ANNUS MIRABILIS

2020 ANNUAL REVIEW & 2021 STRATEGY

Vitality Capital

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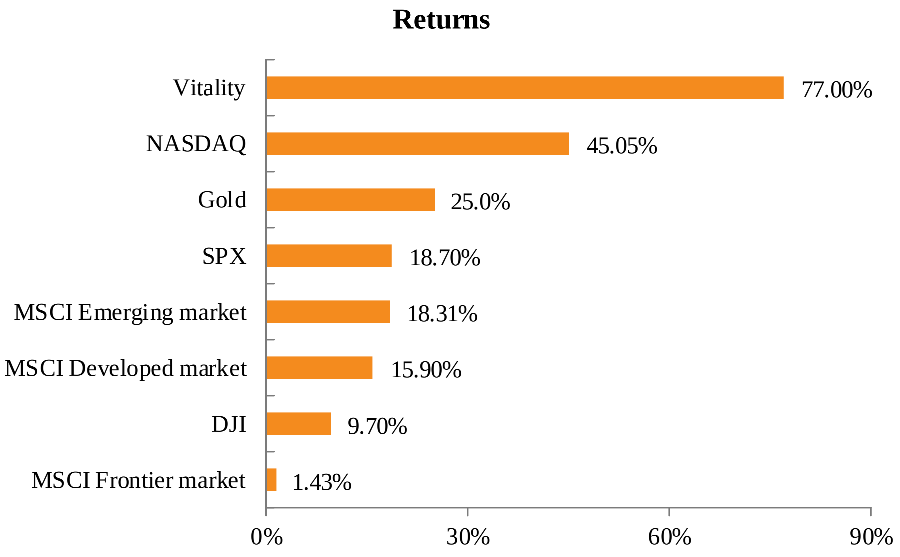
2020 IN NUMBERS

- **77% -** Gross return of Vitality Capital during the year
- **16% -** S&P 500 return for 2020
- **0% -** or less, Interest rates in USA, EU, Japan (58% of global GDP)
- **23% -** The leverage (debt/equity) we employed on average during the year



- **-$35 -** Oil price hit a low of -$35/Barrel, marking the first time it went below 0
- **2016 –** last time Dow Jones was at 18,200 before it crashed to that level in Mar/2020
- **23,500** – Total points swing in the Dow Jones during the year, from 29.4K to a bottom of 18.2K to peak at 30.5k
- **22** – Number of days it took for S&P 500 to fall by over 30%, the steepest decline in history
- **1** – Number of time S&P has risen by over 50% within a year
- **20x** – return we could have made on the stock NIO if we didn't sell it prematurely at $3 - Current Price $65 ☹
- **$20tn** – Total liquidity pumped by central banks globally during the pandemic, which is 14% of total GDP
- **2021** – The Chinese zodiac animal for this year is the Ox, but that's not why we are bullish
- **173** – Change in Tesla's market capitalization was more than the GDP of this many countries in 2020
- **204** – Companies under active coverage

LETTER TO SHAREHOLDERS

2020 was truly a once in a century year as the pandemic rocked all aspects of life and society and our thoughts and prayers are with all affected. However, as huge was the magnitude of hardships, so was the scope of opportunities. While most businesses suffered, certain sectors saw a decade worth of progress in 10 months. This year turned out to be a friend of the fundamentalist as perseverance paid out big dividends. The stock market witnessed a see-saw worthy of fiction and as asymmetrical as the number 2020 could be. Testing the nerves of even the most ardent optimists in the first half and pessimists in the later.

We ended 2020 with a 77% gross return which is significantly above our expectations entering the year. The exceptional return is attributable to large swings in the index, enhanced research coverage in the second year of our operations, and better understanding of innovations that have not yet come to pass fully.

As the numbers suggest we were able to capture some of the opportunities the market presented. Some through futurist themes which got catapulted into exponential growth due to lockdowns. Some were value plays battered down by the unprecedented toll on the economy albeit temporarily. We also smoked a few cigar butts on the way which, despite no growth prospects, were trading at pennies to the dollar of their worth. This year was marked by some misses in our column as there are a lot of things we could have done different, in hindsight. Market participants are clearly more eager for growth stories than value for now, rightly or not. Wagers on disruptive companies outweighs cravings for stability it seems; however, we are wary of the pitfalls of being excessive. Meanwhile, uncertainty is notches below its peak, some doubts continue to linger as the S&P 500 continue to prods to even higher multiples from its record.

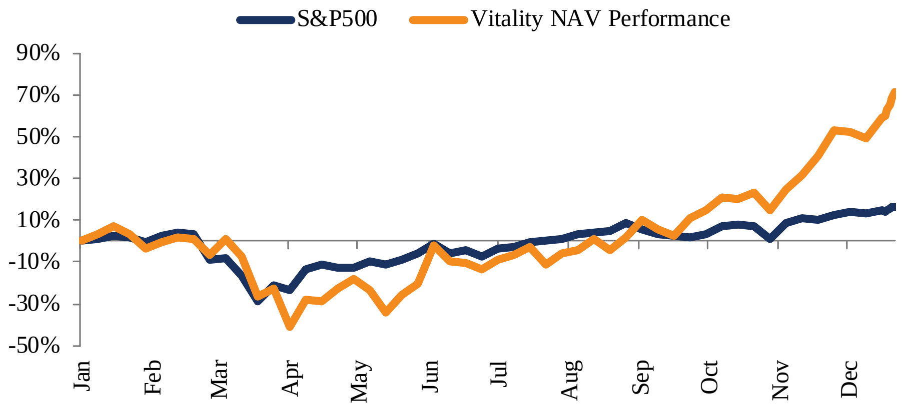
We attempt to beat a middle-ground for ourselves, taking a top-down approach on themes of tomorrow as well as looking for old stalwarts which are molding themselves with time. The question for the immediate future we ponder over is what will be the new normal as the world has changed irreparably. (besides a more academic question about what the P/E should be in a 0% interest rate environment☺)

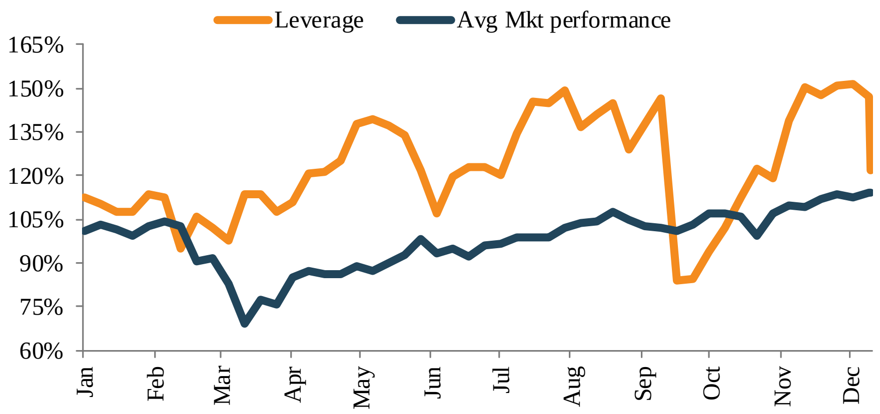
I would like to thank all my partners at Vitality who have shown patience, demonstrated wisdom, and remained sapient long enough to get reap benefits.

Syed R. Mohsin

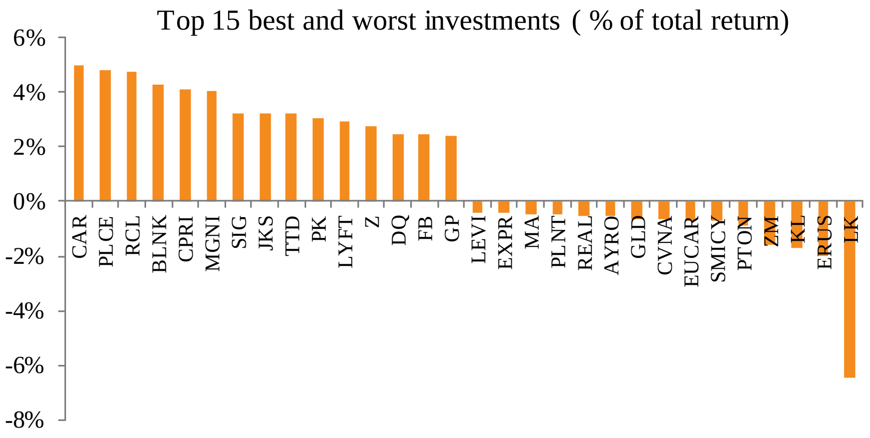
OUR YEAR IN CHARTS

At the peak of the crisis we shuffled our positions to high beta scrips which had crashed. Our strategy was to play on re-opening themes which we saw as an inevitability. Therefore, in the last quarter with positive news pouring in on vaccines, we began gaining on the market and eventually outperformed by 61%

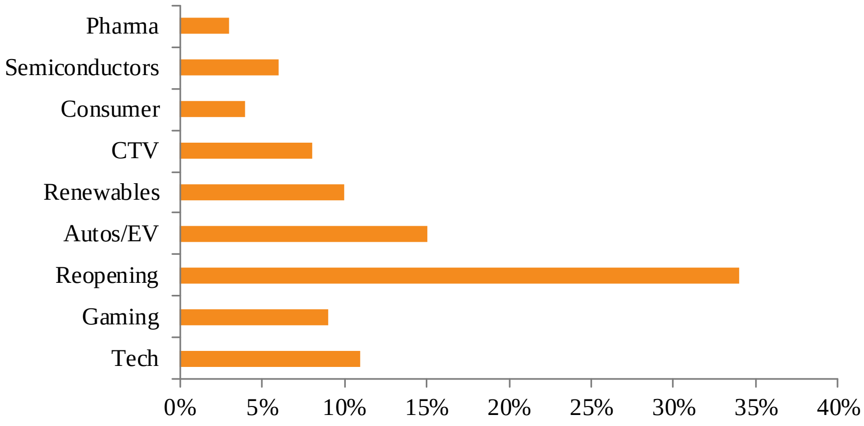




Our average leverage during the year was 123% of our equity going as low as 84% right before the US elections and as high as 150%. We used options to hedge ourselves from any unforeseen corrections which directly increased our overall returns by 0.5% over the year



We remained extremely diversified throughout the year, especially after the market crash. Our average exposure in each scrip remained between 1-5% of the fund size. The biggest setback for us financially was the scandal that hit one of our bigger exposure Luckin Coffee, the stock fell by 90% after the management was found guilty of cooking its books in April. This event led lowered our return by 6%.



STRATEGY 2021

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PARTY LIKE IT'S THE 1920'S

ECONOMY

RISKS

FAVORITE SECTORS AND STOCKS

STRATEGY 2021 ANNUS MIRABILIS

Covid-19 recovery, liquidity and disruptive technologies to drive growth

2020 can be described as Annus horribilis (Latin phrase for a ‘horrible year”) where everything that could go wrong went wrong. With multiple vaccines for COVID-19 approved in most countries, plans to embark upon a vaccination drive are underway on war footings. While it will take months even in a best-case scenario for a complete rehabilitation, even gradual reopening will breathe new life in global economy, indicating that 2021 might be the year of recovery. Just on the basis of a low base effect, 2021 should see the largest GDP jump Y/Y in memory.

The “New Normal”

The capital markets have evolved considerably over the past 4 decades from being dominated by energy to finance later and then to tech in the past decade. We could be at the cusp of something similar.

If all goes as planned, 2021 would be the inflection point where the world would again normalize. However we anticipate some things might have changed forever. We feel that value pockets will unlock in this new normal such as new consumer habits, work philosophy (office), social media, healthcare, entertainment (CTV), industrialization (AI, robotics) and the role of internet in everyday lives. The transformation of energy and mobility, which is unrelated to the pandemic, will spur into growth phase over the next decade with the emergence of “Green Energy” at the top of the agenda of all major economic power houses. 5G internet is also gradually finding its footing across the world, opening up new possibilities across all realms of the society, whether its communication, finance, manufacturing, or accessibility. We feel there will be new challenges in this new world and the companies that solve for these challenges will create the new world order. Finding these companies will remain at the core of our strategy in the medium term.

