“Lies, Damn Lies, and Statistics,” or How I Built the New Airport in Hong Kong

By David Barol, MPP, CFP®, CLU®, ChFC®, BFA®

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During the age of the Coronavirus, governors and the White House argue over where to send resources, worry about flattening the curve, and wonder whether the economic harm will be worse than the disease. All these people, and all these decisions, rely on the accuracy and integrity of the models.

“Where you stand depends on where you sit,” wrote Graham Allison, the dean of my graduate school. My view over public policy is biased by my past work constructing these models.

Goodbye Kai Tak

If you have spent fifteen minutes with me, you will have heard me talk about the time I built the new airport in Hong Kong. Well, I didn’t construct it all by myself; other people helped. For that matter, I didn’t pour the concrete or roll out the tarmac, nor did I hammer nails into studs. I wasn’t even in Hong Kong during the construction, but -- and I’m not bragging on myself -- without what I did, the airport would never have been built.

The Hong Kong Civil Aviation Authority (CAA) knew they needed to do something to relieve the capacity constraint at the single-runway airport called Kai Tak. Fly bigger planes, you say? Hong Kong already landed the highest number of passengers per aircraft. Extend the hours (sleep be damned)? They had so little room to park planes they used to fly them to other airports just to make room for others to land.

For anyone who flew into Kai Tak Airport, you may remember how the pilots would fly toward a giant red and white checkerboard painted on the side of a mountain, then make a sudden right turn to line up with the single runway, descending through Kowloon City -- the densest city on earth -- between high-rise apartment buildings, so close, you could look out your window and see people hanging clothes on their balconies.

There were two problems with expanding the airport. The first was that there was no room: the edge of this incredibly dense city crowded the small terminal building, and the single runway was already surrounded by water on three sides. The second was money. Great Britain's 99-year lease on the New Territories was about to expire, and the Chinese government made it clear there would be no renewal. Quickly after settling Hong Kong Island and Kowloon, the British realized they would need more land to feed the growing population. Almost all the food production took place in the New Territories, which contained nearly 90% of the dry land in Hong Kong, including large ponds filled with thousands of white ducks used to make Peking Duck, which I learned on a bus tour was not a breed of duck but rather a style of preparing it.

Hello Chep Lap Kok

Without the New Territories, the British knew they could not guarantee food for the rest of Hong Kong from which they earned over 4 million pounds per year. So, in 1997, the sun finally set on the British Flag, which was the same year the new airport at Chep Lap Kok opened.

My role in all this was to develop an economic model of the Hong Kong economy, which would predict the impact increasing aviation activity – the number of flight operations, passengers, and tons of cargo – would have on employment, wages, and tax revenues. The Hong Kong government used the model to consider the economic impact from different airport designs, which in turn would provide a common ground for the three major players to agree on a cost for the project. Hong Kong would run the airport, the British would finance the project through issuing bonds, and the Chinese Communist Government in Beijing would commit to paying the annual debt service, once they took over.

This ain't your granddaddy's airport. It was the most advanced airport and the largest construction project in the history of the world. The one and only time I saw it, the island of Chep Lap Kok rose steeply out of the sea off the western coast of Lantau Island, which itself takes about thirty minutes to reach by hovercraft from Hong Kong Island to the east. The reason the British didn't settle Lantau in the early 19th century was that Lantau lacked a dependable freshwater source. The plan was to blow up this mountain of an island, flatten the rock about, and build two independent runways, a terminal, and other necessary structures. When I visited before the first shovel went into the ground, all that was there was a quiet fishing village reached by a single-lane road up and over the mountain ridge that ran the length of Lantau Island, north to south. Besides creating a massive landfill, this project connected the airport with the rest of Hong Kong with a highspeed rail line, a heavy rail line, and a six-lane highway connecting Chep Lap Kok to the mainland through a series of bridges and tunnels.

The model calculated the direct (a baggage handler), indirect (the dentist the baggage handler sees), and multiplier impacts (the rolls of toilet paper both the airport worker and the dentist hoard in times of crisis.) The economic concept of marginal analysis means we should spend on the airport as much as we hope to get back over the next so many years. Higher interest rates used in the calculation result in shorter periods used to determine whether the project is a worthy investment. We don't want to pay more than what we expect to get back from the net cash flows. But this is not how a Socialist government like China's typically makes decisions, which is why China has cities sitting idle and why the economy was on the verge of economic calamity, even before the pandemic.

