

The Impact of COVID-19 on consumer behaviour in the food and beverage industry

How the virus has affected the performance of GNT, as
well as the firms' strategic outlook

About GNT:

GNT is a German food coloring producer, operating on a multinational level, that focuses entirely on creating colors from natural ingredients (or as their motto states: “coloring food, with food”). The company also provides service solutions, guiding its clients on how to appropriately incorporate their product into the production process, both from a scientific and logistical standpoint. It is a family-owned business that supports around 400 employees worldwide and is rapidly expanding its reach while holding the leading position in the market.

The company was originally founded in 1978 by Dr. Horst Hoeck, who pioneered the concept of creating food coloring from vegetables, fruit and other plants. Since this point, the company has grown to entirely generate the market for natural colors (or “coloring foods”), which represent food coloring products that are composed only of edible materials, without the inclusion of any chemicals. The natural colors market, which currently only composes a small share of the entire food coloring plane, is still worth \$1Bn worldwide today, finding itself mostly applied in non-alcoholic beverages and confectionary goods.

The firm, despite its size and focus on maintaining a highly competitive stance in the market, is facilitated by an open work environment that encourages interaction and freedom of expression above all else. There is no pressing sense of hierarchy, as higher ups within GNT mingle and interact with other coworkers without second thought. Office doors are almost always left open, and employees are encouraged to walk in with a question or idea whenever the need arises. GNT emphasizes that it is a family driven company, partially because it is owned and managed by family, but mainly because its employees are welcomed and encouraged in a way that is distinctly familiar.

The approach almost mirrors that of a modern start-up firm, with productivity being encouraged through a free environment, the aim being for employees to develop a passion for the company’s goals and thus contributing out of devotion rather than fear of backlash. This is furthered by the fact that GNT’s values and goals are exemplary; there is a clear sense

that the firm imposes a net gain on the market and its consumers, which serves as a motivational ingredient for its workers.

Surprisingly, the firm not only encourages familiarity amongst its employees, but also amongst its suppliers. One of GNT's most vital components is its suppliers of natural ingredients. GNT obtains most of its color sources in the form of fresh produce from farmers located in Germany and the Benelux area, with some exotic raw materials, such as Spirulina, being shipped in from further abroad. A majority of the firm's raw materials are grown inhouse, with GNT incorporating almost all the producers of its inputs into its vertically integrated supply chain. This allows the company to avoid price fluctuation and thus volatility in its own offering rates, with the added risk of having to pay its farmers regardless of yield. Said integration is not just essential for efficiency but is also facilitated by the core values of the firm, namely the building and maintaining of strong and long-term relationships with its agricultural suppliers.

At its core, GNT is a company that very much reflects the desire of the modern consumer, despite the fact that it was founded far before the current market trends cemented themselves as the norm. Especially among younger individuals, sustainability, health and quality play an essential role in deciding which products to purchase. This coupled with the storytelling capacity GNT has, and the genuine effort it shows to benefit those in its sphere of influence, positions the firm in a promising way for further consistent growth in the future.

My Role:

While working at GNT I was supervised by, and officially a part of, the marketing department of the firm's Aachen office. My role, however, was more leaning towards that of a strategy consultant / analyst, meaning most of my work occurred independent of any specific department within GNT.

The project I was given consisted primarily of analyzing the impact which COVID-19 had on the food coloring industry, the consumers, as well as GNT specifically. In this sense, I focused both on the external and internal perspective, with my ultimate goal being to summarize all information I obtained into a concise and focused analysis of the firms' performance, focusing on improvements in its future strategy. The majority of the information about consumers and the market was obtained from online sources, while information about GNT's response to the crisis came largely from the department heads within the firm. To obtain the latter, I thus conducted multiple interviews, throughout which I asked key managers within the firm a series of questions regarding their response to COVID-19 and how they would alter the firm's stance to avert damage from future crises.

I presented the summary of my findings to GNT's board of directors and gave an indication of what, given the information I obtained, I believed to be necessary steps in the firm's strategy looking forward. As a whole, it was an immensely valuable experience for me as I obtained a unique perspective on the industry and got a glimpse into the inner workings of the firm.

Abstract

This paper focuses on how consumer behaviour has changed due to COVID-19 and how said change has impacted the operations and future strategy of GNT. It was in large parts found that GNT is strongly positioned in the market, despite its premium nature and a looming decrease in purchasing power, due to the persistence of the trends with which the firm has facilitated its growth. Furthermore, the operations of the firm were impacted differently by region, with the performance of an affiliate being influenced by the state of the local economy. For the US affiliate, it was found that the sales showed large correlation with the local disposable income and could be most accurately predicted using distributed lag model using disposable income values from the same period (DL (0)).

