



Thematic Investing for the Future

Q4 Market Update

“Video Killed the Radio Star”

- The Buggles, *Video Killed the Radio Star*, The Age of Plastic, 1980



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Moore’s Law states that the number of transistors on a microchip double about every two years, though the cost of computers is halved. Gordon E. Moore was the co-founder of Intel and made this observation in 1965. The basic tenant being that the growth of microprocessors is exponential. Today, the doubling of installed transistors on chips occurs much faster than two years. Experts think that, at some point, this decade we will reach the physical limits of Moore’s Law and that due to the heat and needed cooling to run transistors, in the future we will stop making things smaller. Technological change has been accelerating and extremely consequential to our daily lives as well as our economies and the markets. Looking back at the progression of the cell phone, it is astonishing how quickly in the last decade we have moved forward.

The first true mobile phone was immortalized by the film “Wall Street”: the Motorola DynaTAC 8000X built in 1983. It weighed 2.5 pounds, had 30 minutes of battery life, took 10 hours to charge, and sold for a cost of \$4,000 (a cost of approximately \$10,960 today)¹. This is now referred to as 1G phones (the first generation). The second generation 2G phones debuted in the mid 1990’s- everyone remembers the indestructible Nokia phones which your grandparents might still be using today. The third generation 3G phones were the first to go digital and have improved infrastructure to increase coverage and data speeds and is seen as a turning point in what a phone can do. Then the watershed moment came June 29, 2007, when the iPhone was born. While they were not the first smart phone, they were the first to be universally adapted and loved. The iPhone completely innovated the way we interact with others and spend our time. As we push forward into the fifth generation 5G phones, data speeds will only get faster and technology more and more integrated into daily

life. 5G is estimated to be 20x faster than the existing 4G networks². To put that in perspective that should allow you to download a full-length movie in seconds.

The lyric “video killed the radio star” is oft quoted when discussing technological progress. But I would argue the correct interpretation is “video changed the radio star.” According to Forbes, the highest earning radio stars currently are Howard Stern at \$95mm, the late Rush Limbaugh at \$77mm, and Ryan Seacrest at \$65mm³. All three learned how to pivot their shows and capitalize on new media; either by making their radio shows live tv or by utilizing their internet and social media to build followers and sell products and ad space. There are now multiple tv shows that are broadcasts of radio shows. And many successful radio personalities pivoted to new social media platforms to reach a wider audience. Keep the radio show, but add on a TV show, YouTube channel, Facebook page, and Instagram page to magnify your voice and reach more listeners. There was a large outcry that streaming would kill music, as how could artists monetize their product without CD sales and radio plays? The success of Spotify and Pandora as well as the rise of Apple Play and Amazon music, show that the new platforms allow artists to still succeed. Many have developed savvy social media presences. I may not understand, or even know, who these artists are, but they are still very successful and building large and lucrative fan bases. Newer generations barely know what a CD is, much less the importance of “going platinum” when success is now measured in numbers of followers or video streams.

So where does progress get us? What does the future hold? Over the next decade we think the rapid shifts we have seen will continue to accelerate due to the increasing pace of technological change. You cannot fight the forward progression of time, and we feel having a portion of investments allocated towards future and thematic plays could be accretive. It comes with a large warning label though. For every Tesla there are going to be 1,000 Nissan Altras⁴. Failure rate is high and investing towards the future comes with much higher volatility and risk of loss.

Thematic investing has come to the forefront in recent years as we have seen some successful fund managers like Kathy Wood’s ARK funds experience exponential growth. These types of investments can be exciting, but we caution that investors should never chase hot themes and put only a percentage of their assets towards thematic investing as the future may unfold in ways we cannot envision now. Typically, we view thematic investing as a satellite investment that should be complemented by a core portfolio to ensure proper diversification.

