

Second Quarter 2019

Economic and Market Commentary

By the end of the War, the city of Mainz was not much more than a pile of rubble. More than two dozen Allied bombing raids saw to that. Most of the historic buildings had been destroyed, and its remaining population lived principally in their cellars to escape the nightly terror.

Today, modern Mainz is a thriving river port city on the left bank of the River Rhine. Mainz has an affluent population of almost 250,000 people and is a central hub for German wine production. But let's not get ahead of ourselves. Let's start with Mainz's earliest days more than 2000 years ago.

At latitude 50 degrees North, the Romans established the northern most outpost of the Empire, Mogontiacum in the year 13 B.C.E. Chosen for its strategic location at the confluence of the Main and Rhine rivers, Roman General Darius had his legions building their fort on the high ground of Kastrieh Hill.

As an important military center throughout most of Roman history, great buildings were established: the largest theater north of the Alps, an elaborate monument dedicated to the city's founder, Darius, and a stone bridge across the River Rhine. The city was no stranger to political intrigue and was the site of Emperor Severus Alexander's assassination in 235 CE. By the middle of the fourth century, the Roman Empire was in a state of decline. Barbarians were soon at the gate.

In 368 CE, the Germanic tribes' leader, Rando, took the city in his eventual drive toward Gaul. For the next hundred years, the region went through a series of occupations by the Alamanni, the Romans again, the Celts, the Saxons and the Franks. The city was decimated in 451 CE when Attila the Hun came through, destroying everything in his army's path. As would happen in the future, the city was rebuilt while its ashes still smoldered.

A Period of Relative Calm

By the time the Western Roman Empire finally fell, what was to become Germany and much of Western Europe came under the rule of the Franks starting with King Clovis 1. Mainz became a strategic center for this new Frankish kingdom, and a new mint was built. Remember this fact because it comes into play prominently about 1000 years later. Don't worry—I won't recount them year by year. In fact, it's time to leap forward some 300 years.

Charlemagne united many of the Frankish kingdoms in the late 8th century. Many tribes and fiefdoms under his rule spoke a variety of languages and practiced diverse customs. This period punctuated the distinction between what later became known as France and Germany. Mainz found itself on the border which created an identity conflict not fully resolved until World War I.

Through much of the early Middle Ages, Mainz grew and prospered. It built a great cathedral and founded the Holy Monastery of St. Stephan. Jewish scholarship and community was often

tolerated as well as persecuted. Mainz was a product of its time, a city struggling with its ethnic and cultural identity. It ultimately became the “electorate of Mainz,” and seat of the Archbishop-Elector of Mainz. In other words, at the time the title was a substitute for the Pope north of the Alps.

Some Call It An Intellectual Ice Age

It wasn't until the late Middle Ages, hundreds and hundreds of years after the conquests of Charlemagne, that the Age of Discovery began to dawn. You see, for the longest time, civilization was content to muddle along. Crops were relatively plentiful, droughts few and far between, and political unrest was left to the nobles and war lords. By the early 1300s, that way of life was about to change swiftly.

It started with the Great Famine of 1315. Crops failed for three straight years, and people starved all across Europe. When the famine was over, the “Black Death Plague” arrived. Talk about a double whammy. By the time the Plague ended, half of Europe's population had died out. Social unrest and constant warfare broke out. This is the time of the “Peasants' Revolt” and the “Hundred Years War.” To make matters worse, the Catholic Church's unity, which was the glue that had held Europe together until that time, fell into disarray.

It's Darkest Before the Dawn

With all of these challenges, Europe was about to embark on the Age of Discovery. Science, math and exploration were about to explode. You see, for the better part of 200 years, European Christians were engaged in the Great Crusades, an effort to retake the Holy Lands from the Ottoman Turks. This period resulted in mass slaughter perpetrated by both sides. Terror reigned, yet the Knights Templar would not give up on their quest to retake the Holy Lands.

As is the case throughout history, war zones create a climate where scholars and educators seek refuge from chaos. Such was the case during the Crusades. Greek and Roman texts, saved by the Eastern Roman Empire after the fall of Rome, gained great attention when Byzantine scholars sought refuge in the West. The Italian Renaissance was about to begin.