Introduction:

Over the course of this assignment, the focus will be to first dissect the impact which the Corona Virus has had on the market for FMCG (fast moving consumer goods), with a specific focus on food and beverage. After said analysis, the performance of GNT itself will also be analyzed, the focus here being on the sales performance of one of the firm's largest affiliates, GNT USA. As a whole, the goal will be to highlight to the impact which COVID-19 has had on the market surrounding GNT and then provide some insight into the specific effects it has had on the firm level.

Both the consumer analysis and the analysis of GNT as a firm are partially inspired by numerous papers that tackle similar analytical approaches. For the analysis of the consumer market, papers by Michael C. Hall (2020) and Maurie J. Cohen (2020) were used to facilitate the research approach. The prior focuses on the means through which consumption can be displaced due to a crisis, namely spatially, temporally or in terms of selection. The latter focuses on the permanent impact and policy response with regards to COVID-19 and helped to extend parts of the analysis into predictions for the future. Furthermore, a variety of sources from journals focused on FMCG as well as surveys focused on consumption, were used for this segment.

For the segment on GNT specifically, namely the pseudo-out-of-sample analysis, a paper by Huayu Shen (2020) was used. The paper highlights how COVID-19 had impacts on the firm level, with a specific focus on firms operating on the Chinese market. The study aided in providing structure for this assignment, while also providing various valuable insights with regards to the impact which COVID-19 has on the firm level. The study highlights the importance of population mobility decrease, using the real options theory to indicate that smaller firms suffer more, due to their investment scale, when compared with larger firms. The paper also used Maslow's Hierarchy of Needs to provide a better understanding of consumer behavior, which formed part of the basis for the consumer research conducted throughout this paper.

This research is, due to the current nature of events, both scientifically and socially relevant. The scientific relevance stems from clear gaps in the current research with regards to how single firms are impacted by the corona virus. The paper by Shen, H (2020) focuses on stock market listed firms, but there is very little research with regards to how single, private firms performed. Furthermore, there is not a lot of existing research in the European region, with most focus being directed towards the US and China. The social relevance stems from the potential to learn from COVID-19 and improve the firm level response to any future upcoming crises. The study could potential make it clearer how consumers and the market behave in the event of a global crises, making the economic response which is necessary more apparent.

The Consumer:

“Society is never the same as the one that existed before the calamity. For good or ill, calamities are unquestionably the supreme disruptors and transformers of social organization and institutions” – Pitrim Sorokin, 1942

The opinion, concern, focus, worry and behavior of the consumer are factors that have an immense, all-encompassing influence on GNT. Despite GNT mainly dealing in Business-to-Business communication and relations, the grocery shopper in the supermarket ultimately dictates everything, purely through choosing what to buy and what not to buy. Trends in recent years have shown consumers gravitating towards the exact area in which GNT operates; natural, healthy and sustainable products have become center focus for many, with transparent supply chains and the stories behind products growing increasingly vital.

Naturally, the growth in this direction, or any direction, was affected by the emergence of the COVID-19 pandemic at the start of 2020. Consumer behavior was certainly altered, in some cases perhaps even permanently, but as a large portion of market research shows, not necessarily to the loss of GNT or the coloring foods industry. Consumers became more price sensitive and simultaneously more focused on preventative healthcare. Furthermore, the online retail sector expanded immensely, more goods were consumed at home and consumers frequently panic bought or hoarded products they perceived as essentials. In short, the core trend from which GNT benefits is very much still existent, if not amplified, and the market changes that have emerged due to the crisis offer both challenges and interesting opportunities for GNT to appeal to the end-consumer.

A study conducted by Michael C. Hall in the Journal of Management (Hall, 2020) highlights that a crisis (usually a natural disaster) leads to “consumption displacement”, the alteration of what is consumed, where it is consumed, when it is consumed and how it is consumed. This serves as a useful tool when dissecting the impact which the virus has had on the coloring foods market and attempting to understand its coverage and overall influence.

