APRIL 25, 2020

Introducing the Alpha Edison Consumer Impact Index

PERSPECTIVES

AN AE SERIES

ISSUE 4

In mid March, as some cities began to roll out stay at home orders, many Americans experienced what history had previously described as a quintessentially Soviet crisis: they ran out of toilet paper. Economic pundits reassured us that the panic was unwarranted. Nearly six weeks later, Amazon Fresh still shows Charmin as 'sold out' and people are buying bidets. Covid forecasting has truly taken us into uncharted territory where it seems old economic rules no longer apply. Why have some shortages been handily resolved while others still plague us? Why are flour and macaroni back on the shelves at Trader Joe's but NextDoor is filled with daily calls for yeast?

A post-Covid world begs for a new approach to sector and market investing-- one that takes into account not only the immediate impact of this dramatic transformation, but the second-order consequences as well as the third and fourth.

The global COVID19 health crisis has created unprecedented economic disruption to all sectors. Even the most stable markets (e.g. food and beverage, capital goods, apparel) have seen multi-digit overall growth or decline within a matter of weeks. These market shifts are difficult to predict because they are the aggregation of complex first and second order effects, both exogenous and endogenous to the business — from the impact of social distancing on topline consumption, to shortages in the supply chain, to macroeconomic effects of worldwide recession, and more.

In order to optimize venture investing in a post-COVID world, we must both **track** the impact of economic and market shocks on different investment areas, as well as **anticipate** the future of the disruption-recovery cycle within our investment time horizon.

Today, we introduce the **Alpha Edison Consumer Impact Indices**, which addresses this first need by creating near real time, highly granular longitudinal metrics across most consumer markets. These indices not only allow us to adapt investment theses to rapidly changing markets but also form the training data for future predictive models (which we will delve into more deeply in later issues).

Many traditional market metrics have fallen short during this crisis because they are built on quarterly or monthly earnings reports. Now we see dramatic swings in consumer markets every day. This volatility results from chains of shocks, with often contradictory impacts, that result in a rapid series of industry phase transitions. For a simple example, envision gross sales' swings as regulatory restrictions (downswing) incite consumer stockpiling behavior (upswing) creating supply chain shortages (downswing) that bankrupt smaller competitors (upswing) until the macroeconomic climate reduces consumer ability to buy (downswing). Conclusions drawn from poorly time-sampled traditional data sources will be rife with false positives and negatives in this time of outsized volatility, and result in errors in long-term investment planning.

While traditional metrics may have sufficed under "normal" conditions, the current economic realities necessitate a higher resolution for useful fidelity. Our indices are based on daily data streams from proprietary AE sources and allow us to track changes with higher time, location, and sector/market/product granularity. This higher resolution allows us to us to more accurately build causal models to explain why those shifts are happening (through correlation models that we will discuss later). By understanding causality in market shifts, we can eventually decompose them into time differentiated factors (i.e. those with long vs short term impacts) and better predict persistence of change.

Constructing the Index

The AE Consumer Impact Indices are based on multiple streams of consumer behavioral data from different sources. They cover both brick and mortar retail and e-commerce, as well as consumer services. The different data streams make up a fairly robust sample of the US population, with sample sizes of 20K to 100K consumers depending on the data source. For some data sources, we are able to leverage demographic data to renormalize aggregations for different representative populations. Additionally, by pulling multimodal data, we are able to increase the accuracy of our results by cross validating data sets that cover the same products or services.