Inexhaustible Quantitative Easing

One of the measures of Covid-19 which the world will never recover from is the USD 20 TN of liquidity pumped in the global financial system over the past 10 months. To put into perspective, global GDP was estimated at USD 142 TN at the end of 2019. Moreover, interest rates have dropped across the globe, to 0% in most of the developed world and to sub-zero in some. Central Banks are adamant that low rates are here to stay and we believe with Governments being the biggest borrowers and their already substantial fiscal deficits, there will be extremely low motivation for rates to climb again in the near term.

Needless to say, capital markets are one of the biggest beneficiaries of low returns on debt. Bonds have never been this out of favor and even high-risk debt doesn’t seem to carry the bang for the buck. The rise in popularity (and price) of alternate assets such as crypto-currencies not only exhibits the exuberance in investors but also their lack of risk averseness.

Creative stock picking vs delusional optimism

As mentioned earlier, growth is getting exceptional pricing from investors with stocks trading triple figure price earnings ratios are fast becoming a norm. Not all the optimism is unfounded as some companies which have traded at such high multiples in the past have justified the pricing with immense growth in top and bottom line. However, buying companies at such high pricing has its pitfalls as failing to meet expectations lead to severe retribution at the bourse. We are more confident in placing bulk of our investments in companies with proven track record and demonstrably profitable business models. While hyper growth , prototype based or topline fixated businesses are the soup of the day, we feel larger companies with steady growth and healthy cashflows will hit our sweet-spot. Having said that, we will dip our toes in some smaller companies with exponential growth potential, where even with fractional exposures we can make meaningful returns, with a lot of due diligence and some luck.

Overall, our strategy in constructing our portfolio will remain unchanged from now, with no large and concentrated position in one company and keeping 7-8 sectors on our map. While we are extremely excited about what the future holds, we will not let FOMO drive our decisions.

PARTY LIKE IT'S THE 1920'S

Global Pandemics seem to have a liking for the 2nd decade of the century

We have drawn some comparisons of the 2020s with the 1920s with the biggest coincidence is that the last global pandemic took place nearly a 100 years ago however the similarities do not end there. The 1920's are also known as the roaring 20s for its economic boom and its joi de vi-vre.

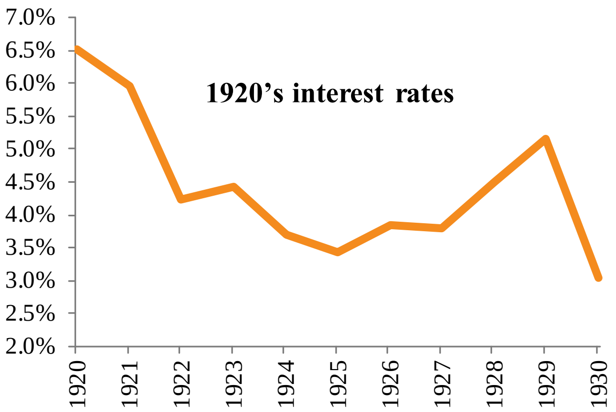
Monetary loosening and quantitative easing never gets old

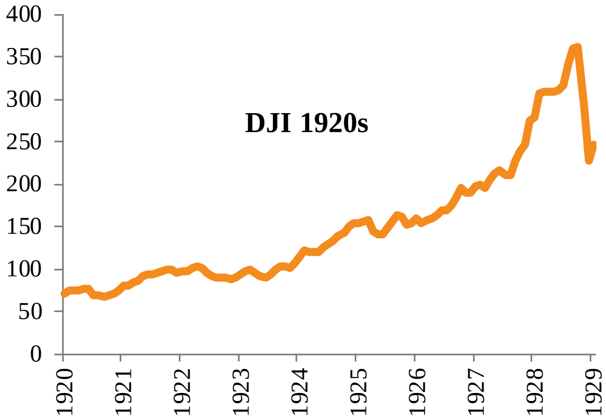
WW1 ended in Nov 1918 and a following economic slowdown resulted in 1919-1920 Recession. In 1921, Woodrow Wilson joined Harding Administration and realized the need to cut interest rates and increase money supply, this led to unprecedented credit and vis a vis manufacturing boom. During this period, the DJIA went from 70 points to 350 points in a span of less than 9 years. Later, Fed increased interest rates to control over-heating, excessive lending, and speculation – credit bubble busted.

Industrial revolution, sounds familiar

1920's also mark the 2nd industrial revolution as technological advances led to mass electrification, as the energy sector revitalized the economy from coast to coast. The advent of motor vehicles revolutionized transport forever while electronic wonders like the television and the telephone started popping up in households.

We have drawn a few comparison in what happened a century ago and the present. Of course, this was followed by the great depression, but we hope we don't have to address it in our next annual report.





Technological Advancements

1920's	2020's
Electrification	**Renewable Energy**
Electrical Grid	Solar
Household Electrification	Wind
Electronics	**Digitalization**
Electrical Appliances	Internet of Things
Telegraph	5 G
Radio	Social Media
Television	OTT Platforms
Telephone	Telecommuting
Unemployment	**Job Losses**
Assembly Line	Artificial Intelligence & Robotics
Automobiles	**Electrical Vehicles**
Cars with Internal Combustion Engine	BEV, HEV, PHEV, Autonomous Cars
Medicine	**Biotechnology**
Health Discoveries	Genetic Revolution
Education	**Skill**
College and Vocational Institutes	Massive Online Open Course (MOOC)
Retail & Advertisement	**E Commerce & Digital Marketing**

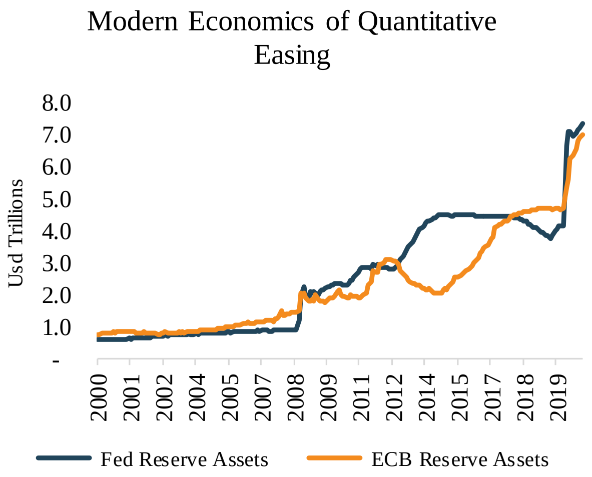
ECONOMY

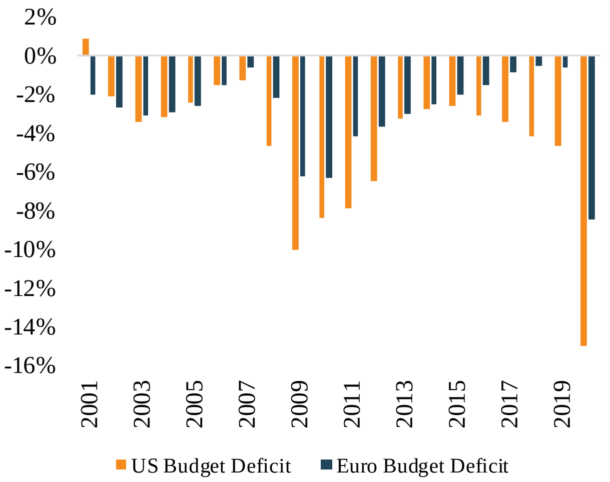
Quantitative easy - One size fits all

Quantitative easing has been a popular tool for battling economic slowdowns over the past two decades. Covid-19 induced economic crisis too drew a similar response, albeit at an aggressive pace.

US Fed's balance sheet expanded from less than USD 4.2 TN in Feb/20 to USD 7.0 TN by May/20. Likewise, ECB's balance sheet also widened by more than 50% in 2020.

While QE has been an effective tool in combating macroeconomic slowdowns, the liquidity pump has already resulted in steep contraction in the velocity of money, thus limiting its future effectiveness in the absence of an increase in volume.





Budget deficits - are they still relevant?

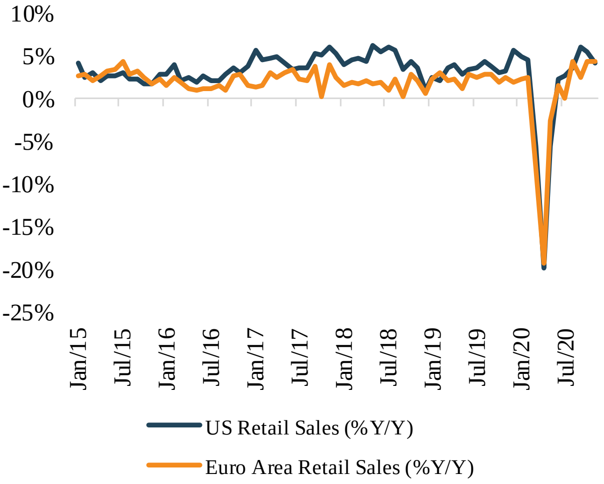
US federal government reported a colossal budget deficit of USD 3.1 TN (15% of GDP) in 2020, more than 3x the deficit (4.6% of GDP) recorded in 2019, as the authorities stepped up spending to counter the aftermaths of the pandemic. Likewise, euro area's budget deficit is estimated to top 8.5% of GDP in 2020, a multi-fold increase from less than 1% of GDP in 2019.

While there has been hue and cry around persistence of fiscal deficits, lower marginal propensity to consume due to elevated incomes and supply side efficiencies have kept inflation concerns at bay, thereby allowing developed economies to opt for hefty budget deficit monetization. In the absence of any supply side shocks, fiscal deficit monetization could continue supported by sub-zero interest rates.

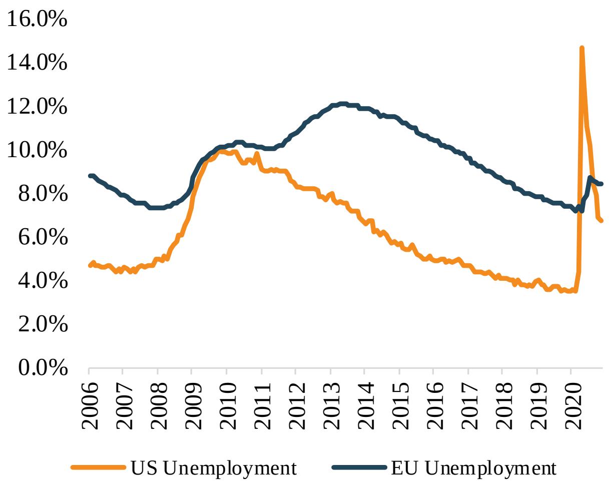
Consumer spending - V-shaped recovery

Retail spending in US plunged 19% Y/Y in Apr/20 as the country went into lockdown to control the spread of Covid-19. However, the indicator has staged a phenomenal recovery since then with cumulative 10M2020 retail sales turning flat Y/Y. A similar trend is visible for euro area; however, the recovery there has been relatively slower.

The strong recovery can primarily be attributed to timely hefty fiscal stimulus announced by the US government, amounting to more than 10% of GDP. Going forward, we believe the new stimulus program is crucial to maintaining the momentum of spending as the economy gradually recovers from the Covid-19 shockwave.



ECONOMY CONT.



Employment - full recovery unlikely

After snowballing to 14.7% amid heightened uncertainties, unemployment rate in the US has retreated to 6.7% as of late thanks to the large fiscal stimulus.

While we expect gradual economic recovery, unemployment may not return to pre-Covid-19 level anytime soon as some of the employment may have been lost forever.