A primary focus, as mentioned, is *what* is consumed after and during the crisis. A key effect, according to a study conducted by Innova Market Insights, was an alteration in the distribution in which indulgent items were consumed. It was found that indulgent foods were frequented by high income individuals during the crisis and avoided by low-income individuals, the sharpest decrease in consumption being found in single households (26%) and single parents living with children (34%) (Green, E, 2020). Similar trends could be observed from a macroscopic perspective, with countries like Italy showing high net increases in the consumption of premium products, and countries like India heavy net decreases (Green, E, 2020). The study further shows that consumers appeared to gravitate towards products that were capable of telling stories, either about their ethical international sourcing or their provenance, small batch craftsmanship and regionality (Green, E, 2020). It was found that 56% of consumers say their purchasing decisions are influenced by stories surrounding a brand, with 41% stating that they are interested in the sourcing behind their purchase decisions (Green, E, 2020). Despite the impact which COVID-19 has had on the consumption patterns of higher cost goods, there is very much still demand for extremely detailed and thorough products that come at a premium.

While said trend was significantly potent before the virus, it seems to have been amplified rather than disrupted, with consumers still willing to pay more for goods which they believe to be holistically valuable. This boils down to products fulfilling certain requirements, such as being highly personal and allowing the consumer to believe that the product was designed with them in mind (Ferrer, 2020a). Sustainability and sourcing ethics are also essential to consumers, with one in three shoppers worldwide declaring that they have increased their research on ingredient origins throughout the last year (Innovations in Food Technology, 2020). It is also growing increasingly important for brands to have a distinct personality which the consumer can identify with, as well as a high attention to detail, particularly in design, as consumers seek visual validation for higher prices (Ferrer, 2020a). In a similar sense, a “human touch” is desired, whether through the image of a supply chain worker on the packaging or the invocation of nostalgia via catering to past traditions or present culture (Ferrer, 2020a). Especially in the post-corona market, consumers are becoming increasingly selective with their goods and focusing on getting as much value for their expense as possible.

Another trend that has been amplified by COVID-19 in a similar sense is the desire of consumers to eat products which are healthier and more natural. Consumers had grown increasingly macronutrient focused prior to the crisis, with the demand not only being to reduce sugar (57%) and fat (19%) intake (Diary Industries, 2020), but also to increase the intake of nutrients such as protein, minerals, vitamin and fiber (Green, E, 2020). This has since been amplified in every sense, with 80% of consumers stating they plan to improve their diet, and 56% of consumers stating that they are paying more attention to natural food claims, due to the Coronavirus (Diary Industries, 2020). The continued increase can largely be explained by consumers feeling more pressed to become healthier and build their immunity to viruses and infections. The demand for this is so high in fact, that it has spawned a trend of its own, namely the desire for supplementary immunity and resistance boosting products that advertise explicitly with said properties. In the UK, around 28% of consumer desire more immunity boosting F&B (Nutrition Insight, 2020). There has also been a surge in products which cater to boosting moods, productivity, gut health and the nervous system (Nutrition Insight, 2020). There are many examples of large brands attempting to profit from this growing trend, such as Kellogg's releasing its "Special K immune Support multigrain flakes".

It is thus in a large part a case of existing consumption trends further embedding themselves and certain sub-trends emerging due to the pandemic, while the decrease in purchasing power has influenced demand distribution. In this sense, "*what*" is being consumed has certainly developed due to the virus, also in part due to recommendations by governments to store non-perishable goods, which has led to said industry experiencing a huge increase in sales where it was previously on the decline (Der Lebensmittel Brief, 2020). It can be assumed, however, that this, as well as trends with immunity in focus, is unlikely to persist in the future. What will likely be much more present in the long term is the demand for natural, healthy, sustainable and holistic products that cater to the consumers current needs.

Consumption was further displaced by COVID-19 in the spatial dimension, or the "*where*". As mentioned in the study by Michael C. Hall, the state of crisis in general tends to affect

regions within a country in a similar way, with regards to where the cashflow from consumption is observed. The research shows that with the announcement of a lockdown, regional inflow, into industries such as retail, spikes while outflow into other regions decreases (Hall, 2020). Industries impacted by the lockdown, such as hospitality, restaurants and catering, experience standstill in terms of cashflow, with inflows and outflows declining at a similar rate and jointly approaching zero (Hall, 2020). In the following periods, inflows and outflows stabilized on a regional basis, essentially resembling grocery and necessities only expenditure (Hall, 2020). It was also found that consumption at the start of recovery became much more regional, with a focus on purchasing local products and avoiding import (Hall, 2020). It can be assumed for this to be partly due to patriotism and communal spirit, and partly due to an aversion to the risk and logistical complications which have plagued international trade throughout the pandemic.