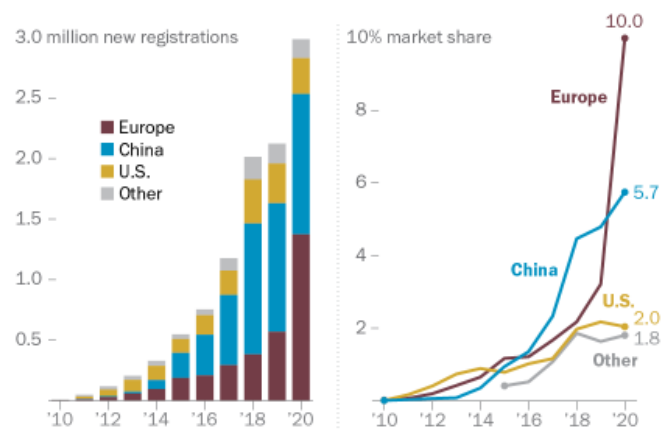
We have identified 5 main themes that we see playing out over the next Decade and how they will affect the future of the markets. There are others that will also be important, such as the future of Cryptocurrency, health, biotech advancements (CRISPR technology), and Space that did not make our top 5 but may play large roles in our future.

THEME 1: The Era of the Internal Combustion Engine Wanes

The internal combustion engine has driven progress since its invention in 1876. It helped power the industrial revolution, but we feel over the next decade it will begin to pass the baton to battery driven power. Change happens gradually and adoption rates will vary depending on the country, culture, and economic stability, so we are not calling for the immediate death of oil and gas, or gasoline powered cars. However, there is no avoiding the shift to more modern engine and power technology. Cars and trucks are just the tip of the iceberg; battery powered airplanes and boats, as well as the ability of cities and individual homes to store power, will herald in a new generation of leading companies. The lack of ability to store power has always made energy transmission more difficult and increased transmission loss due to our inability to bank power during consumption lulls to help offset peak power needs. Technology in this space is changing rapidly, but currently the lithium-ion battery works well and is a leader in Electric Vehicles (EV's) due to its small ion size (third only to Hydrogen and Helium). They have a very high voltage and charge storage per unit of mass and one of the highest energy densities of any battery technology today. They also have no "memory effect" which is where repeated partial discharge/charge cycles can cause lower capacity⁵. Lithium batteries need to address the heating and safety issues, as seen by the ability of these batteries to overheat and catch on fire. The development and advancement of solid-state batteries, as well as ensuring the safety concerns are fixed, will push battery technology forward even faster. Range and charging are still limiting most EV's, but they are continuing to push the technology forward. There are 3 major types of EVs: Fully battery powered, a Plug-in Hybrid EV that has a gas tank and charging port, and Hybrid EVs that use an electric motor to assist gas powered engines. Lithium is also not the only battery technology under development; Jaguar Land Rover is testing a hydrogen fuel-cell prototype and California has built an infrastructure to support hydrogen powered vehicles. Hydrogen is a very common element and to fill up Hydrogen powered EVs takes about as long as a regular gasoline powered car. The shift will not only be driven by shifting consumer demand, but also most major car companies pledging to shift to producing all electric lineups in the future. GM has pledged to produce all electric cars by 2035, Volvo by 2030, Jaguar all electric by 2025, and Ford 100% carbon neutral by 2050⁶. Whether its Lithium, Hydrogen or some other power, the way we move will change.