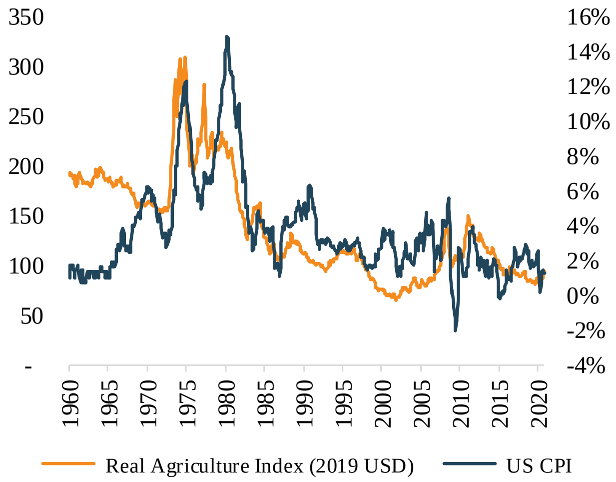
Hence, unemployment may continue to remain a cause of concern for Fed for the foreseeable future.

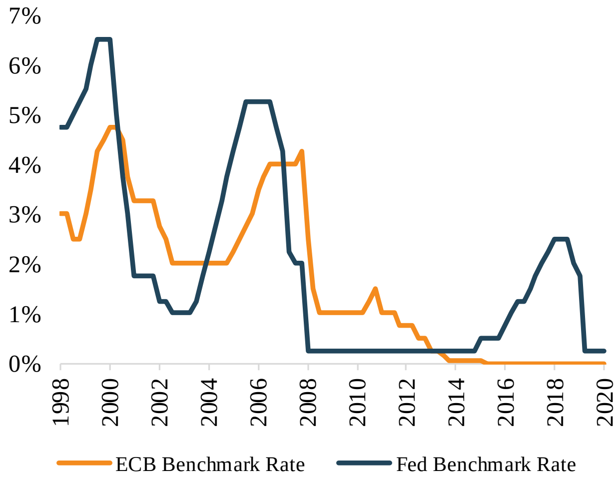
Inflation - structural trap

Yield improvements together with supply side efficiencies have caused the prices of agricultural commodities to drop in real terms over the long run.

Though food prices hover near the lower end, any shocks are likely to be supply side driven amid Covid-19 related supply chain disruptions rather than demand driven. A 10% increase in food prices could push inflation higher by 1.4%.

Nevertheless, long term outlook for inflation remains weak on the back of continuous enhancements in supply side and absence of any demand shocks.





Interest rates - lower forever?

Amid subdued long term inflation outlook, it may not be unwise to stretch the imagination of sub-zero interest rates from longer to forever as central banks in developed economies combat the dual risks of slow growth and deflation.

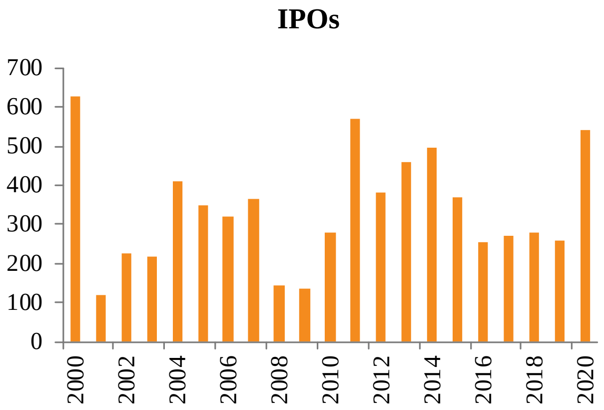
Fed has already indicated its tolerance for slightly above 2% inflation in order to avoid any temporary supply side shocks.

Nonetheless, a sharp spike in inflation beyond expectations could force the Fed to revisit its loose monetary policy, which could have grave repercussions for both economic cycle and capital markets.

RISK: MODERN DAY TULIP MANIA

Avoid the froth

Tulip mania was a period during the Dutch Golden Age when contract prices for some bulbs of tulip reached extraordinarily high levels, and then dramatically collapsed in 1637. This could be the golden age of liquidity which will almost certainly soil another bubble of its time. Some red flags are already flashing with record IPOs taking place in 2020 at nearly 500 companies going public, double that of last year. Previously more than 400 companies went public only in the year 2000, at the peak of the (in)famous DOTCOM bubble. If that wasn't warning enough, most numbers of IPOs have doubled within weeks of going public.



Retail investors which were a rather smaller part of the capital markets are now a fast-growing breed collectively known as Robin-Hood investors. We perceive that a large chunk of these investors are momentum based rather than being driven by fundamentals. According to some estimates, retail investors which made up 10% of the market in 2019 had a 20% market share of trades in 2020 and 25% on peak days. These investors tend to be short term and are probably contributing to the meteoric rise of small caps. With such a large base of short-term momentum-based investors, a correction can convert into a crash swiftly.

To defend ourselves from such a situation, we will continue to place lions share of our investments in companies with healthy cash flows, which will enable us to use dividends to buy more in an over-sold market. Also, we will continue to use leverage sparingly, so we have dry powder if there are opportunities in the market, as we did last year.

We kiss and it croaks

In the classic fairytale by Disney (one of our investments), a frog is transformed into a prince after it is kissed by a princess. As mentioned earlier, we are on the look out for some disruptive and exponential growth stories which have high profitability potential in years to come. Most of these stocks are not justifiable based on current numbers, whether its sales or profits (some don't even have profits), however it's the space they are in or their business model which might lead us to invest in them.

While we entail more complex methods to arrive at a business decision than just kissing random frogs and hoping they turn into princes, such businesses do have a much higher risk profile. Our strategy to diversify and only invest fractionally into high-risk high return theme should protect us from any big losses in an individual scrip.

Inflation or swifter economic recovery

Liquidity is one of the bedrocks of our investment theme this year and we base most of our decision on the premise that interest rates will remain low for at least another 12 months. However, if interest rates rise against our expectations, it will have a significant impact on the market and on how we invest.

The biggest reason which might force central banks to hike rates is inflation, while for the US 2% inflation is something the Fed targets, a number significantly higher than that could lead them to cool down the economy via monetary policy.

Another reason which might lead to faster reversal in rates is faster growth. On the surface it's a good omen, however if post Covid-19 recovery is faster and higher than anticipation, central banks might see fewer reasons to keep abundant availability of liquidity at no cost.

FAVORITE SECTORS & STOCKS

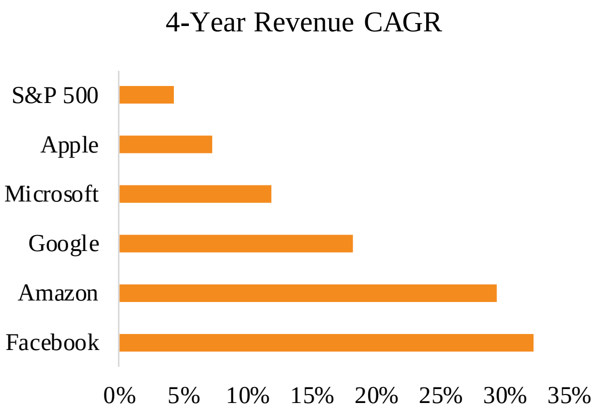
US BIG TECH	RENEWABLES
MOBILITY	SEMICONDUCTORS
CONNECTED TV	CYBER SECURITY
CHINA	GAMING
GENOME	

US BIG TECH

The largest tech names in S&P500 are growth companies and will remain so. They have the required ammo in the form of human capital and large cash piles to consume growth pockets around their existing businesses.

We think analysts expecting stability of revenues for large tech companies are ignoring their strong cash position and large networks. These companies can grow inorganically, like Google acquiring Fitbit and Salesforce acquiring Slack. Big tech companies combined have more cash than market capitalization of 10 fastest growing tech companies in Nasdaq.

Even if regulatory restrictions confine their inorganic growth – which we don't believe will be an issue, they can still warp speed new high growth initiatives, like Apple's "Titan" (Electric vehicle project) or Facebook's Diem (Crypto currency project) and scale them very quickly, leveraging their existing network and very large user bases.



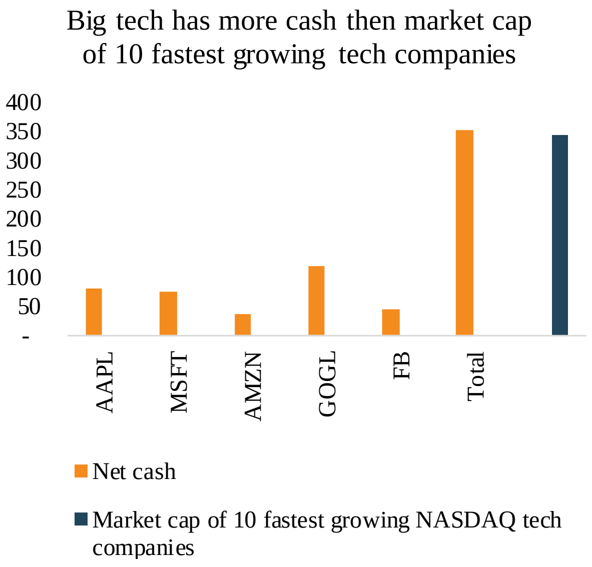
Big tech have strong positions in high growth markets (like cloud and video gaming) and have new initiatives in future growth markets (like Crypto, Virtual Reality, and Autonomous Driving) giving them long runways ahead whilst their current businesses continue to grow as well.

Big tech offer growth in cash rich profitable businesses. Comparing these companies with smaller and relatively recent growth companies make them look undervalued and underappreciated.

Average EBITDA margin of 44 fastest growing tech companies is 0% (TTM) and 23 of the 44 fastest growing companies burned cash. While profitability of businesses are uncertain, these 44 companies are trading at average 21x EV/revenue and 40 per 1% of growth vs Big tech average EV/Revenue of 7.1x and 40 per 1% of growth.

While we understand high premium for growth and hence high valuation for relatively smaller and newer businesses growing very quickly, we do not concur with the assumption that these smaller businesses will eventually achieve similar profitability as big tech.

In current near zero interest rate environment, we expect profitable growth will be appreciated. High margin & cash rich big tech with non monetized assets (Facebook) and valuable assets in current and future high growth markets (Google and Microsoft) should continue to attract investor attention.