A similar effect is *how* products are consumed, which also somewhat falls under the category of spatial displacement. As certain industries fail, it is important to acknowledge how many other industries rely on them as their distribution platform. Planes serve meals not often served elsewhere, cinemas represent a huge portion of annual popcorn sales and the HORECA industry constitutes a large channel for the sale of alcoholic and nonalcoholic beverages (Diary Industries, 2020). The virus has certainly reduced consumption of such goods through disrupting their distribution channels, but it has also led to much more being consumed at home. Online shopping has surged in popularity to facilitate this, with online purchases increasing between 6-10% on a bimonthly basis for all product categories throughout the pandemic (UNCTAD, 2020). This is especially true for parents working from home, who rely on online deliveries for groceries in order to maintain an effective schedule (Der Lebensmittel Brief, 2020). Consumers are also becoming increasingly cautious of viral transmission via the packaging of goods, with more emphasis being placed on hygiene and safety. This has led to the rise of so called “white glove delivery” services that focus on transmission free delivery while also allowing consumers to shop online in new ways, such as through VR (Green, M, 2020).

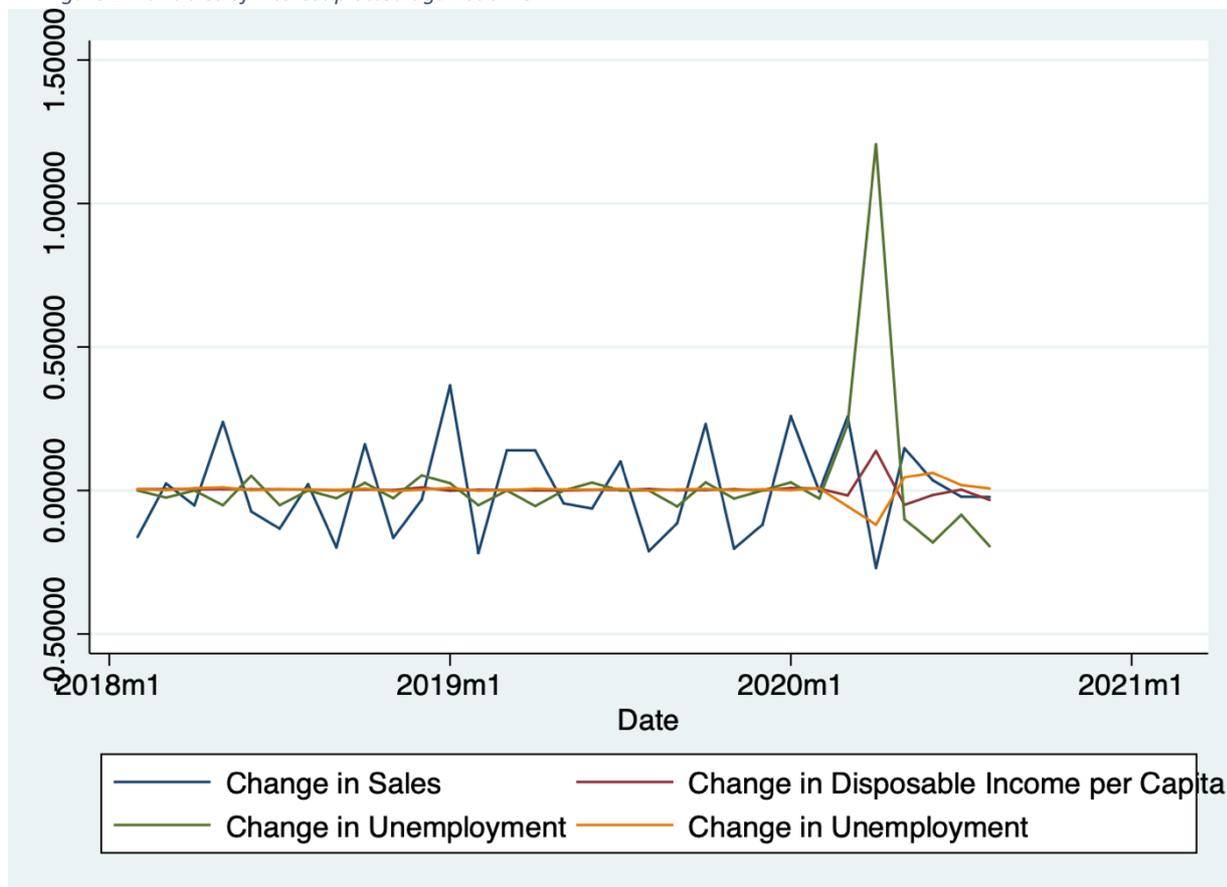
It is also important to acknowledge how the pandemic displaced consumption in a temporal sense, or the “*when*”. It is frequently observed that there was a surge in sales after the virus