Friele And Else Make A Home

By the late 14th century, Mainz was once again a flourishing hub in Western Europe. Friele Gensfleisch zur Laden was a widower. Son of a successful merchant, he had power and social prominence. He was also a talented goldsmith and minter who supervised at the 900-year-old Mainz mint. (I told you to remember it, didn't I?). Tired of bachelorhood and being a single dad raising a brood of kids on his own, Friele went a courting. It wasn't long before he and young Else fell in love. She, the comely daughter of a prosperous shopkeeper, soon married Friele and they started a family of their own. The couple's first child was a son. They named him Johannes. A strong and capable young boy, he soon went to work at the ecclesiastic mint with his father, learning the goldsmithing trade.

Young Johannes had an inquisitive mind and an inventor's hands. He learned about black smithing, minting, casting and metallurgy. Eventually his expertise was recognized by the ruling

elite, and he was appointed to a seat on the “Assizes,” who ruled on forgery cases, serious business considering the fact that forgers could have a hand chopped off if convicted.

It's All In A Name

Back in 15th century Mainz, the wealthy and political elite often had their surnames linked to the names of their ancestral homes. Such was the case with Johannes, whose family occupied the same manor for almost 100 years. The manor house was known as “Gutenberg.” But young Johannes Gutenberg’s life was not one of meteoric rise but one challenged with obstacles, some self-induced, some external in nature.

Gutenberg’s first major challenge was to survive the Mainz Peasant revolt of 1411 when he and his family relocated to Strasbourg, where his mother’s family had property. During this time, he studied, invented and got involved in all kinds of misadventures. Perhaps most troubling for him was his involvement with a scam to make “polished mirrors.” The mirrors were supposed to capture and keep the images of holy relics that had been acquired by Emperor Charlemagne. The concept was seductive, and investor money flowed in. After a couple of years, investors grew impatient, and Gutenberg promised he would “share a secret with them” that kept them temporarily appeased. The secret? How to create written text with moveable typeface, a concept that changed the world.

Things Start Moving Fast

The idea caught on fast. The world was ready. Eyeglasses had already been invented, moveable type and paper had also been invented, ink had been refined. The Romans had been using screw presses since the first century to make olive oil and wine. It took one person to put it all together, and that person was Johannes Gutenberg. He employed the Latin alphabet which sped up type setting, printed in the code x format (page turning, not scrolls) and replaced water-based with oil-based inks, and the printing revolution was about to begin.

From his single print shop in Mainz, printing spread to almost 300 cities in the next 20 years. Italy, France, Germany, the Netherlands, Belgium, Switzerland, England and Poland were all sharing ideas through the printed medium. Literacy was on the rise, and a thirst for knowledge developed that could not be quenched. Manuals and books were printed, double-entry accounting increased trade. By the end of the 15th century, more than 20 million books had been printed and Christopher Columbus had set sail along with Vasco Da Gama. Scholars today view this period as the “beginning of modern history.”

My Friend Mac

For many years, I’ve enjoyed a friendship with a fellow named Mac. We swap articles and perspectives and commiserate about the deferred maintenance required on our boats. A few months back, Mac had sent me an article on “Disruptor Innovators,” companies and technologies that both push the envelope of civilization forward and sometimes upset the apple cart of the known, accepted and predictable. Just like the innovation of the wheel, the hoe and the printing press.

Surprisingly enough, the term disruptive innovation was only introduced into the modern lexicon less than 25 years ago by a fellow named Clayton M. Christensen. Professor Christensen teaches at Harvard today and first introduced the concept in his book, *The Innovator's Dilemma*. Many refer to this work as the most influential business idea so far this century. In recent years, Professor Christensen has written about how the concept can be applied to our health care and education systems. His groundbreaking scholarship is recognized globally as evidenced by his honorary professorship at Tsinghua University in China.

Talk About Appropriate

Right around the time of your reading this commentary, we'll be celebrating the 50th anniversary of Apollo 11 landing on the moon (July 20, 1969). For almost six years now, curators have been working on the restoration of Houston's Mission Control center, bringing it back to its Apollo-era appearance.

When the last of the painters left, the rotary dial phones plugged in and all was restored as it was, 85-year-old Gene Kranz was invited back for an emotional moment. He sat at the console where he had served as Flight Director. After closing his eyes, he said, "It feels like I'm in the chair again and I hear these words: "Houston, Tranquility Base here, the Eagle has landed."