Company	Market Cap	Forward PE	Forward EV/EBITDA	Revenue growth	Net income growth
Apple	2,256,000	29.9	22.3	10%	9%
Amazon	1,634,000	40.9	20.7	18%	50%
Microsoft	1,682,000	22.5	16.2	13%	30%
Google	1,185,000	23.3	14.9	11%	9%
Facebook	778,000	18.6	12.6	27%	34%

US BIG TECH - FAVORITES

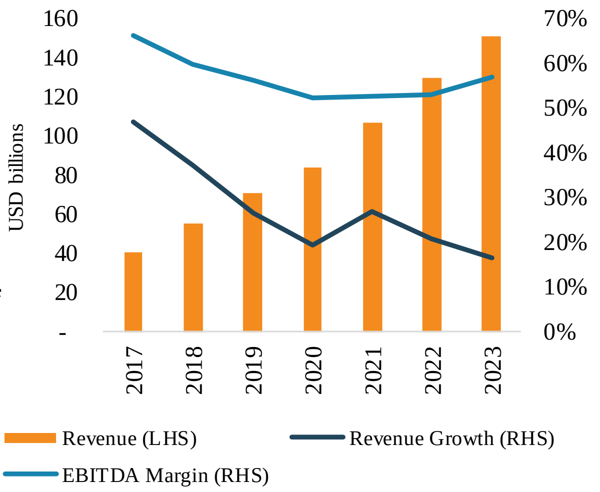
Facebook (Nasdaq: FB)

In our opinion, Facebook is the most under valued big tech stocks. We believe the regulatory/antitrust concerns are overplayed and it still offers highest ROI for advertisers

Investors are yet to appreciate its majorly non-monetized echo system – which is trying out various models to monetize it. FB is testing e-commerce and payments through WhatsApp nd has already announced its intention to enter block chain space

Sitting on cash of USD 45 bn, FB will continue to capture growth bubbles appearing around its. Its recently acquisition of Kustomer is an example. FB also has strong presence in AR/VR market through Oculus - second most sold VR headset globally – which has potentially a very long runway

We feel that cash rich FB, with its high margin and resilient ad business and new initiatives around growth opportunities, should trade 30x forward earnings opposed to current 15x in prevalent low interest rate environment



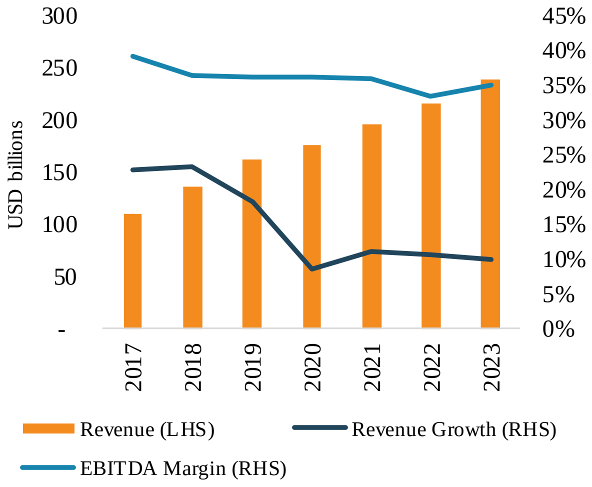
Google (Nasdaq: GOOGL)

We do not see Google as a search engine anymore. It owns some very valuable high growth assets which are not priced in the stock

Other than YouTube, which is most popular streaming service and major CTV player, and its cloud business which has 3-year CAGR of 47%, Google owns Waymo – an autonomous driving company in advanced stages

In our opinion, growth from YouTube and Cloud can more than offset revenue loss from search; it could become a major player in wearables market through Fitbit; and Waymo can provide very long growth runway. With USD 118 bn net cash, it can grow inorganically or warp-speed any initiative

We expect Google's stock to trade at a premium to other tech in 2021-22 closer to 35x its earnings. It is currently trading at 22x.

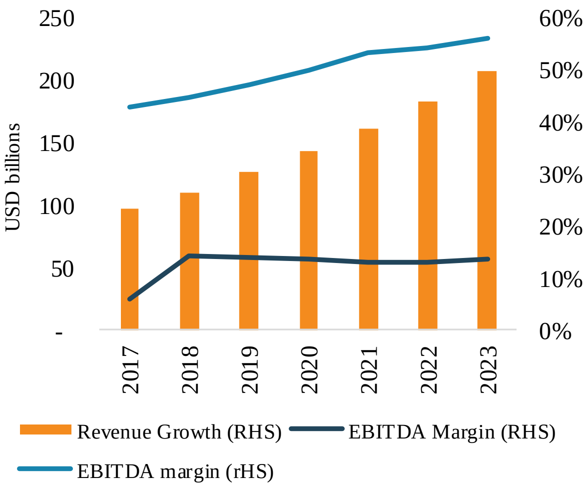


Microsoft (Nasdaq: MSFT)

Microsoft is a story of revenue growth, margin accretion and reasonable value; it has one of the most successful cloud proposition – growing 20%+; it has strong presence in Video games sector through Xbox which we expect to accelerate; and it owns the most popular office suite which is now going SAAS.

Microsoft is switching its product sales to SAAS model which is already showing benefits on cost sides with EBITDA margin north of 50% in FY20, up from 40% in FY16 and we won't be surprised with further improvement as office suite is completely converted to SAAS.

Currently trading at 16x EBITDA, company offers strong balance sheet, stable growth and exposure to high growth sectors like cloud and video games. In current near zero interest rate environments, we believe MSFT is a must own stock and could trade as high as 20-22x EBITDA.



RENEWABLES

A trend towards decarbonization and digitization of the electricity grid

Renewables were one of the sources of energy that grew during 2020, and we expect investment in renewables (specifically wind and solar) to accelerate further in 2021, sustaining a trend toward decarbonization, decentralization and digitization of the electricity grid. The trend is mainly driven by merit based economic cost (Levelized cost of energy) as solar and wind are in the money against grid pricing and further attraction comes from "green stimulus"

US soon to re-enter the Paris Climate Agreement

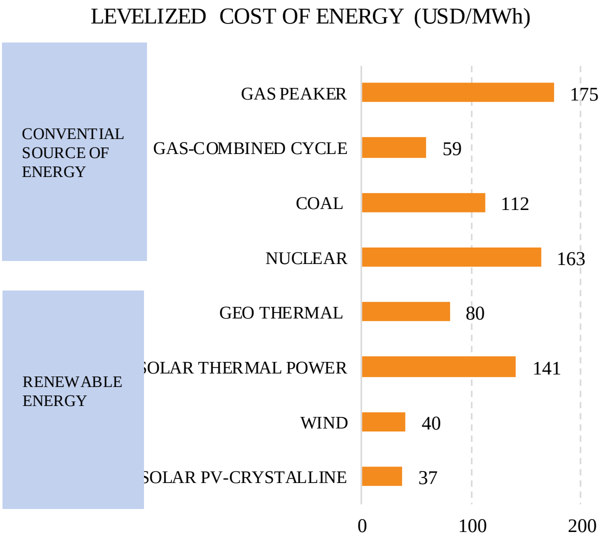
At the top of Biden's climate agenda is getting America back into the Paris Climate Agreement. Biden's USD 2trn, to be spent in 4 years, aims for clean electricity system including renewable power and nuclear by 2030. The plan aims to achieve carbon free power sector by 2035.

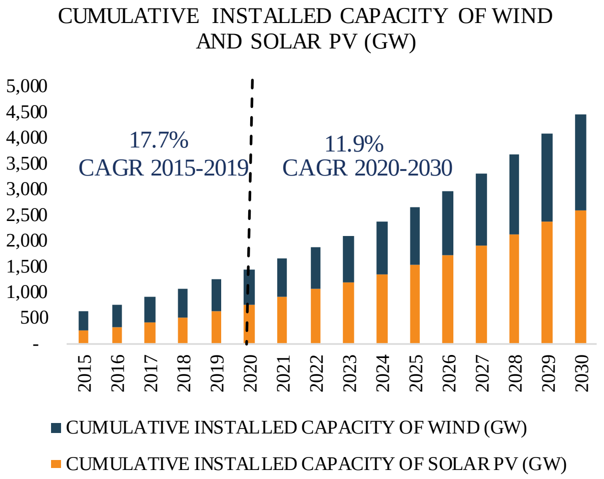
Accelerating the pace towards clean energy

Rapid decline in renewable energy cost, specifically solar and wind, has accelerated the pace of installations as solar and wind now comprises of 70% of new installations globally in 2020 from 45% in 2015. Global electricity generation mix of Solar and Wind in 2019 was 2.8% and 8.9% respectively, which is expected to reach 11% and 18% respectively by 2030. The runway of installations translate into a 10-year energy dispatch CAGR of 12.0% and 10.6% for solar PV and wind respectively.

Key Risks:

- Decline in oil prices would make solar and wind bets unattractive as costs for oil and gas based energy will decline.
- Covid-19 has disrupted the supply chain of wind energy.





Company	Market Cap	Forward PE	Forward EV/EBITDA	Revenue growth	Net income growth
Jinko Solar	2,800	9.2	4.9	8.5%	12.6%
Canadian Solar	3,004	14.2	4.9	12.0%	10.0%
Solar Edge Tech	16,340	58.6	51.0	17.0%	15.0%
Daqo	3,990	17.7	11.5	8.5%	9.5%
TPI Composites	1,890	29.5	9.9	12.0%	15.0%
Vestas (Euro)	39,240	39.5	14.0	9.0%	17.0%
Seimens (Euro)	22,540	47.4	24.9	8.0%	20.0%
Nordex (Euro)	2,630	39.0	9.0	9.0%	68.0%

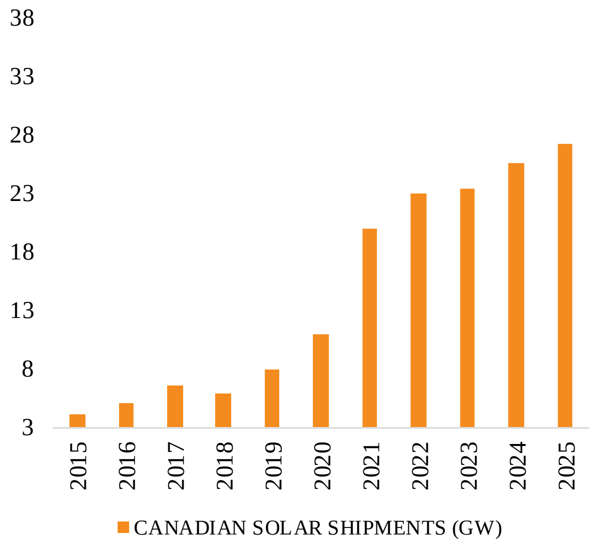
RENEWABLES - FAVORITES

Canadian Solar (Nasdaq: CSIQ) - Giant of the Solar PV Module

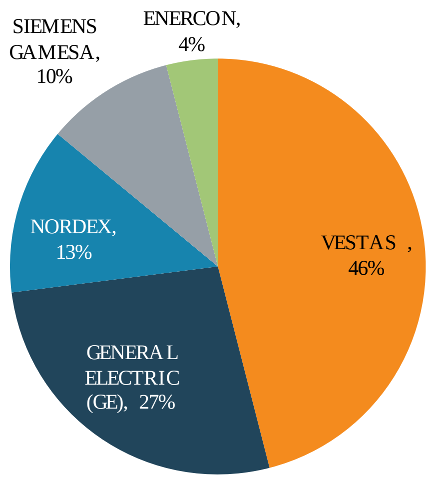
Canadian solar is one of the largest players in solar module space in addition to being in solar project management business

While demand is growing faster, supply side is consolidating - top five module manufacturers will have market share of 75-80% in 2021. CSIQ's capacity expansion and vertical integration will enable the company to gain global market share, enhance pricing power and improve costs

We estimate a 10-year earnings growth CAGR of 10.0% for CSIQ and find current valuation at 14x FY21 PER very attractive. While faster than expected decline in module prices and slowdown in Solar PV installation will reduce attractiveness for the sector



TPIC CUSTOMERS



TPI composites (NASDAQ: TPIC) - dominant wind blade manufacturer

TPIC is the largest wind blade manufacturer with blue-chip customer base and we believe, the company will benefit from its leading position in the on-going secular progression of wind power

Increase in market share coupled with normalization of gross margins should result in 10 year earnings CAGR of 15%. Further improvement in onshore wind efficiency and environment concerns should continue to boost revenue backlog in upcoming years (currently around USD 3 BN)

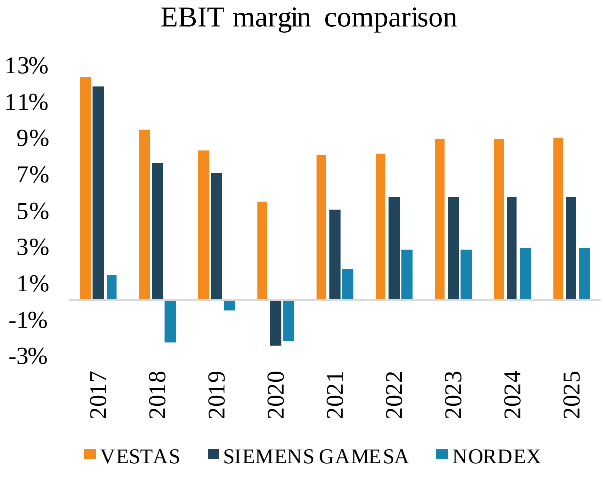
Downside risks include: 1) slowdown in demand for wind energy and 2) big players begin to produce more components internally

Vestas Wind Systems (CPH:VWS) - the global leader

Vestas is the leading manufacturer and installer of wind turbines with c.25% market share which has more than doubled in 5 years. Vestas has the highest margins (8.6% in 3Q2020) in the industry, spends more on R&D than competitors and can offer turbines at lowest prices. In effect, this causes Vestas to consistently increase its market share around the world.