had its first impact, and a large fall in sales afterwards, largely explained by consumers panic buying and hoarding goods (Hall, 2020). In this sense, consumption was displaced forwards in time and then saw a gradual reversal to the mean, provided it was not hosted by an affected industry. It is also notable that in some areas demand was created due to the temporal outlook of the lockdown, such as, for example, consumers purchasing bread making equipment and technological goods in anticipation of boredom (Hall, 2020). Furthermore, temporal displacement also occurred at the household level, with the lines between fixed meal occasions being blurred due to schedules being disrupted and many staying at home (Ferrer, 2020b). A study conducted by Maurie J. Cohen suggests that governments will look to utilize their influence to reverse the economic effects of this displacement through encouraging a reversion to “normal” (Cohen, 2020). There will likely be a need for significant economic stimulus, in some areas more than others, with central banks already signaling lower interest rates and, in some cases, even announcing they will be negative (Cohen, 2020).

Data

The data availability for firm focused analysis was fairly minimal, meaning this segment is somewhat restricted. The data used originated from two places; primarily, GNT provided US sales data in Kg on a monthly basis for the years of 2018, 2019 and 2020, which will be described as “Sales”. Secondly, in order to perform a distributed lag analysis, values for monthly US disposable income per capita were obtained from the St. Louis FED (U.S. Bureau of Economic Analysis, 1959-2020). Further variables were found to perform a test for correlation, namely US monthly unemployment rate (U.S. Bureau of Labor Statistics, 2009-2020) as well as US monthly GDP (Trading Economics, 2018-2020). These variables can be seen plotted against time in monthly intervals, in figure 1.

Figure 1: variables of interest plotted against time



When it came to processing the raw data there were a few standard processes implemented and a few complications that had to be solved. All data analysis used throughout the paper was conducted in STATA. Primarily, sales data was converted into a sales growth rate via the

operation of calculating the log of a variable and the subtracting the log of its lag, creating a variable that indicated monthly percentual growth. This was also done for the variables of disposable income, unemployment and GDP. The complication that arose was regarding the time series variable, namely the month and year, which had to be destringed and expressed in monthly terms in order to function as a basis throughout the analysis. Further data vetting occurred via a regression using Newey West standard errors as well as a Dicky Fuller test, ensuring the variables were viable for prediction.

Method and Approach

When analysing the performance of the firm in the US market, the best approach was to use time series models, namely autoregressive, distributed lag and ARDL, with sales as the dependent variable and disposable income per capita growth rate as the independent variable. As found from a regression of the dependent on the disposable income, unemployment and GDP growth rates, the highest correlation existed with the disposable income growth rate, as shown in Table 1.

Table 1: regression results

	Sales Growth Rate
	Sales Growth Rate
Disposable Income Growth Rate	-5.504*** (2.245)
Unemployment Growth Rate	0.656* (0.379)
GDP Growth Rate	1.914 (1.886)
Constant	0.001 (0.029)

Notes: This table includes results from a regression with Sales Growth Rate as the dependent variable and Disposable Income Growth Rate, Unemployment Growth Rate and GDP Growth Rate as the regressors. Significance found via t-tests conducted is indicated by *, with "*" = $p < 0.10$, "***" = $p < 0.05$ and "****" = $p < 0.01$.

The regression shows a highly significant negative correlation with disposable income, indicating that a 1% rise in disposable income is leads to a 5.5% decrease in GNT's sales growth rate, all else equal. A smaller significance was found in the US unemployment rate, which showed a positive correlation with sales, where a 1% increase leads to an increase in the sales growth of 0.656%, all else kept equal. As the highest explanatory power was held by the disposable income variable, this appeared most suitable for use in the distributed lag model.