What better time for us to take a forward look at the challenges and strategies that will need to be deployed in the future as well as celebrate this landmark accomplishment. Consider this the first installment in a multi-part series as our presidential election cycle continues to gear up into overdrive. What are the real salient issues of our day, the ones that not only affect our lives and our prosperity but that of future generations? We'll look at some disruptors and the innovative solutions they are developing to push the envelope of civilization forward.

With our new century now almost two decades old, we must face the challenges of climate change, geopolitical unrest, increasing wealth disparity, an increasing shortage in affordable housing, replacing fossil fuels, race relations, religious intolerance, a bloated and self-justifying bureaucracy as well as inept regulators. No segment of society or commerce should be exempt from self-reflection. Not yours, not mine. Many of these challenges could have made their way to any list drawn up 100 years ago, 500 years ago or a thousand years ago. But when it's all said and done, no need is more basic than food. How do we feed ourselves, and that's where I'll begin.

"The pessimist complains about the wind: The optimist expects it to change, the realist adjusts the sails."

William Arthur Ward

Our planet is more than four and one half billion years old. The Last Ice Age only ended some 12,000 years ago. Two hundred and fifty years ago, nine out of 10 Americans were involved in food production; today the number is less than 5%. Two hundred and fifty years ago, the planet had a population of approximately 750 million people; today the number is well over seven and one half billion. For those of you keeping count, that's a ten-fold increase in the blink of an eye.

It's estimated that by the end of this century alone, the planet's population will exceed 10 billion. Clearly, the status quo is not good enough. Innovation and creativity need to shoulder their way to the forefront. It's time to trim the sails.

Let Me Bring It Home

The word vignette's etymology comes from middle French and was originally a derivation of the noun *vigne*, meaning vine. Back then it was used to describe the decorative borders sometimes found on a page of text or at the beginning of a book. Why? Because those decorative flourishes reminded many of the shape of a grape vine. It wasn't until the past 150 years or so that the word became synonymous with a brief literary sketch or narrative. It is in that context that I'd like to share four vignettes to expound on the first topic of this series—food. It doesn't get much more basic than that. The question is: How are we going to feed 10 billion people and not live on a planet reminiscent of *Blade Runner* (one of my all time favorite movies).

This is not meant to be some esoteric diatribe on the evils of the modern industrial age or misguided policy and regulations. Instead, this is going to be a brief discussion of real problems affecting real people (our neighbors) and the type of disruptive innovators that make us proud to be a part of the human race and alive during such a period of invention and innovation.

Cows vs. Cars

Just like Julie Andrews sang to us in *The Sound of Music*, "Let's start at the very beginning, it's a very good place to start." You don't have to be a geophysicist to understand the concept of greenhouse gases like carbon dioxide compromising our ozone layer, effectively thinning our atmosphere and making the planet hotter, the ice caps smaller and the oceans higher with hurricanes and fires becoming evermore prevalent. This is not voodoo science. It is fact. What is not as obvious is the effect of those bovines we loved to watch while driving in the country who produce methane gas (as a byproduct of their digestive system) whose negative effect is 23 times more damaging to our ozone layer than a comparable amount of carbon dioxide.

Let me present it to you another way: Every head of beef or dairy cattle you see is equal to the average car driving 7,800 miles per year as far as the environment is concerned.

The reality is the world is a generally more prosperous place than it was several hundred years ago. The population has skyrocketed, and the average person consumes much more beef and dairy products than their counterparts of 250 years ago. To accommodate the one and one half billion cows and bulls on the planet, tropical and rain forests have been cleared to create pasture land at an alarming rate, thus compounding the problem. (Please recognize that I'm not on my soap box here because there are few things in life I enjoy more than a juicy cut of prime rib from the chuck end, but it does give one cause for reflection. I was going to say, "food for thought," but even I won't stoop that low.)

Nuts To You

If you were to throw a dart at a map of California with the intention of hitting the center of our agricultural heartland, you would not be far off target if you hit Los Banos, Merced County. This

sleepy Central Valley town represents the nexus of some of the great questions before us today—fair trade, water usage, immigration and government subsidies. Perplexing problems to say the least, but believe it or not, in a rare show of bi-partisan cooperation, Democratic and Republican leaders alike met a few weeks ago to hear firsthand from Central Valley farmers and ranchers about the debilitating challenges they face.