Continued increase in market share along with strong pricing power has led the company to gain strong position in service segment where margins have increased by 1000bps in the last 5 years

The company is best positioned to benefit from growth in wind-based power generation globally and is expected to see an average 15%/yr growth in bottom line over the next 10 years



MOBILITY

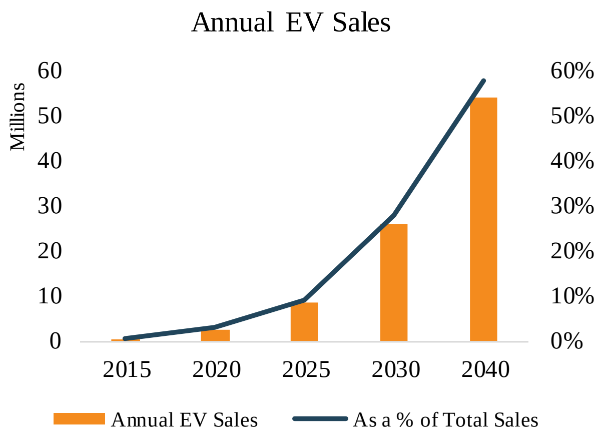
After experiencing negative growth for almost 15 quarters, global auto industry is expected to grow over the next five years on the back of sustained low interest rates, pent up demand and launch of new EV variants

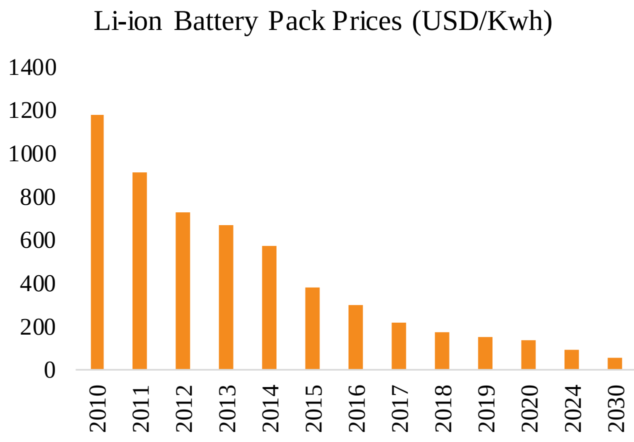
Electric is the future. Global EV sales have jumped from 450k in 2015 to an expected 2.45 million in 2020 and is further expected to grow to 26 million in 2030 due to falling battery prices, improved charging infrastructure and penetration into newer markets. Market estimates EV share of new vehicle sales to increase from 3% in 2020 to around 28% in 2030 and more than 50% in 2040

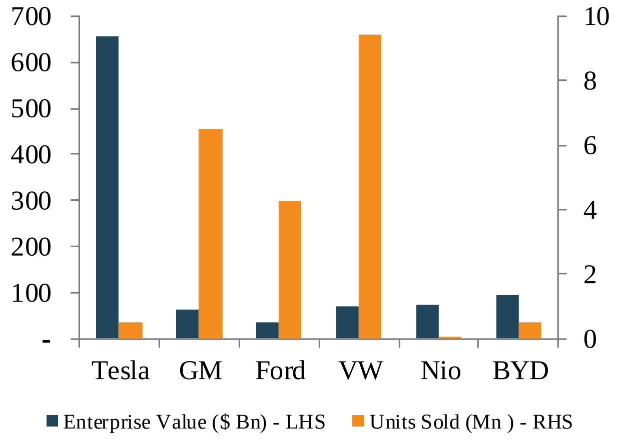
Battery packs are the major cost drivers of EVs and their prices have fallen by 87% from 2010 to 2019. It is expected that newer tech will further drive cost parity of EVs with ICE vehicles by mid 2020s. Demand for EV is further driven by zero-emission vehicle targets announced by several countries through 2030 or 2050 in some cases

While market is busy cheering EV startups, legacy companies are lining up EV models. These startups have negligible share and scale compared to legacy automakers while their valuations are quite lofty. We don't understand this valuation gap considering some of the most popular electric vehicles are coming from these legacy players

We like few of the legacy players in the auto manufacturing sector – Volkswagen, BYD and Ford Motor Company. These companies have existing manufacturing infrastructure to scale production and vast sales & service networks. Additionally, they have invested considerably in electrification, battery and autonomous technology and can challenge Tesla in coming years







Company	Market Cap	Forward PE	Forward EV/EBITDA	Revenue growth	Net income growth
Tesla	658,580	149.0	78.0	24%	75%
Ford Motors	34,620	6.9	2.3	31%	-
Volkswagen	99,690	6.7	1.7	21%	183%
GM	59,600	7.1	3.8	10%	25%
BLBD	494	17.0	11.0	16%	78%
BYD Company	84,000	89.3	26.6	24%	35%

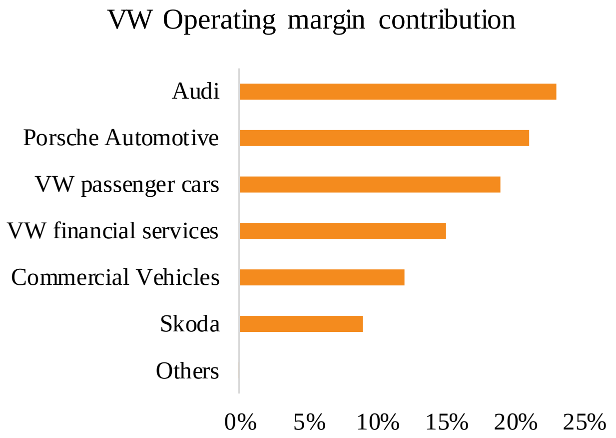
MOBILITY - FAVORITES

Volkswagen AG (ETR: VOW) - largest automaker with aggressive electrification plans

VW group is the largest automaker in the world and owns brands like Audi, Porsche & Skoda et al. It sold more than 10 million vehicles in 2019 and commands 12% market share of passenger cars globally.

VW has the boldest EV strategy amongst legacy players. The company has shifted EUR 73 BN to electrification & future technologies and targets 3mn EVs annually by 2025. It already has the highest EV market share in Europe and ID.3 has been the best selling EV in its markets

VW started its own battery cell production last year and has also made significant investments in battery production (NorthVolt, Gotion) & battery technology company (QuantumScape), We believe VW group's valuation of 1.7x forward EV/EBITDA does not justify it's current position or its future potential in mobility

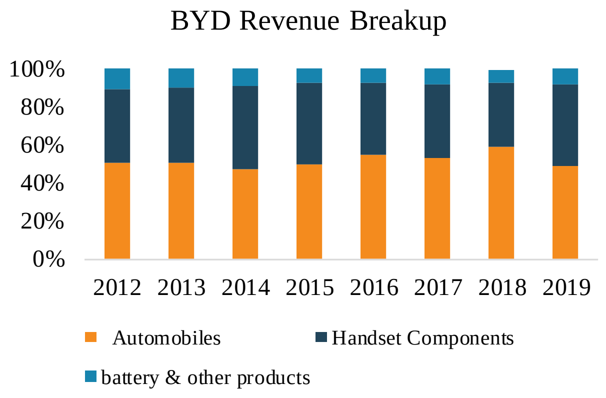


BYD Company (OTC:BYDDY)

BYD NEV business finished the year strong (sales growth of 54% Y/Y in H2). We expect this growth into 2021 and beyond due to hot sales of its Tesla Model 3 competitor Han EV and strength in electric bus business (up 45% in 2020) as governments & municipal authorities move towards electrification of their fleets at warp speed

BYD pledged an eightfold increase in its battery production capacity. Its blade battery technology mitigates the safety concern that EV batteries catch fire while also utilizing space 50% more efficiently. BYD made up only 12.5% of the Chinese battery production in 2019 and could gain share by selling its battery to other vehicle manufacturers and challenge CATL which has roughly 40% of the market.

Improved profitability: With the sales volume of mass produced high-end Han EV rising - unlocking the business value of BYD's vertical integration - we expect higher ASPs in automotive business with improved profitability.

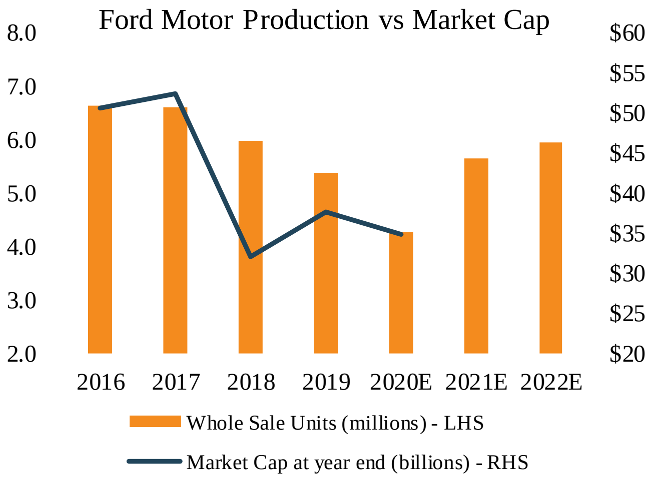


Ford Motor Company (NYSE:F)

Ford is the 2nd largest US-based automaker and the No.1 player in commercial vehicle space globally with more than 50% market share of commercial vans in USA and 14% share of commercial vehicles in Europe.

It has committed more than USD 11 BN to invest in electrification and autonomy through 2022. Its unmistakable legendary pony car brand name makes its first fully electric vehicle Mustang Mach-e as desirable as any other. Ford will enter commercial EV space with the launch of E-transit and electric F-150 in 2022.

Trading at 2.3x its forward EV/EBITDA and 6.5x forward P/E, the company appears inexpensive in both absolute as well as relative terms and a combination of good cars, strong brand recognition plus a great dealer support could work very well to unlock shareholder value.



SEMICONDUCTORS

At the heart of all tech disruptions:

Semiconductor industry is yet again in the driving seat as the world prepares for fourth industrial revolution, i.e., 5G, IoT, and AI. We believe mass adoption of the new technologies shall drive the next leg of growth for the entire supply chain. We expect growing complexities of designs to accelerate CAGR of the chi industry from 6.7% in 2010-20 to 8.0% over the next decade.

Consolidation despite shortage – a rare sight:

Semiconductor industry has gone through large scale consolidation over the past decade with four mergers announced in 2020 alone. Top ten companies already account for nearly two-third of the industry revenue. We expect this trend to continue as growing complexities of designs in the wake of superior performance needs lead to survival of the fittest.

Entering the pickup phase of a growth cycle:

Driven by new technologies just at the brink of their adoption and price to earnings ratio of less than 30x, we believe semiconductor sector offers a lucrative reward to risk ratio given growth cycle is yet to enter full swing.