Table 2: BIC Values

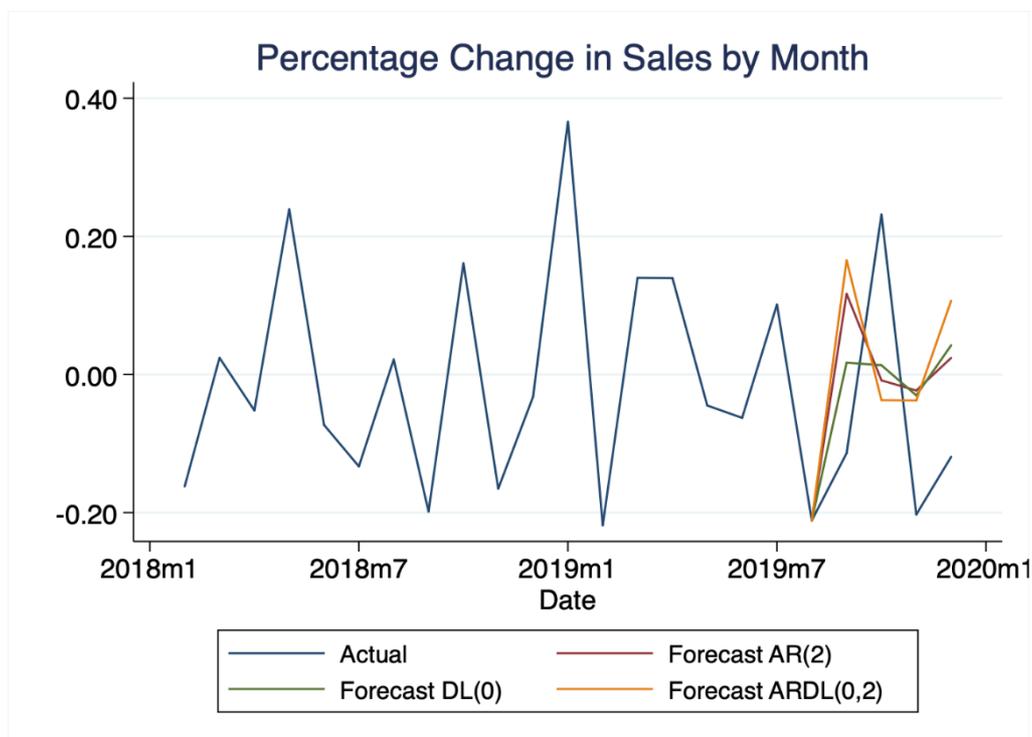
Model	BIC Values
AR(1)	-18.34153
AR(2)	-18.36493
AR(3)	-15.76022
AR(4)	-12.576
AR(5)	-9.318098
DL(0)	-16.05848
DL(1)	-12.91536
DL(2)	-9.724361
DL(3)	-6.536325
DL(4)	-3.604543
DL(5)	-.4233722
ARDL(1)	-16.85327
ARDL(2)	-16.79619
ARDL(3)	-15.25558
ARDL(4)	-12.24844
ARDL(5)	-9.612958

Notes: This table indicates the BIC values for each model investigated, as found through STATA.

Due to the restricted sample size of the data (32 data points) the model testing for AR, DL and ARDL respectively was reduced to models between 1 and 5 lags. Said models were calculated and the associated BIC values (Bayesian Information Criterion) were noted, as found in Table 2. The three models with the lowest (most negative) BIC values were deemed as being the most accurate and then selected for the final round of tests. In said final round, the three chosen models, namely AR(2), DL(0) and ARDL (0,2), were then analysed for their predictive accuracy.

The approach for the time series analysis was that of a pseudo-out-of-sample forecast. In the first part, only results from the reference period (that is, the period before COVID-19) were utilized. From said reference period, the last 4 months were then excluded, and the projection analysis was conducted only with data between January 2018 and August 2019. The three models each rendered predictions for the months of September, October, November and December in 2019, with varying accuracy, as shown in Figure 1.