Europe leads the way in new electric vehicle sales

New global electric car registrations and automobile market share, 2010-2020

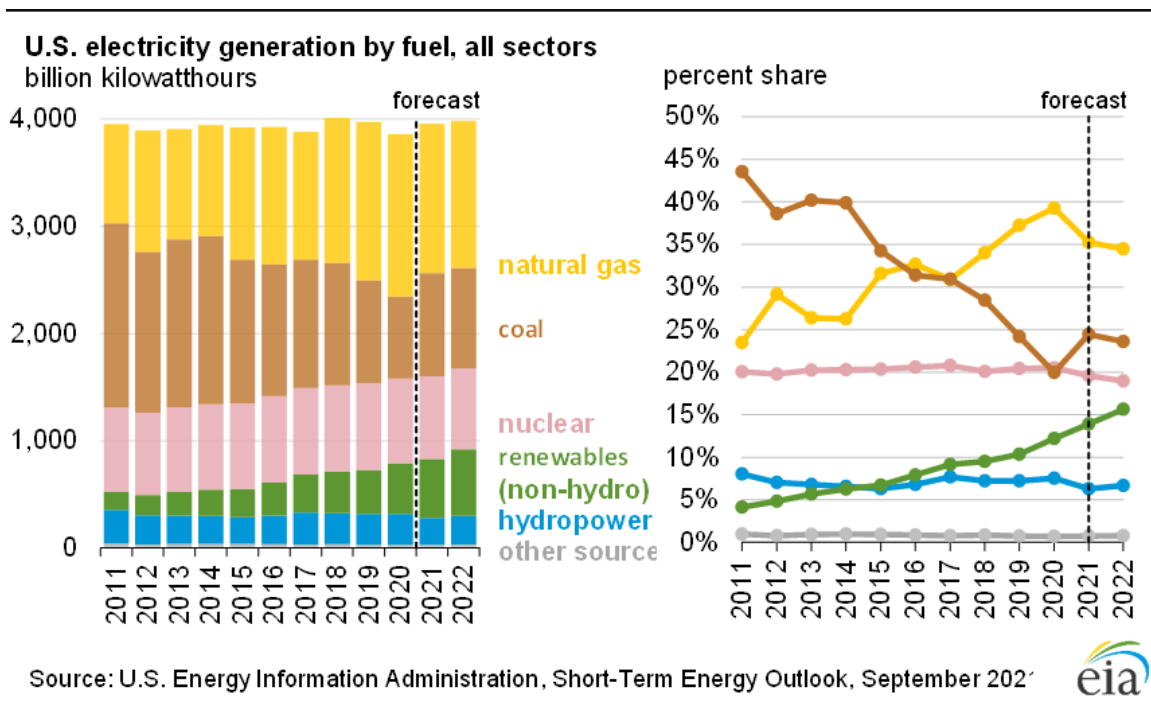


Note: Electric car totals include all-electric, plug-in hybrid and fuel cell vehicles. "Europe" includes the 27 nations in the EU, plus Iceland, Norway, Switzerland and the UK. "Other" includes Australia, Brazil, Canada, Chile, India, Indonesia, Japan, Malaysia, Mexico, New Zealand, South Africa, South Korea and Thailand.

<https://www.pewresearch.org/fact-tank/2021/06/07/todays-electric-vehicle-market-slow-growth-in-u-s-faster-in-china-europe/>

THEME 2: Alternative Energy Sources Will Become More Mainstream

Similar to our first theme, green power will become more of an important player in our electric grids and daily lives. Solar and wind are currently seen as the 2 largest drivers of renewable energy. There may be new technology that comes along to either dramatically improve current solar panels and wind turbines, or possibly even be a completely new way to generate power. Even in Texas, the de facto oil and gas capital of the USA, per ERCOT in 2020, 25% of all electricity in Texas was generated by Wind and Solar⁷. Texas also provides more than one-fifth of the domestically produced energy in the USA through its production of oil and natural gas. Fossil fuels are by far still the most widely utilized energy source for electricity with 59.7% of all electricity in the United States produced via fossil fuels in 2020. However, in 2020, for the first-time ever, renewables produced more electricity than Nuclear with about 20.9% of all electricity generated was from renewables⁸. Most of the market share is being taken from Coal as well as some from Nuclear and Natural Gas. We feel this trend will continue to accelerate as technology gets better and cheaper. New applications and technologies are rapidly changing. For example, in solar they are researching and hoping to develop solar cells that could be printed like newspaper and wrap a building. The green & renewables trend is not going away; more and more companies are measuring and pledging to reduce their carbon footprint and work to be more energy efficient and less wasteful. We feel this trend will continue to accelerate over the next decade, and there has been an increased investor focus in aligning their portfolio with their values. While reporting and data about company practices have vastly improved, it can be hard to know what companies are truly Socially Responsible or follow Environmental best practices. If you look at the top holdings of ESGU (as of 9/20/21) the iShares ESG Aware MSCI USA ETF its top holdings read like the S&P 500: AAPL, MSFT, AMZN, GOOGL, GOOG, FB, TSLA, NVDA, JPM and HD. A socially aware ETF holding Facebook seems a bit of a stretch. The Vanguard ESGV (ESG US Stock ETF) fund has almost identical holdings. You will see more and more investments touting its “green-ness” or how Socially Responsible it is or that it follows ESG guidelines. Make sure you are looking under the hood of these investments as you may be surprised what they contain.