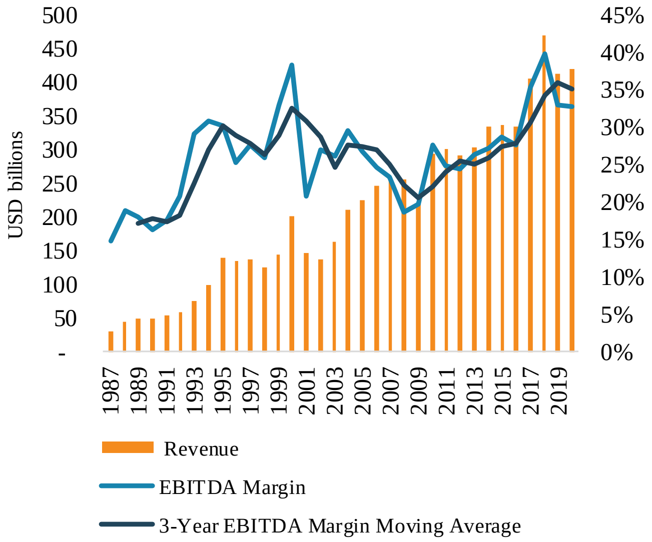
Key Risks:

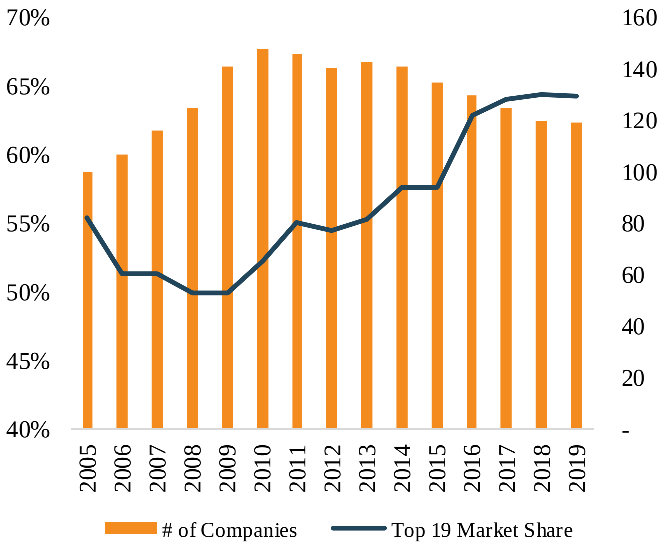
- Tensions over US-China trade relations have created serious uncertainties around semiconductor industry.

- Covid-19 has impacted the supply chain and may impact growth expectations.

- Slowdown in roll out of new technologies could lead to lower-than-expected revenue growth.

EBITDA margins exhibit economies of scale





Company	Market Cap	Forward PE	Forward EV/EBITDA	Revenue growth	Net income growth
TSMC	483,827	25.5	13.6	11.81%	9.00%
Qorvo	19,089	17.8	14.5	18.73%	32.14%
Lam Research	69,765	21.3	16.2	29.45%	38.03%
NXP	44,589	20.1	13.1	13.46%	34.72%
Qualcomm	172,200	21.5	15.4	40.01%	68.68%
Nvidia	325,489	46.8	38.1	51.02%	70.04%

SEMICONDUCTORS - FAVORITES

Taiwan Semiconductor Manufacturing Corp (NYSE: TSM) - gearing up for next technological revolution

TSM remains the largest pure play foundry with approximately 50% of the market share serving to majority end markets. The company serves to almost all major semiconductor designers, i.e. Nvidia, AMD, Broadcom, Skyworks, etc. Its scale advantages, high R&D, and cutting-edge technology allow it to maintain its position in advanced chip manufacturing.

TSM recently announced launch of its 3nm node chips while peers continue to solve the complexities of 7nm node, a sign of its technological superiority. Intel, largest chip manufacturer, too has announced to outsource some of its advanced chip manufacturing to TSM.

At 25x forward P/E, we believe the valuations are unjustified given the enormous growth potential under the fourth industrial / technological revolution.

Valuations	2021P	2022P	2023P
Adj. EPS	3.8	4.3	4.6
EBITDA Margin	66.9%	67.0%	60.7%
P / E	24.5	21.7	20.7
EV / EBITDA	13.4	11.9	11.9
EV / Revenue	8.9	8.0	7.3
P / BV	6.3	5.6	4.9

Qorvo (NASDAQ: QRVO) - riding on the 5G wave

As wireless technologies shift to more complex 5G networks, electronic devices require more radio frequency content per device. Qorvo, being one of the leaders in radio frequency chips, is poised to benefit materially from this transition.

Through years of research and a GaN based foundry, Qorvo remains a leader in GaN technology providing higher performance and power efficient RF chips through their GaN-on-SiC technology.

Trading at less than 20x P/E, we believe the market is under-appreciating the global transition to 5G. Apple's launch of 5G phones should act as a catalyst, in our opinion, as it contributes more than 40% to QRVO's revenues.

Valuations	2021P	2022P	2023P
Adj. EPS	8.6	9.7	10.8
EBITDA Margin	32.1%	34.1%	33.5%
P / E	19.5	17.3	15.5
EV / EBITDA	16.0	13.8	13.1
EV / Revenue	5.1	4.7	4.4
P / BV	4.1	3.6	3.2

LAM Research (Nasdaq:LRCX) - growth under-appreciated

Being a wafer equipment supplier, LRCX remains well positioned in the supply chain as the world gears up for the fourth industrial revolution.

LRCX announced a partnership with peer WFE manufacturer ASML to expand its capabilities on EUV photolithography, introducing a new advanced dry resist technology to increase productivity and yield of EUV chips.

Amid 5-year revenue CAGR outperformance of 8% against industry, LRCX has also exhibited EBITDA margin expansion from 23% in 2015 to 31% in 2020. We believe the company can comfortably deliver growth twice the rate of the sector average.

Valuations	2021P	2022P	2023P
Adj. EPS	22.4	25.1	27.8
EBITDA Margin	32.3%	33.2%	34.1%
P / E	21.6	19.3	17.4
EV / EBITDA	16.4	14.9	13.5
EV / Revenue	5.3	5.0	4.6
P / BV	11.8	9.7	9.8

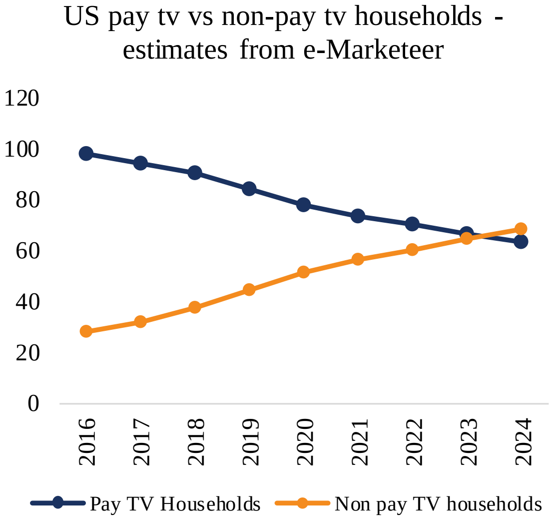
CONNECTED TV

Looking at trends in consumer preferences, emerging business models of content producers and the economics of OTT vs Pay TV, we believe cord cutting could accelerate further and the end of legacy business models is now in sight.

According to recent reports (click here), 25 million US households are expected to cancel their pay tv subscriptions over the next 5 years, 40% reduction from current subs

All major content players are leveraging smart TVs and devices to reach directly to consumer. 2019 saw launch of Disney+, HBO max and Peacock were launched in 2020 and Discovery Plus is expected to be launched in 2021 in addition to several others. Live sports – which kept loyal customers with cable – is also leveraging technology and now being streamed through services like ESPN+.

Additionally, new streaming services are experiencing tremendous growth due to pandemic related lockdowns and large content libraries. Disney+ alone has already acquired close to 90m subscribers in its first year of launch, which is more than its initially announced 5-year target.

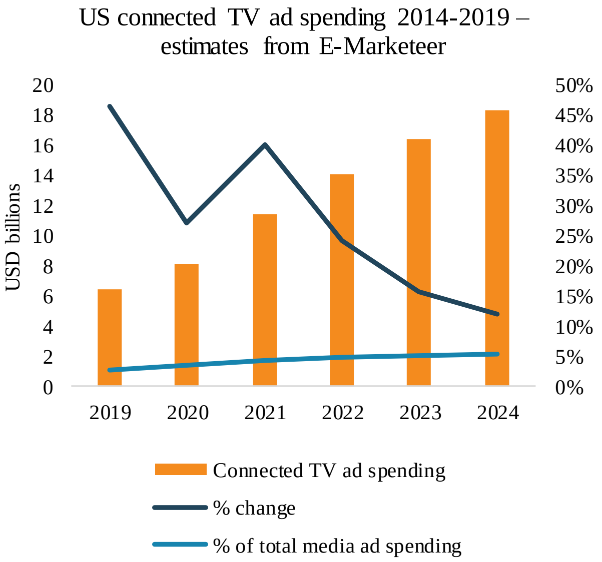


With less than half of households reachable via pay tv, advertisers would shift budgets to CTV specially in premium content and since significant progress has been made to overcome measurement challenges.

While Disney+ and HBO Max are purely subscription bases services, Peacock was launched with both, free (ad supported) and subscription tiers. Several other content producers are weighing advertisement-based services too.

According to recent reports (click here), Free ad supported TV is growing much faster than OTT services

Significant efforts have and are being put to address the two issues discouraging large advertisers from shifting budgets towards CTV – measurement (through partnerships between technology and traditional measurement businesses) and reputational risk (through premium content).



We expect most popular streaming service Youtube (Google), large content producer Disney, streaming services infrastructure provider Roku and advertisement technology platform Magnite to be beneficiaries of accelerated cordcutting and increased ad spend in CTV

Company	Market Cap	Forward PE	Forward EV/EBITDA	Revenue growth	Net income growth
Netflix	238,000	63.0x	41.9x	14%	20%
Disney	328,000	45.0x	21.4x	11%	30%
The Trade Desk	37,620	129.2x	97.2x	27%	53%
Roku	42,140	594.6x	293.7x	57%	225%
Magnite	3,440	2702.8x	66.4x	4%	N/A
Liveramp	4,853	325.8x	197.39x	14%	N/A

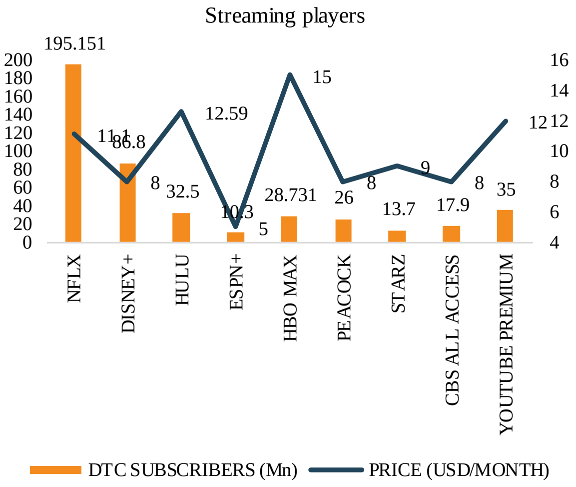
CONNECTED TV - FAVORITES

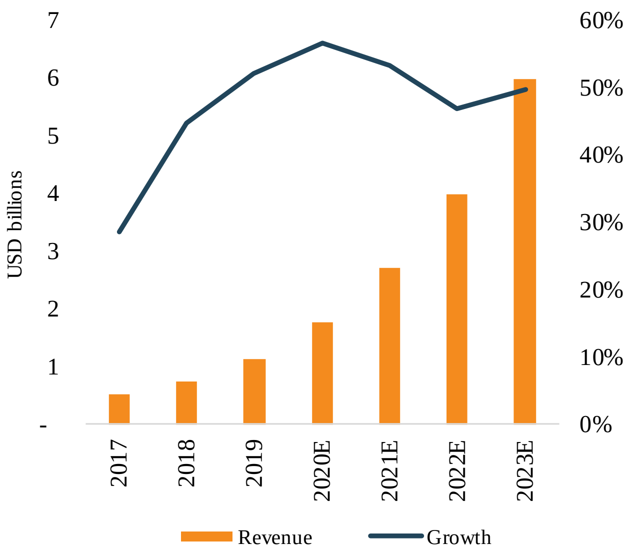
Walt Disney (NYSE: DIS)

Disney's phenomenal success to date in DTC business (86.9mn subs in 1 year-management projections were 75-80subs by 2024) has perfectly positioned the company as a vertically integrated streaming entertainment leader

Massive acceleration in original content should continue to support business model transformation process, while continuous progress on vaccines would uplift operational activities at theatres and theme parks, thereby makes Disney a perfect investment play for 2021 and onwards

Disney's unparalleled IP portfolio together with management's estimate of 300-350mn subs by 2024 (Disney+, HULU and ESPN) is above the consensus estimate for Netflix of 300mn subs. This also makes Disney's market cap of USD 328bn quite attractive compared with Netflix's market cap of USD 238bn which is only a SVOD.