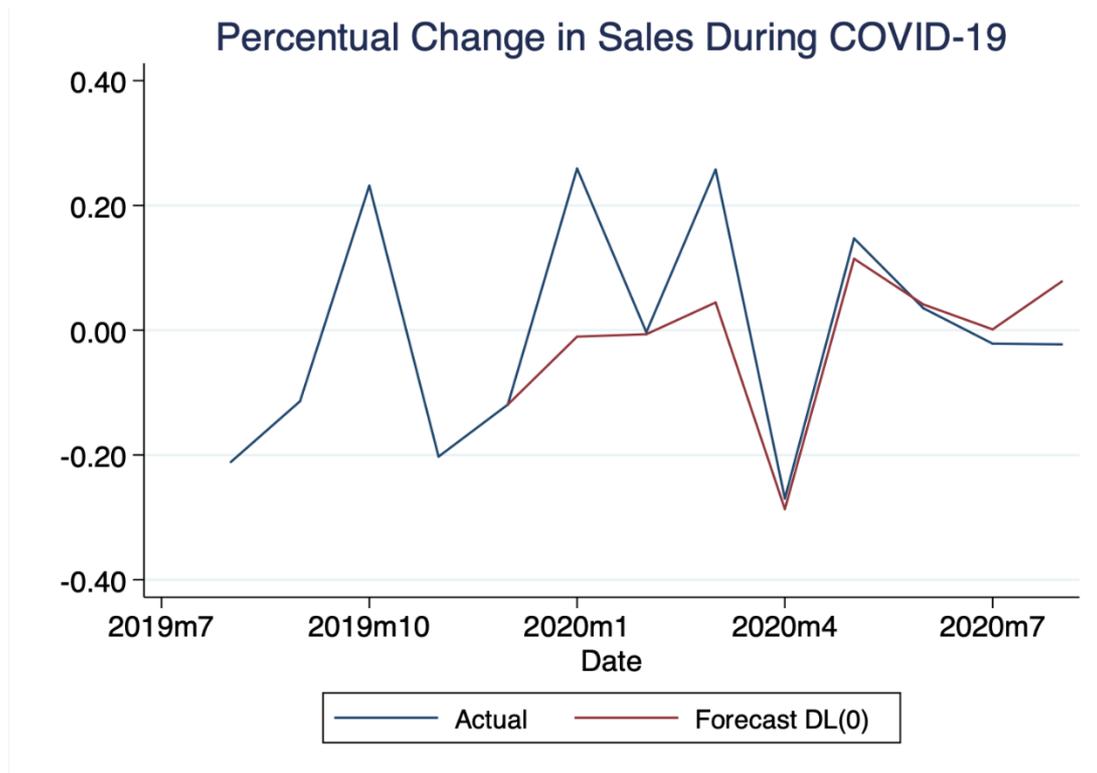
Figure 2: AR, DL and ARDL predictions for the last four months of 2019, based on the reference period of the 20 months prior



From said prediction values, it was then possible to find the prediction with the lowest sum-of-squares value, namely that of the DL (0) model, which was thus deemed most accurate

for prediction. The prediction was then made using all data from the reference period, only predicting the sales growth rates for the months of 2020. As an outcome, the observed sales pattern during COVID-19 could be compared with the predicted pattern according to the distributed lag model. The results of this are shown in figure 2.

Figure 3



The figure indicates that a model using the current period disposable income, most accurately predicts the observed sales value in said period. When looking at the figure in parts, it becomes evident that the model did not predict the two spikes of approximately 20% in January and March. The rise in January can be explained by the drop off in sales throughout the month of December, largely as firms look to reduce inventory before end of Q4. The spike in March, however, is due to the panic buying behaviour at the start of COVID-19. Said spikes are explained by factors outside of the model, while the subsequent drop and recovery is predicted with much higher accuracy.

Nonetheless, the DL (0) model has a correlation coefficient of approximately 70%, making it quite accurate when predicting GNT's sales. However, the model is incapable of future prediction, without data for US disposable income, due to the fact that it does not make use

of time lags. Due to the limited size of the data sample, no model capable of accurately making predictions for the future could be found.

Conclusion

My role at GNT was, in essence, to make recommendations for the company in terms of future strategy implementation. Unfortunately, as mentioned, a large portion of said conclusions are based on data which are not readily available for this report, due to its confidentiality. There are, however, still a few strategic points of focus which I extracted from the data which is presented in this report and can thus highlight in this segment.

Primarily, it can be concluded that GNT stands strong in its current market positioning despite the corona virus, in large parts due to the fact that the trends on which it has developed its business remained intact. As highlighted in the market and consumer behaviour segment, the craving for healthy, nutritious, natural and sustainable has only been furthered by the virus. Despite reductions in purchasing power or the possibility of an upcoming economic recession, consumers continue to prioritize such holistic goods, even when attempting to maximize value for money. In this sense, it is likely for the market within which GNT finds itself to continue expanding with minor complications. Firms will continue to introduce products with a higher focus on healthy and natural, and thus continue to develop in the direction of using more colouring foods.