With only 5% of the country's population involved in food production, it's often hard for agricultural interests to have their voices heard. This time politicians heard, in a very clear voice, the farmers' overwhelming support for the deportation of criminals by ICE (Immigration and Custom Enforcement) agents from our country. What they were equally vocal about was not wanting to see ICE agents coming into a particular neighborhood to pick up one bad apple and at the same time picking up 10 or 12 others whose only crime was not being in the country legally. It is said that more than 70% of California farms are suffering from severe labor shortages with the fallout being crops rotting on the vine. What does make it to the market is then that much more expensive for all of us. An obvious problem begging for an elusive solution.

As I've written about in the past, no one wins in a tariff war. This sentiment was clearly vocalized at the Central Valley Summit, when lawmakers were reminded that California produces 80% of the world's almonds but has only 1% of the consumers. After the Summit, Turlock Congressman Josh Harder of Stanislaus County was asked what his takeaway was. He responded by sharing a passing remark that a mid-Valley dairy farmer left him with when he told the Congressman, "I don't have Republican cows or Democratic cows, but I have cows that need support."

Innovation In Our Own Back Yard

It wasn't all that long ago that you could drive down to South San Francisco and see an array of flatbed trucks selling fruits and vegetables. Sometimes the produce had been grown on small plots of one or two acres each. Known as "truck farms," sometimes the produce would be trucked up from bigger farms in Santa Clara. (Santa Clara didn't always grow silicon). Eventually, by the 1990s, this way of life died out in and around San Francisco.

Today a new form of farming has taken "root" in South City (yes, I know, sometimes I fall victim to my own puns) that can revolutionize food production, water conservation and land management. What do farmers always talk about? Shortages of labor, droughts, the inconsistencies of weather, crop blight and pestilence and the limitations of the seasons? These are age-old problems that are known to anyone who ever spent time on a farm.

Right now, in our backyard, a company called Tigris is successfully practicing indoor hydroponically grown produce. No soil required, LED lights that provide 24-hour growing conditions, with the crops growing up in vertical planters that are rotated by robotic arms. Talk about land efficiency: Tigris is producing one million plants in an area the size of a basketball court. Because these facilities can be established anywhere, think of the fuel saved by them compared to the fuel spent next time you buy raspberries from New Zealand in the middle of winter. Obviously, the LED lights take energy not expended on a field farm, but soon these indoor farms will be harnessing wind and solar power. Their water consumption is already a

fraction of that of field-grown crops.

Tigris is not alone in developing commercially viable, environmentally sensitive indoor farms. There are already 20 companies in the U.S. alone pioneering this technology. Remember the rapid acceptance of the printing press in 15th century Europe? What we're witnessing now is disruptive innovation before our eyes.

BYND

These past few months saw a multitude of IPOs hit the street with grand fanfare Uber, Lyft and Pinterest just to name a few. But of all the IPOs, none captured the world's imagination more than Beyond Meat (BYND), the Los Angeles-based producer of plant-based meat. This company was awarded the national company of the year prize back in 2013 from the people for the ethical treatment of animals.

Beyond Meat uses a process that takes mixtures like pea protein isolates, rice proteins, potato starch, apple extract and apply an extrusion process that cooks the ingredients together. Their product line now has grown to include burger patties, chicken filets, Italian sausage and brats. Again, this disruptor innovator is not alone. Beyond Meat's biggest competitor is Impossible Foods with whom they are locked in fierce competition to fill shelves and restaurant freezers around the country. They are already in chains like Carl's Junior, Burger King, Target and Whole Foods.

So couple this technology with the indoor farming we just talked about and you can see the makings of a revolution in agriculture.

Conclusion

In spite of a robust market so far, this year there will no doubt be volatility ahead. After all, the challenges are still there—a broken health care delivery system, an underfunded social security system, failing infrastructure, a dysfunctional Washington and a bloated and ineffectual bureaucracy. And as we enter into later innings in our Presidential cycle, you know you'll hear all about it.

But on the other hand, our economy most certainly should benefit from our low energy costs, low inflation, low interest rates, and most importantly, innovation. Just as we looked at some incredibly exciting trends in agriculture, all facets of business and manufacturing need to be prepared to modify and adapt whether it's finance (do you think a hundred years from now people will be paying for things with dirty pieces of paper featuring portraits of long dead white guys on the front?), medicine and transportation.

Before I sign off for now, and I'm most excited about continuing this series on change next quarter, let me leave you with this one intriguing question: Do products like those of Beyond Meat belong in the meat *or* produce section of our supermarkets? Let me know your take on it.

As always, with...

Best Regards,

Ray Lent
RLL/dot
Enclosures