THEME 3: Social Media Dominates Our Social Lives

Every generation likes to complain that the next generation is lazier, dumber, and generally going to be a failure. Even back in 1st Century BC, Horace was said to lament “the beardless youth... does not foresee what is useful, squandering his money.” Or in 1330’s Yoshida Kenkō writes “In all things I yearn for the past. Modern fashions seem to keep on growing more and more debased.” The rise of social media has accelerated many trends and brought on new problems to our societies. On one hand, it is wonderful to connect with old friends, far flung family members, or even enthusiasts and hobbyists that share your interests. On the other, it has created a monster of misinformation and a culture of living one’s life for the online shares and likes. The phrase “*Pics or it didn’t happen*” should be the motto of this century. There is no denying that younger generations are living more online and that will continue to shape social habits, spending, and consumption patterns for years to come. Already our “celebrities” that teenagers admire are YouTube stars or TikTok stars vs. the movie stars of old. This shift more online has led to a very different cultural experience for those under the age of 18. How they consume information, how they share information and most importantly how they spend their time is now more online than in person. This will bleed more into society and stores will have to shift their patterns and offerings to fit this new change. More delivery, less eating out. More streaming, less movies in theaters. More emphasis on likes and shares than on content. Facebook, which owns Instagram as well, recently had its own internal company documents leak showing that it knows that Instagram is toxic to teenage girls. The Wall Street Journal quoted an internal Facebook presentation that stated, “Thirty-two percent of teen girls said that when they felt bad about their bodies, Instagram made them feel worse.”⁹ This effect of social media on mental health, physical relationships and overall culture will play out more over the next decade as those who grew up online become adults and shift into the working world. TikTok is a great example of the rapid rise of new platforms. Launched in China in 2016 under a different name called Douyin, it was purchased by ByteDance, folded in Musical.ly and in 2018 launched TikTok’s global takeover. It was the most downloaded app in 2019 and 2020 being downloaded 693 million times in 2019, and 850 million in 2020. TikTok did run into regulatory headaches and is still banned in India which has spawned multiple knockoff apps. Even with hurdles, it is expected to surpass 1 billion monthly active users by the end of 2021¹⁰. As rapid a rise as TikTok has had, and even the launch and success of Snapchat, Facebook still reigns supreme with 2.8 billion monthly active users and growing. In their recent earnings report it notes that 1.84 billion users visit FB on a daily basis making it one of the top destinations for advertisements and marketing. Considering the current global population is estimated to be 7.9 billion people, that means about 23% of the entire world logs into Facebook daily¹¹. We anticipate further new social media platforms developing in the next Decade that may continue to shape how media is consumed and how people interact.