Secondly, from the pseudo out of sample analysis, some conclusions can be made about the US affiliate of GNT, which is one of the firm's largest sales generators. While this does not provide much perspective on the firm as a whole, it does offer some insights into the dependence which a regional affiliate has on its local economy. It is clear that the US affiliate's performance is very significantly negatively correlated with the local disposable income growth rate and can thus accurately be predicted by a model using said value in the same period. This signifies that growth in the population's disposable income simultaneously suggests a decrease in Kg sales growth rate for GNT. While this at first appears counter-intuitive, given that a higher purchasing power should signify higher sales, it is possible that the effect exists due to the lags between business-to-business and business-to-consumer interaction.

A high growth rate in disposable income could indicate a low in the period prior. The following can thus be assumed; in the first period an individual has low disposable income, purchases less goods and the producer generates less sales. Then, in the second period, the consumer sees an increase in purchasing power (regression to mean) but the producer still has an excess on stock and, regardless of the increased sales in the second period, will choose to purchase less from GNT. Despite said periodical lag, the model still makes accurate predictions given current period values, leading to the conclusion that the sales growth rate in Kg of the US affiliate has a large correlation with the local disposable income growth rate.

Reflection

When reflecting on my internship and looking back on it with hindsight, I realize that it was an experience that was both unique and extremely valuable. Due to the role I played at GNT, and the nature of my assignment, I gained new insights into the world of economics and business, and spoke to experts in a large variety of fields at length about their perspective. In being granted such a wealth of information of such high value, I believe that I have learned a lot and gained a large portion of the practical experience that is, arguably, somewhat unavailable at university.

My supervision at GNT was conducted by the Marketing and Market Development Manager, Maartje Hendrickx. I was first introduced to the task at hand; GNT took interest in my university assignment, specifically the focus on how corona had impacted the market and consumer behaviour, and which direct effect this had on the firm. I was further tasked with performing strategic consulting and using inhouse data in order to highlight the firms existing weaknesses and future potential. In order to gain a perspective on both how corona impacted the consumer and how GNT was performing, I was tasked with doing internal and external research on the topic. The external research is, in large portions, also reflected within this report, in the form of consumer analysis and survey data. The internal research, namely interviews with department leaders within the firm as well as data analysis of a more confidential sort, unfortunately had to be excluded from the report due to the sensitivity of the information. In this sense, while the report does reflect parts of my research into how corona ultimately impacted GNT and what this means for the future, large portions of the actual strategic advice collected from interviews had to be excluded.

This means, in many ways, that my internship extended far beyond what this report reflects. Especially the interviews with department leaders were immensely insightful; I learned first-hand about how an international firm responds to crisis, both internally and externally, and then had the opportunity of backing said facts up with data. I was given a large amount of responsibility and resources and, more importantly, my task was taken seriously by each individual I spoke to, regardless of their position within the firm. In this sense, I was truly

facilitated by GNT in order to extract the most value from my time, both for the company and for my own personal experience.

It is arguable that GNT taking this approach can in large parts be accredited to the familiar spirit of the company. I was fortunate enough to be stationed at the Aachen office in Germany, meaning I was allowed to come into the office to work, due to the German COVID-19 guidelines. In my time at the office, I also got to experience much of said familiarity first-hand, rather than only through my interviews and meetings on Microsoft Teams. It was extremely noticeable how welcoming and open everyone in the company was, both online and in person. This led to a very productive working environment for me personally; I always felt comfortable asking for help with questions I had or consulting certain experts within the company on their opinions on matters I was investigating.

That having been said, it is also important to acknowledge challenges and complications I faced throughout my time at GNT. What I struggled with most was obtaining an overview of the firm's operations and current standing while also understanding the market in general. I was slightly overwhelmed with the amount of information I needed to digest; not only did I need to understand, at least partially, the science behind colouring foods and GNT's manufacturing, I also had to extract the key points from the wealth of information I obtained from interviews and research. Finding consensus was extremely difficult, and it was often a challenge to filter interview transcripts down to their core points. Despite thinking the task may have been too ambitious, I continued to boil down the information I had, and ultimately managed to create a fairly varied summary of my findings.

All in all, my expectations both in terms of my own experience and ultimate performance for the company were exceeded. Not only was the experience extremely valuable and far more enjoyable than I could have hoped for, but I also feel as though I managed to achieve a final outcome that somewhat contributed to the firm's future.

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<https://www.bls.gov/charts/employment-situation/civilian-unemployment-rate.htm>

Abstract

Sum of Squares Values

DL Model = 0.120572007

AR Model = 0.1635705583

ARDL Model = 0.2284479022