Roku (Nasdaq: ROKU)

Roku started as manufacturer of devices to connect TVs with internet but is now largest operating system provider for smart TVs – one in three TVs sold in US today is a Roku TV.

Roku acts as a distributor of content – hence it is able to distribute all DTC services (Disney +, Netflix, Peacock). Business has a large moat provided by its long-term partnerships with TV manufacturers, hardware specific operating system and a large user base.

Roku's business model and network effect make it beneficiary through both, content producers expanding into DTC and advertisers moving budgets to CTV.

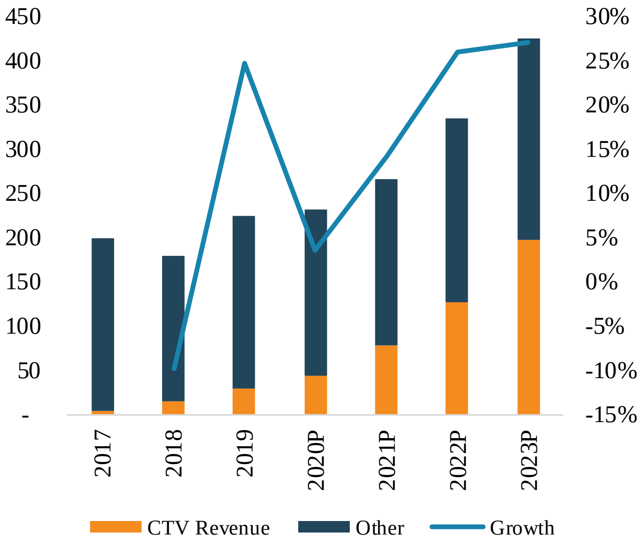
Although Roku trades at FY2021 and FY2022 EV/EBITDA of 293x and 83x respectively, its unique positioning, strong tech and a long runway could allow it to grow at 10-year CAGR of 30%+ and become one of the largest players in media space.

Magnite (Nasdaq: MGNI)

Magnite is the largest sell side platform in Advertisement Technology – it consolidates publishers ads spaces and sells the ads spaces to DSPs. Company has recently started an identification token which its publishers use to identify audience without relying on cookies or identifiable information – a value added service differentiating Magnite from other sell-side platforms. Magnite's CTV business contributes c.20% to its revenues and is expected to grow 50%+ in FY20.

Magnite and TTD are the only investible adtech players positioned to benefit from growth in free ad supported TV. TTD is currently trading at 44x EV/Revenue while Magnite is trading under 15x.

While Magnite operates on the sell side (which space is fragmented) as opposed to TTD (which is less fragmented demand side), its global footprint, large customer base (which includes Disney's Hulu) and new value-added services makes it an equally important player in CTV space as TTD.



CYBER SECURITY

THE DIGITAL BLANKET

Excessive digital data needs protection:

Data generation globally reaching close to 50 zettabytes in 2020 from only 2 zettabytes in 2010 and its is set to grow by multiple folds over the next . With the emergence of 5G and further IoT commercialization, need for data security is unprecedented. Global cybersecurity spend reached USD 167 billion in 2019, depicting a 5-year CAGR of 10.6%, which we expect to accelerate to 12% over the next decade.

More connected devices = more vulnerability:

Growth in IoT carries enormous implications for cyber security as it exposes networks to multiple routes for breaches. Consequently, we expect cybersecurity space to add hundreds of billions in revenues and tens of billions in profits over the next decade.

Specialized security needs:

The move to cloud networks in the wake of cost savings has not come without a cost. Exposure of data to external networks increases vulnerability to cyber attacks and hence carries dedicated security needs. Cloud service providers only secure their platforms and are not liable to protect any of their customers' infrastructure.

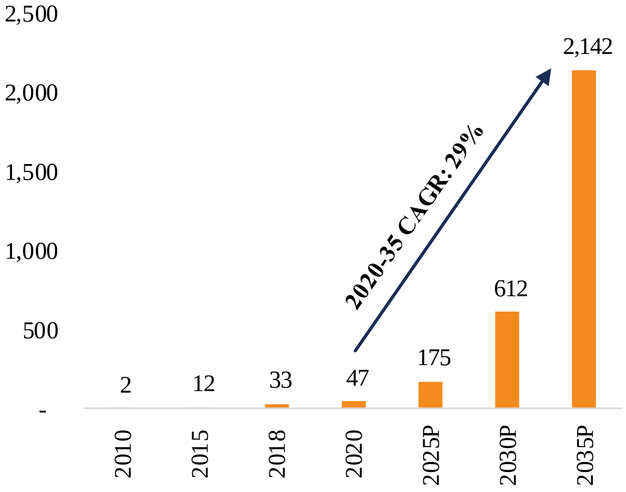
Key Risks

- Excessive competition especially with bundled product offerings by cloud service providers.

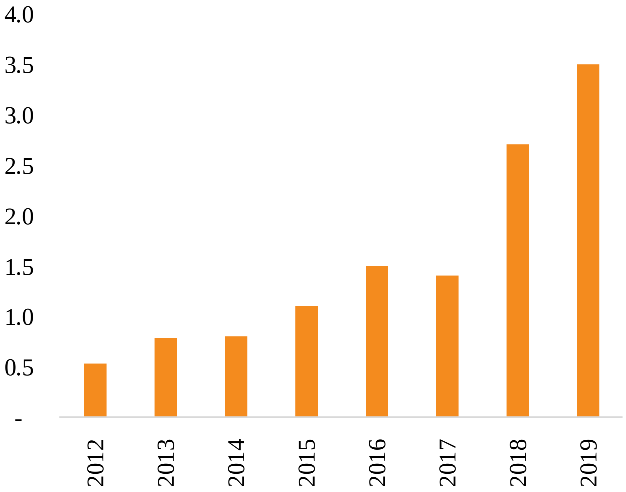
- Rapid technological advancements in computing devices, which tend to get misused by hackers.

- Abuse of artificial intelligence for cyber crimes by exploiting the user behavior.

Global Data Creation (Zettabytes)



Financial losses of internet crimes (FBI)



Company	Market Cap	Forward PE	Forward EV/EBITDA	Revenue growth	Net income growth
Palo Alto	33,990	61.5	35.5	20.7%	24.5%
Fortinet	24,028	40.7	26.2	15.5%	11.9%
Crowdstrike	46,530	991.9	546.2	78.5%	N/A
Zscaler	27,014	528.4	320.3	30.6%	59%
Okta	33,728	5,543	1,421	40.4%	N/A
Splunk	27,877	N/A	N/A	-8.3%	N/A

CYBER SECURITY - FAVORITES

Fortinet (Nasdaq:FTNT) - Unabated leadership in SD WAN

With edge computing emerging as a new paradigm within the cloud computing domain, Fortinet is extremely well positioned to provide both types of cybersecurity solutions. Edge computing growth is estimated to surpass that of cloud by nearly 12 pp.

FTNT has a superior flexibility and competition strategy wherein the company provides integration facilities with the softwares of external vendors, thereby offering a broad security fabric.

The demand for SD WAN is set to explode as businesses attempt to address latency issues through a hybrid cloud-edge model. FTNT remains the fastest growing SD WAN vendor.

Valuations	2019	2020	2021P	2022P	2023P
Adj. EPS	2.5	3.2	3.6	4.2	5.2
EBITDA Margin	27%	23%	29%	29%	29%
P / E	58.9	44.8	40.0	34.8	27.9
EV / EBITDA	39.1	29.4	26.2	22.6	14.8
EV / Revenue	9.0	8.6	7.6	6.6	5.8
P / BV	33.1	24.6	16.2	11.3	6.3

Zscaler (Nasdaq:ZS) - offering seamless user experience

According to a study, work from home model has increased the risk of cyber attacks by approx. 41%, thereby creating a need for an alternative to VPN. ZTNA provides much faster speed along with significantly lesser number of crashes.

ZTNA is a software-based solution which allows organizations to get rid of appliance solutions; therefore, any internal application in cloud or datacenter can be accessed without need for any additional infrastructure or configuration.

A centralized admin portal allows real time monitoring of all user application activity. Since ZTNA is not tied to network, user policies can be managed through application segmentation instead of complex network segmentation, thus providing large cost savings.

Valuations	2021P	2022P	2023P
Adj. EPS	0.4	0.6	1.0
EBITDA Margin	14%	16%	19%
P / E	528	337	203
EV / EBITDA	320	213	133
EV / Revenue	43	33	26
P / BV	54	47	35

Okta (Nasdaq:OKTA) - Enhancing productivity

Eliminating the need for passwords, OKTA has been providing considerable cost savings since more than 80% of the breaches tend to be weak password related.

The ratio of on-premises to cloud applications is constantly declining. Increased users in external network cause difficulty with IT management, where OKTA provides cost savings in terms of active directory by providing access management solutions.

Single sign-on (SSO) is an authentication process that allows a user to access multiple application with one set of login credentials. Given 68% of employees switch between ten apps every hour, single logins save substantial time and money.

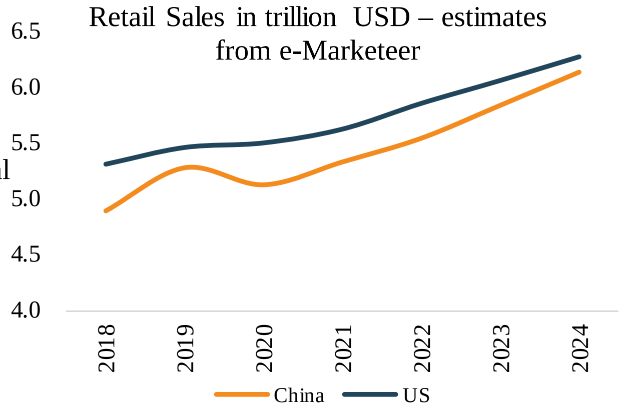
Valuations	2021P	2022P	2023P
Adj. EPS	0.0	0.0	0.4
EBITDA Margin	3%	2%	7%
P / E	5,543	6,059	596
EV / EBITDA	1,421	1,278	367
EV / Revenue	40	31	24
P / BV	48	52	50

CHINA

Managing a fund with global mandate, we cannot ignore China as of the large economies, it is growing the fastest. Chinese output is forecasted to outpace US in under a decade and its retail sales have already caught up.

China's growth story continues with focus moving from infrastructure to manufacturing and now consumption. Our understanding is that incomes will continue to grow leading to both, urbanization and narrowing of consumption gap between urban and rural population.

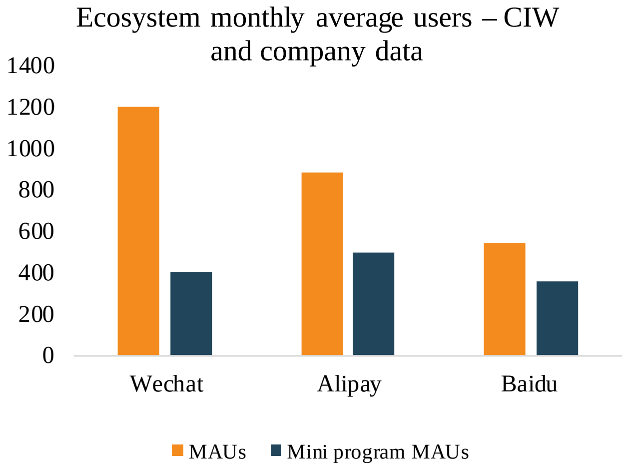
We also believe that Chinese government's efforts to keep technology at the center of its plans will bring China to the forefront in future technologies. It is already the biggest market for electric vehicles and batteries and is the most efficient producer of renewable energy infrastructure.



