **Problem Statement**

Corona is a light beer brand ranking #4 in sales worldwide. Corona suffered a decrease in sales after the start of the COVID-19/Coronavirus pandemic. Only in China, Corona underwent a \$170 million loss in earnings. Other beer brands' sales decreased, too, most likely due to lockdowns, which led to bar closures and fewer public gatherings. Corona's brand is associated with the Coronavirus, whose name has 'Corona' in it. Corona's executives, including Ms. Kenwood, are concerned that the association damaged Corona's brand image. Their goal state is to understand if Corona's brand image suffered from the Coronavirus pandemic, causing decreased sales worldwide. If the hypothesis is true, then Corona would need brand renovation. Otherwise, Corona can shift its attention to other aspects of product and market development.<sup>2</sup>

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<sup>1</sup> Disclaimer: the scenario and interview are hypothetical and did not happen in real-life. The story, all names, characters, and incidents portrayed in this production are fictitious.

<sup>2</sup> #rightproblem: I identified the initial state (sales are decreasing, perhaps because of damaged brand image), goal state (renovate brand if the hypothesis is true), and scale (worldwide sales). I also explained the consequences when the hypothesis is true and when it is false. Stating the problem clearly and concisely ensures the client has the same understanding of the problem.

## Synthetic Control

After evaluating the available data and the case, we decided that the **synthetic control method** would be most effective in assessing the hypothesis because:

1. Corona and other beer brands have time-series data about its sales.
2. The intervention here is **not** the start of the pandemic, but rather the association with the Coronavirus. Corona is the only brand with such association, meaning it is the only brand receiving the treatment.
3. While other brands have also been affected by the pandemic, most of them don't have any association with COVID-19, so we can use them as control units.

Synthetic control is a method that allows us to imagine what would have happened in an alternative universe where Corona is not associated with the Coronavirus pandemic. The method combines other beer brands (control units) into one synthetic control brand whose characteristics are similar to Corona's (treatment unit). Synthetic unit's sales (outcome) almost identically trace Corona's sales pre-pandemic (before intervention). Once we have a quality control unit, we can evaluate if the intervention (association with Coronavirus) made any difference by looking at the graph and Mean Squared Prediction Error post-intervention. Let's look at a hypothetical example to illustrate the method. First, we describe the required type of data. Secondly, we present a graph comparing sales for Corona and its synthetic twin pre- and post-intervention

## Data

The table below shows some relevant characteristics for Corona and other beer brands. We constructed a synthetic Corona whose characteristics pre-pandemic closely match the actual

	Corona	Synthetic Corona	Guinness	Bud	Budweiser
Annual ROI	3500	3469	4200	2950	3345
Turnover Rate	3.7	3.83	5	2.3	4.1
Target Audience Income	\$2,000	\$1,978	\$4,000	\$1,850	\$2,300
Sales in 1Q 2020 (Billions)	144	146	218	112	156
Sales in 4Q 2019	134	136	208	102	146
(continue time series data for sales)					

Figure 1: Hypothetical characteristics for Corona, its synthetic control units, and other beer brands. The table shows the type of data required for applying the synthetic control method. Specifically, we need time-series data showing sales (or another outcome variable) pre- and post-pandemic. Also, other beer brands should not have any association with COVID-19.

brand. The only difference we desire is that the synthetic unit should not have received treatment, meaning it has no association with Coronavirus. Hence, the synthetic Corona is a mix of other brands with no association with COVID-19, and the synthetic Corona's sales are a weighted sum of other brands' sales. For example, if Guinness did not contribute to the synthetic control, then its weight is zero, contributing nothing to the synthetic unit's sales.

## Illustration

Now, we plot the sales of Corona and its synthetic twin. We indicated the COVID-19 pandemic start, which is when Corona obtained its association with Coronavirus.