Last year, my son and his wife flew into Hong Kong. I asked him to look for the plaque that honored my vital work there. Although he said he was not able to locate one, he did raise a Tsingtao beer in salute to his father. So, at least I got that going for me.

Back to Models

Mark Twain said there were three types of lies: “lies, damned lies, and statistics.” We can find support for nearly every argument by finding some expert somewhere who built a model.

“Garbage in, garbage out” is another way of saying a model is only as good as its inputs and how policymakers want to use the model.

The Sun Setting on the British Flag

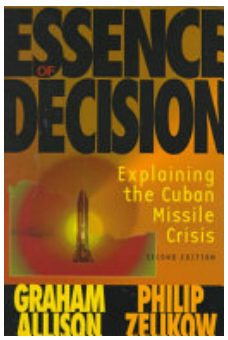
When Federal Express asked us to return to Hong Kong to use the model to justify granting Fifth Freedom Rights to Federal Express, I had lunch with two of my liaisons from the CAA. One of them told me that my work was not about building a new airport but was about finding a way to make up for the lost revenue Britain earned from the colony.

“They used you, mate.”

I do not doubt the British used the model to continue to extract millions of pounds each year after they left Hong Kong in 1997. And the Chinese government I am sure realized that as well. Maybe the most important use of the model was how the Chinese government found a peaceful way to allow the British to relinquish control over the entire colony, not just the New Territories whose lease expired.

Before you trust a model, understand its purpose, because some policymakers look for models to support their existing position. Models do not come from a sterile laboratory. They are used by politicians to support the position they already had in mind. One of my first interviews after graduating from Harvard’s Kennedy School was with the Airline Pilots Association. They wanted to know how comfortable I would be constructing models to advance their position. I told them, “If the numbers justify a policy, I would have no problem advocating for it.” The interview did not last much longer.

Speaking about the most adventurous cuisines in the world, econometric models are a lot like eating at a Chinese restaurant. You wouldn’t want to eat someone else’s food because you don’t know what goes into it, and you wouldn’t want to eat your own because you do. We base models on observable data, surveys, and guesswork -- otherwise known as extrapolation. When we predicted that a flight from Japan would consist of 43% business travelers who would buy 8.6 cameras and require 317 rolls of toilet paper, we were using the midpoint of averages with significant degrees of error about the mean, plus or minus. If we find, through surveys, that for every thousand rolls of toilet paper, 1.6 people got a full-time job, plus or minus half a person, then we compounded the uncertainty of the model. By the time we finished with this complicated model, the degree of error was plus or minus 100%, which may explain why we can have predictions about the number of deaths from Coronavirus varying from 60,000 to over 2 million.



Don’t blindly trust models. They are only as good as their inputs. Graham Allison, the dean of my graduate school, wrote about the “51-49 principle.” We need to make decisions, one way or the other, but sometimes they are based on scant evidence. Sometimes, it takes just a small amount of information on the other side to sway the argument the other way.

We developed models for the airports in Philadelphia, Dallas, Baltimore, and DC; reusing the model we developed for Hong Kong, an island, would not make sense.

Nor should we use the same model for establishing economic and health policy for Manhattan as we would for Italy or North Dakota.

The people developing the models know this already. According to my son (who I don't think even bothered looking to see if there was a plaque), companies like Salesforce and Microsoft are developing platforms to allow researchers from around the world to add data to these models. This data, as it becomes available, helps narrow the variation about the mean to predict the need for hospital beds, masks, medical personnel, and ventilators by location, along with the number of cases, deaths, and immunities, predictions that for now change daily. The best way to tighten variation about an average is to collect more information, which, as time goes on, we invariably do. Try not to make too many decisions as to travel or school too far in advance; we just don't know. Models are helpful in the absence of no information at all, but just remember to ask who developed the model, what was their bias behind the model, and what additional information could change the initial predictions.

Take a deep breath, stay calm, and carry on. This, too, shall pass.