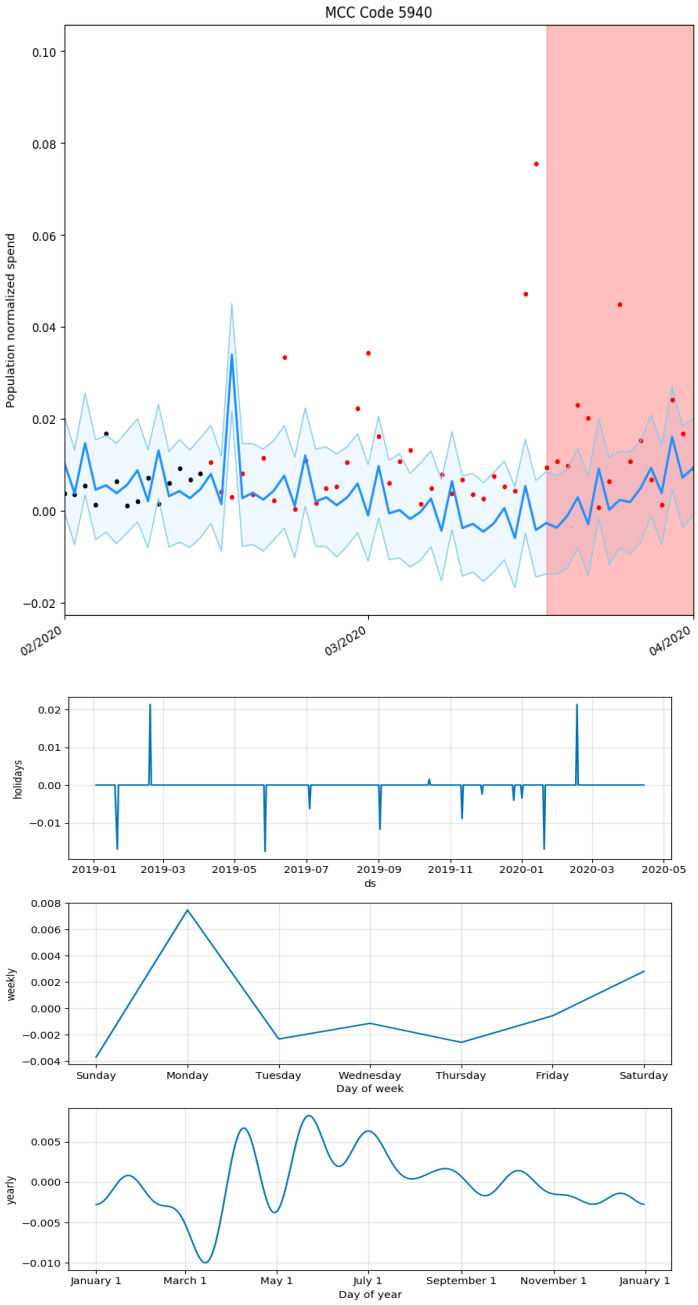
The AE Consumer Impact Index is a measure from -100 to 100 that compares the behavior of a market after COVID19 to expectations set before the crisis. The index is specific to a business variable, sector/product, time window, location, and confidence interval. Negative valued indices correspond to a suppression (for example, movie theatres and restaurants), and positive valued indices represent amplification or growth (for example, groceries, cashless payments).

As an illustrative example, let's examine the AE Consumer Impact Index for bicycle stores nationwide. Simply put, people are buying more bikes. But how many more, with what impact, and to whom?

We construct the index by looking at historical data before the COVID19 crisis (i.e. before Feb 15 2020). These historical actuals are used to create a seasonally adjusted prediction of what market behavior should have indicated had there been no COVID disruption, as well as confidence intervals that capture the region of expected volatility around our predicted mean. We compare actual performance during this crisis with the prediction, in particular counting the number of days where spend is an outlier to our confidence interval in our time window.

The value of the index may be a surprise to many who expect social distancing measures to reduce sales at bicycle shops. Yet our data indicates a growth in sales. Digging deeper, two effects help explain this surprising finding. First, orphaned gym goers are seeking non-communal forms of exercise, even if that exercise is outdoors. Second, bicycles have become the option for essential workers to commute safely to their jobs with shutdowns in mass transit systems. In NYC, four East River bridges that connect Manhattan with Brooklyn and Queens are bike commuting routes; usage of these routes increased 52% in March 2020 over the previous years.

Variable: Dollars Spent (Population Normalized)
Sector: Bicycle Stores
Location: Nationwide US
Window: Rolling 14 Day from April 1, 2020
Confidence Interval: 1-σ (68%)
AE Disruption Index: *26*



Displays the population normalized pre COVID19 (black points) and post COVID19 (red points) spend at bicycle shops. A predictive model that is seasonally adjusted (holiday, weekly, and yearly components shown above) is trained on one year of pre COVID19 data (February 2019 to February 2020). We build a predicted value for the spend (dark blue line) with a confidence interval (light blue region) that shows the expected range of consumption. The time window of 14 days is shown in the red area.

NYC rideshare program Citibikes saw a 67% surge in usage since the start of the crisis, despite being shared/ communal transportation. To illustrate how behavior drives regulatory changes, the demand spike for bikes has caused NY Governor Cuomo to classify bike shops as essential businesses. San Francisco, Philadelphia, and New Orleans have followed suit.

Using the Index

The AE Consumer Impact Index helps gauge the magnitude of disruption to a wide swath of consumer markets from CPG to financial services, from commodity to niche products. By being able to hone in on specific markets seeing dramatic growth or decline, and the underlying behavioral changes, we can identify industries potentially undergoing long term structural change and invest in companies that are unlocking latent demand.

To do so, we must also differentiate temporary volatility from persistent change. We have written about the habit disruption and shifting risk tolerances impelled by the COVID19 crisis. Yet it's an open question which of these disruptions will lead to long term structural changes, and which will revert back to the mean once the health crisis has stabilized or been resolved. For example, we know that consumers have been stockpiling groceries in the beginning of the COVID crisis as a result of restaurant shutdowns and fears about food security. But will the stockpiling of groceries lead to a long term increase in consumption or will the initial shock in spend resolve into the same steady state as social distancing continues? In the bicycle shop example we previously explored, will commuters revert back to public transportation when COVID19 is contained? Or will their newly found enjoyment of biking or continued anxiety of mass transit hygiene permanently change commuting behavior?