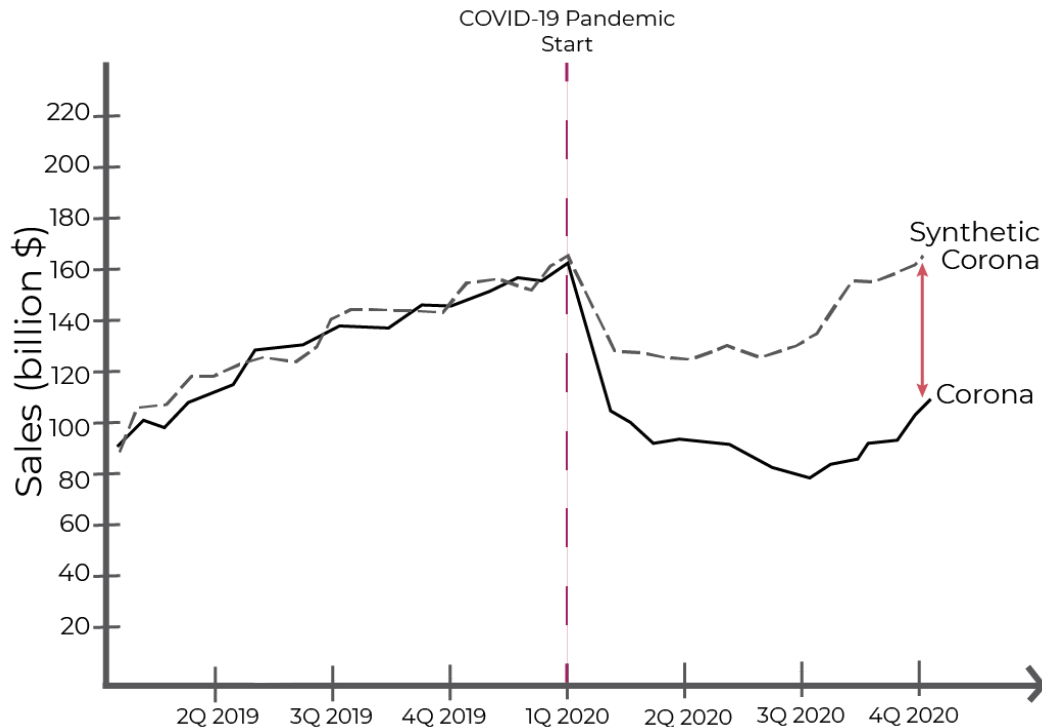


Figure 2: Hypothetical Synthetic Control Test of the impact of COVID-19 association on the Corona brand. We have a good synthetic control unit because it closely traces Corona's sales pre-pandemic. After the pandemic's start, which associated COVID-19 with Corona, Corona's sales have dropped more significantly than synthetic Corona's, which does not have any association with COVID-19. The difference in sales post-pandemic start can be attributed to the impact of COVID-19 association with the brand, implying that its image has suffered.

From the image, we can see that we have a quality synthetic control because it closely traces Corona's sales pre-pandemic.<sup>3</sup> Once the COVID-19 pandemic started, both brands' sales went down. However, Corona's sales have dropped significantly lower and are recovering slower too. We can attribute this difference to the impact of the COVID-19 association on Corona's brand. We assume that unobserved confounding variables did not contribute to the outcome and conclude that Corona needs brand renovation.

<sup>3</sup> #dataviz: I created a graph that clearly illustrates the synthetic control method, labeled axes, differentiated lines through type (dashed vs. solid) and color (gray vs. black), used a colorblind-friendly palette, and included an informative description.

## Explanation

One explanation for why the association damaged brand image is that people build mental availability cascades that connect experiences, feelings, thoughts, and behaviors in one network (Kahneman, 2015). Similar words, such as 'Coronavirus' and 'Corona,' are connected too, allowing us to find synonyms. However, when an element in the network obtains a negative connotation and feelings, it influences connected elements too. Corona is associated with Coronavirus because of the common root. Thus, the brand is affected by people's negative attitude towards anything associated with Coronavirus, which prompts people to think of disease, fear, and death.<sup>4</sup>

## Action Steps

To assess the hypothesis with our method and decide if you need brand renovation, we advise you to follow these steps:

1. Gather time-series data for Corona and other beer brands
2. Remove control brands have no association with Coronavirus
3. Check that Corona is the only treatment unit
4. Create a synthetic control unit using the R package "Synth." Alternatively, consult a data scientist or statistician.
5. Assess the outcomes: if post-pandemic Corona's sales are significantly lower than its synthetic twin's, consider a brand renovation. If the sales are higher, then Corona gained

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<sup>4</sup> #psychologicalexplanation: I provided a plausible explanation of how the association with Coronavirus might negatively affect Corona's brand image, referring to Kahneman's theory of availability cascades, which encapsulate psychological aspects like feelings, thoughts, emotions, and behavior.

popularity as a result of the COVID-19 association. Otherwise, the brand's image has not been affected.

## Conclusion

In this letter, we proposed the synthetic control method to check if Corona's brand image was affected by its association with the Coronavirus. We provided a hypothetical example for illustrative purposes and provided action steps for implementing the method. We hope our work helps you decide if Corona needs brand renovation.<sup>5</sup>

Word Count: 875

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<sup>5</sup> #audience: firstly, I identified the target audience - a board of business executives at Corona. Then, I tailored my decision memo in a professional, respectful tone, using business language, avoiding jargon, and providing simple tables and graphs to illustrate the method.

### References

Kahneman, D. (2015). Chapter 13: Availability, Emotion, and Risk. In *Thinking, fast and slow* (pp. 136-143). New York: Farrar, Straus and Giroux.