TOP SOCIAL MEDIA MOBILE APPS BY GLOBAL CUMULATIVE TIME SPENT*			TOP VIDEO STREAMING MOBILE APPS BY GLOBAL CUMULATIVE TIME SPENT*		
#	SOCIAL MEDIA APP	AVE. TIME PER USER	#	VIDEO STREAMING APP	AVE. TIME PER USER
01	FACEBOOK	19.5 HOURS / MONTH	01	YOUTUBE	23.2 HOURS / MONTH
02	WHATSAPP	19.4 HOURS / MONTH	02	MX PLAYER	7.6 HOURS / MONTH
03	INSTAGRAM	10.3 HOURS / MONTH	03	NETFLIX	7.0 HOURS / MONTH
04	TIKTOK	13.3 HOURS / MONTH	04	HOTSTAR	4.5 HOURS / MONTH
05	FACEBOOK MESSENGER	2.7 HOURS / MONTH	05	AMAZON PRIME VIDEO	3.7 HOURS / MONTH
06	TWITTER	5.6 HOURS / MONTH	06	YOUTUBE GO	9.5 HOURS / MONTH
07	LINE	10.6 HOURS / MONTH	07	TWITCH	5.1 HOURS / MONTH
08	TELEGRAM	2.9 HOURS / MONTH	08	JIOTV	2.5 HOURS / MONTH
09	VK	13.9 HOURS / MONTH	09	YOUTUBE KIDS	6.2 HOURS / MONTH
10	WHATSAPP BUSINESS	9.3 HOURS / MONTH	10	VOOT	4.2 HOURS / MONTH

<https://mk0hootsuiteblof6bud.kinstacdn.com/wp-content/uploads/2021/05/TikTok-6.png>

THEME 4: Technology Takeover, and Privacy becomes Scarce

Smart phones keep getting smarter and more integrated into our daily lives. What was once a device for talking to others now contains your bank account, your digital payment wallet, your pictures, your email, your favorite websites and countless other facts about you and details that you now let it remember. New smart watches continue to get better at tracking health and fitness and may become more integral in monitoring blood pressure, blood sugar and other common health concerns and could feed data directly into your doctor’s office. This further integration of technology and health will make treatment and diagnostics faster and more accessible, though privacy issues will be a huge concern. As our lives move more online (or into the ever talked about cloud) more of ourselves are exposed to hackers and people who would want us harm. Do I want my doctor to be able to see how many times I went to the gym last week without my permission? Privacy is already a scarce resource, especially as we discussed in Theme 3 with more of our personal moments posted online. The Smartphone has already changed dramatically in its 14 years of existence and may further morph in the next decade. Your phone now talks to your car, your smart home, and even your refrigerator. Everything is becoming “smart.” However, interconnected systems can lead to more risks as well as vulnerabilities we were not aware of. I am sure in the next few years we will see a story about someone hacking into a refrigerator and eventually gaining access to your private files on your computer as they are all networked together. There are many benefits from these advancements though. People have the ability to work from home or have more flexible work situations due to the ability to video conference and file sharing online. We can now shop for and buy almost everything with a click of a button and have it delivered to our homes. For those who have health issues and cannot drive, the ability to summon an Uber, or have groceries delivered to their home allows them to stay more independent for longer. We feel cyber security and privacy focused companies may see above average growth as more of our lives are online and more people are concerned about how their data and information is being gathered and used. The technology sector will most likely continue to lead the markets, as it is the one seeing innovation and consumer demand that will drive earnings. This is not the tech bubble of the late 1990’s early 2000’s. These companies make billions in revenues and will continue to be more integrated into daily life. Which companies will lead, and which will get overtaken by competitors, or possibly regulated and broken up will be major drivers of return over the next decade.

IT’S NOT MY FAULT...



3/4 of Americans expect more from the government when it comes to data regulation

...BUT IT’S MY RESPONSIBILITY

2/3 of Americans believe they are responsible for their own data security

DATA DRAMA

Consumers’ top 5 data privacy concerns:

1. Identity theft
2. Financial fraud
3. Personal data being sold or shared without their consent
4. Misuse or inappropriate use of their personal data
5. Government surveillance



HEY, WE HAVE YOUR DNA



Despite consumers’ knowledge of the risks associated with sharing data, more and more appear to be prioritizing their health over privacy. Of consumers who provided DNA to the genetic company 23andMe, **80%** have given consent for the organization to share their information with third parties.