There are many behavioral science and statistical approaches to predicting answers to these questions, some of which we will be exploring in future articles. The AE Consumer Impact Indices help track these differing unfolding scenarios for recovery as they happen, as well as provide some nuanced ways to understand correlations in behavior that help us inform predictions.

As a tracking mechanism, the values of the index provides a statistical measure for disruption and recovery. In Fig 2, we show the expected index values for the different possible outcomes for a growth scenario (i.e. a positive valued index). In a full recovery, we expect the maximum to occur at peak COVID crisis, remain stable as the crisis continues, but then to decline to zero as we return to normal. In a "no recovery" scenario, the disruptions to that spend category are permanent, and stay at a high index in perpetuity — an indicator that the market underwent structural demand and/or supply side change. Also possible is the partial recovery scenario, where performance returns to levels that are differentiable enough to see a statistically significant shifting of the mean.

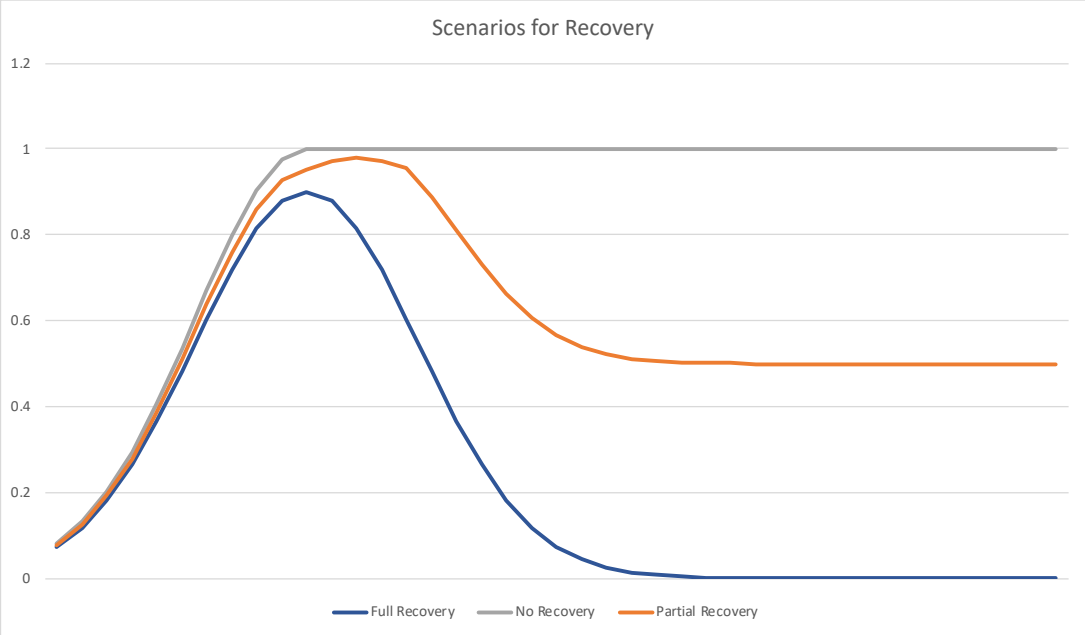


Figure 2

Using the Index (cont'd)

Such an analysis is inherently reactive to real world changes in spend. Though having a near real-time tracking of the disruption-recovery cycle is helpful, the next step is to incorporate this data into predictive models that define scenarios for recovery as the crisis continues and eventually concludes. A simple treatment for predicting recovery scenarios is to look for leading and lagging correlations of recovery in baskets of related products and services. As we observe recovery or continued disruption of those products we know to be "leading," we can predict behavior for those products that are "lagging" but are likely to behave similarly. For example, sales in diapers might be a leading indicator for daycare services revenues a year later. Sales of softballs (a spring sport popular with girls) might lead sales of field hockey equipment (a fall sport popular with girls) later in the year. We can use baskets of correlated but time distanced products to build models that predict recovery that give us the advantage of earlier insights.

While leading and lagging analysis will be illuminating, those relationships are often correlative rather than causal. A more in-depth analysis using the AE Consumer Impact Indices requires not only cross correlation between baskets of indices, but the development of causal behavioral models that includes explanatory exogenous variables on behavioral change and the broader environment (e.g. macroeconomics, regulatory, global health) that can have both a short and long term effect. By using cross-sector high resolution data, one can create data driven methods to differentiate between the short and long, and make appropriate investment decisions for venture time horizons.

Ultimately, COVID19 has become a boon for economic shock modelling and stress testing; by pushing many industries to the extreme, we've been able to understand them as we could never before. Interdependencies between markets we hadn't believed to be correlated are being revealed for the first time, helping us all build better models for the future. However, because the crisis has created so many simultaneous shocks, making sense of cause, effect, change, and permanence becomes possible only with high resolution, wide scale, real time data capture. As we leverage our unique AE data sources in this way to form a better understanding of today's complex economy, we will share with you the AE Consumer Impact Indices and our future work with them.

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