<https://www.stellarising.com/blog/infographic-data-privacy-and-consumer-concerns>

THEME 5: Artificial Intelligence and Robots

Not to make this section sound like an excerpt from a Terminator movie, but the rise of the Machines is coming. Yes, it's rather amusing to watch the Boston Dynamic's *Atlas* robot fail miserably at dancing and other human tasks that we find simple, but robotics is moving swiftly and in concert with Artificial Intelligence. Robotics have the ability to upend the workforce and the availability of manufacturing jobs. The automotive assembly line has already shifted dramatically. In 1913 it took 140 workers and a rope and a winch to move a Ford Model T through the full assembly line in 93 minutes. The assembly line model, along with interchangeable parts, revolutionized many industries and provided countless high paying jobs. Ford used to employ more than 300,000 people in 2005; it now only has 186,000 global employees as of 2020. What took 93 minutes in the original assembly line now takes approximately 20 hours of work to build an F-150¹². New automobiles are assembled starting with machines stamping out components needed, machines inspecting parts with lasers and then machines screwing together the pieces. Ford no longer welds as much as they switched to aluminum body parts necessitating screws since spot welding aluminum requires much more power. There are human inspectors, and human elements to the assembly process still, but much less than ever before. McDonalds rolled out touch screen menus in 2016 and continues to roll it out inside restaurants as well as they now have an App to order directly from your phone for curbside pickup. Along with these automated processes, Artificial Intelligence (AI) will have a huge impact on our lives over the next decade. AI, as defined by Britannica, is "the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings."¹³ AI already drives what you see in your Netflix queue or recommendations on Amazon as it is the driver behind the algorithms that produce those recommendations and advertisements. AI is a powerful tool for analytics and data analysis that will only get smarter and more integrated into daily life. Health care is one area that you could see large amounts of data gathered and analyzed by AI programs to customize care based on demographics or even your individual genes, lifestyle, and environment. AI can drive simple tasks too, such as monitoring levels of water and warning if it gets too low or too high, powering or alerting a tool that it needs to turn on and perform a task. AI-assisted work is perfect for jobs that are repetitive and physical and can be driven by AI based tools (such as robotics!). AI will also drive your smart car and is the main component of the self-driving cars. It is likely self-driving autonomous cars will be common by 2030, though insurance and regulatory issues will persist as the technologies get worked out. All is not lost to the AI driven robots; human labor may not necessarily become obsolete as these technologies get adapted faster, but we will continue to innovate and fuel growth in new industries and sectors of growth. I do not think all the jobs will disappear, but they may look very different than they look now.



Progress and charge are inevitable and fighting against the march forward is a hopelessly lost cause. Due to the integration of technology in our lives, and the ever-increasing rate of advancement, the next decade will surely surprise us with some unexpected trends. Looking forward, one must feel hopeful that our lives will be enhanced by these changes, and they will not be to our detriment. It can be difficult to pinpoint what will have the largest effect on the markets and our lives in general. When Dolly the sheep was cloned July 5, 1996, many predicted that cloning would change the world. We haven't seen cloning be a major factor economically or culturally in the 21st century. Thematic investing comes with risk as investors are trying to predict what the future will hold, and which companies will be successful in those emerging technologies. For every Google and Apple, you have a hundred Ask Jeeves and Nokia. Also, the shift and rush to creating investment products that cater to thematic, socially responsible, or ESG focused investors means a great deal of due diligence needs to be done before buying a thematic fund. Understand its screening criteria, current holdings, and benchmark as well as its stated goals, management team and expenses are key to making sure you don't fall prey to a hot theme or a fund masquerading as one thing just to win your business. As always, understand what you own and why, as well as what the risks are. Caveat Emptor rules supreme in investing. In 10 years, it might be an AI bot researching and writing quarterly reports while I sit on the beach!

Appendix:

1. https://www.motorolasolutions.com/en_us/about/company-overview/history/explore-motorola-heritage/cell-phone-development.html#:~:text=Achieving%20A%20World%20First,first%20commercial%20portable%20cell%20phone.
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13. <https://www.britannica.com/technology/artificial-intelligence>



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