We think large technology companies provide the best proxy on China. They have thrived on digitization and urbanization of a very large and growing middle class and their scale within China is much bigger than their US counterparts.

Lack of retail and banking infrastructure earlier on pushed growing Chinese middle-class consumer to leap-frog to technology faster than developed economies. Opposed to US tech companies, which contribute 10% to the economy (click here), China digital contributes a third to Chinese output (click here). Other than services and retail, they have direct or indirect exposure to all sectors in the economy.

Chinese tech companies are bigger in terms of usage and services than their US counterparts – Chinese users access super apps developed by these companies more frequently and for a lot more use cases. With a strong foothold in China, these companies are now expanding into connected emerging economies like South East Asia and Subcontinent.



We like the largest technology companies (Tencent, Alibaba and Baidu) in China. We believe that other than being a proxy to overall Chinese consumer driven economy, these are good businesses with moats which can compete globally. These companies are also at the forefront of future technologies and have strong balance sheets to support their new initiatives.

Company	Market Cap	Forward PE	Forward EV/EBITDA	Revenue growth	Net income growth
Tencent	699,782	32.6x	19.2x	15%	10%
Alibaba	648,318	19.4x	14.0x	30%	22%
Baidu	73,754	21.5x	14.0x	14%	6%
JD.com	137,293	26.8x	19.6x	26%	225%
Pinduoduo	218,882	117.3x	139.9x	31%	N/A
Meituan	223,530	104.6x	50.1x	41%	1,748%

CHINA - FAVORITES

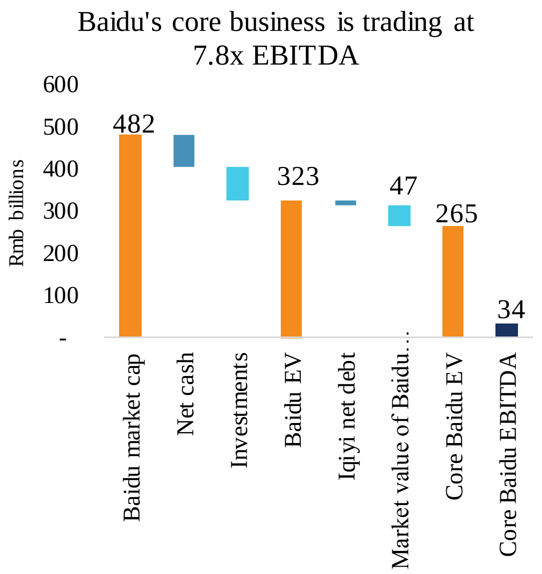
Baidu (Nasdaq: BIDU)

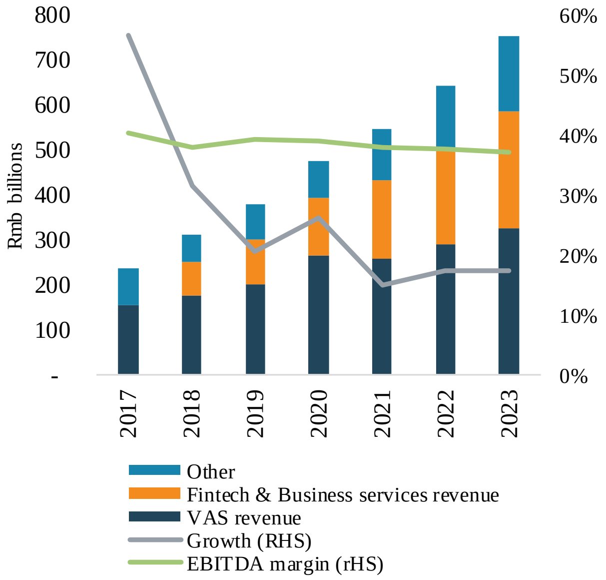
We believe concerns around controversies surrounding Baidu's search business, regulatory issues and competitive landscape in iQiyi's market have been overplayed and investors have completely ignored Baidu's transformation

Other than its legacy search business with over 500 million users, Baidu now has a miniapp ecosystem with over 330 million users, market leading smart home speakers and AI cloud business. It also owns Apollo, autonomous vehicles company which runs robotaxi services in three cities in China.

Market is expecting Baidu's core business to grow and Apollo's revenue from connected transport infrastructure will start impacting topline in 2021-22.

We don't think a business like Baidu's current EV at less than 8x EBITDA (at current iQiyi stock price) is justified. Market will sooner or later look at the core business of Baidu separately and we expect it to trade around 20x EBITDA in 2021-22 as growth becomes visible.





Tencent (OTCMKTS: TCEHY)

Tencent has developed the most powerful digital ecosystem in the world. It is used by over a billion users for several use cases and has become massive source of traffic for companies selling to Chinese consumer. WeChat is what Facebook might be looking at for the future of WhatsApp.

Tencent is market leader in China in online gaming. It also monetizes entertainment through subscriptions to its streaming business and ads. But the fastest growing segment is its Fintech and business services (Cloud), which has long runway. Tencent also owns stakes in fast-growing companies like Huya, Meituan and others, both, in China and abroad.

We believe Tencent's position in Chinese digital economy is that of a gatekeeper which has not yet been monetized to its full extent. It currently trades under 20x EBITDA, which does not truly reflect the tech it has made, the assets it owns and the power it commands.

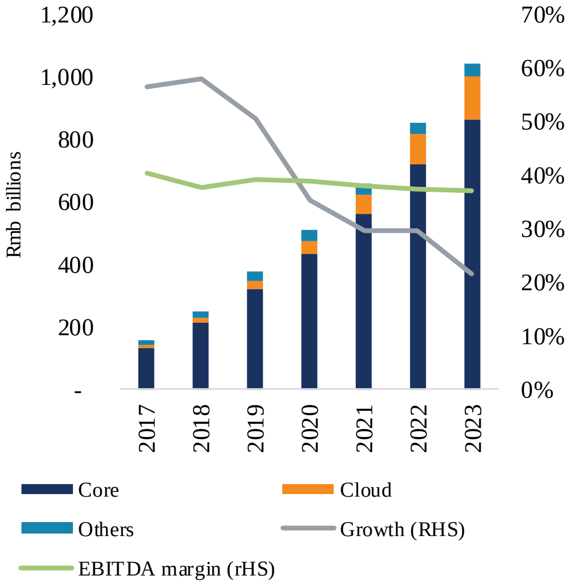
Alibaba (NYSE:BABA)

Alibaba's stock has taken a beating (down c.30% from its peak) as it is at the center of media attention owing to regulatory concerns and last minute cancellation of Ant Financial IPO

None of what is happening has affected Alibaba's core businesses (Domestic and international retail and whole sale E-commerce marketplace, logistics, food delivery and Cloud) and we think company remains a key player in Chinese economy. Company also owns e-commerce and fintech companies in several emerging markets like Indonesia, India, Russia and Pakistan.

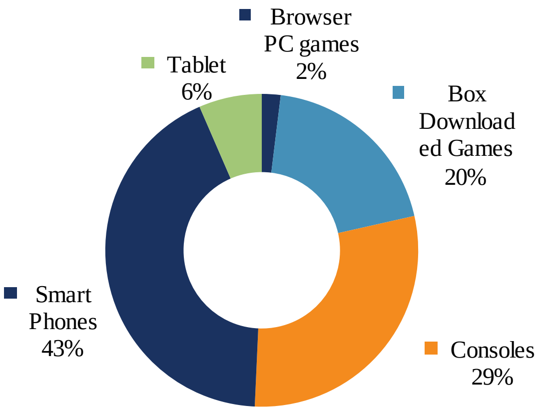
Although nothing can be said with certainty at this stage, we believe that whatever the regulatory changes will be, they will not have catastrophic impact on Alibaba's core businesses.

We feel that at 14x EBITDA, Ant Financial has already been priced out and Alibaba has become an attractive bet on overall Chinese economy – specially on China's domestic and global trade and China's consumerism. In time, noise around regulatory issues will reduce and investors will pay attention to revenues growing north of 30% and following margin improvement story.

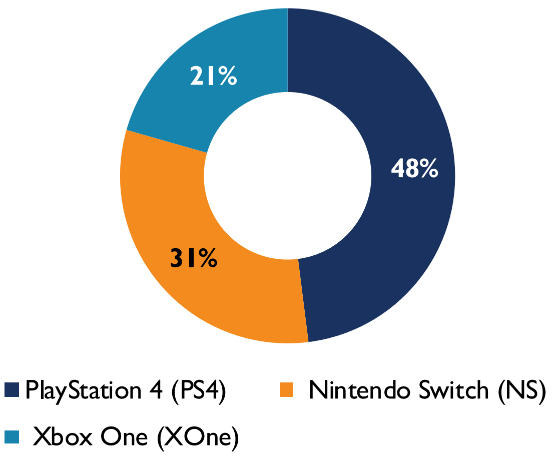


GAMING

Organic growth meets technological tailwinds - In 2020, the worldwide games industry will produce sales of USD174 BN, +19.3% Y/Y. The global gaming market is expected to reach USD 270 BN by 2025, with a CAGR of 9% over the forecast period (2020 – 2025). 5G will further enhance gaming experience with quicker speeds, ultra-low latency, and higher capacity. During the coronavirus pandemic, cloud gaming boomed. Gaming is also gaining popularity amongst newer generation as a legitimate sport with E-sports in infancy, which is growing on to become a significant industry.

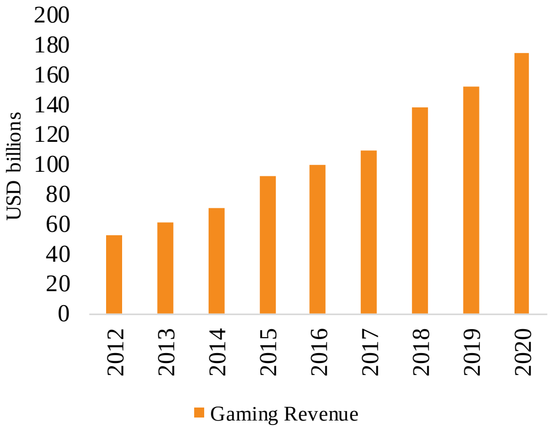


New console generation is a near term impetus - COVID-19 lockdowns resulted in increased interest in gaming which should maintain momentum with new generation of consoles launched in 2020. PS5 and Xbox broke sales records. The USD 45 BN console industry is dominated by three main platforms-Sony, Microsoft, and Nintendo. While Microsoft's strategy builds on its ecosystem, strong Game Pass content offering and play-anywhere philosophy, Sony concept of gaming remain same as of PS4 i.e. story base AAA titles. Game publishers have previously performed well after the launch of a new console, and we hope the trend continues.



Consolidation and branding provide developers with moat. Video game publishers continue to benefit from tailwinds in the industry, such as digitization of sales and increased spending on in-game content, leading to higher margins. Sector remains considerably consolidated with frequent M&A activity.

Gaming offers a lucrative mix to investor with low competition among publishers and console makers. We have made a bouquet of investments in the gaming sector with stocks of top publishers (Activision Blizzard, EA Sports, Capcom and Take2), mobile game publishers (Netease and Tencent), console pureplay (Nintendo) and gaming streaming (Huya). Some of our big caps also invariably have gaming exposures like Sony (PS), Microsoft (Xbox), Google (Stadia), Amazon (Twitch)and Facebook (Oculus).



Company	Market Cap	Forward PE	Forward EV/EBITDA	Revenue growth	Net income growth
Electronic Arts	41.66	26.21	16.97	7.6%	169.1%
Take-Two Interactive	23.9	52.17	34.3	4.6%	1.9%
Capcom Co Ltd	8.44	33.72	23.9	-4.6%	32.2%
Sony	127.58	31.04	11.02	1.0%	-
Netease	66.18	25.74	20.8	31.0%	28.3%
Activision Blizzard	71.76	27.92	19.6	6.7%	10.3%

GENOME

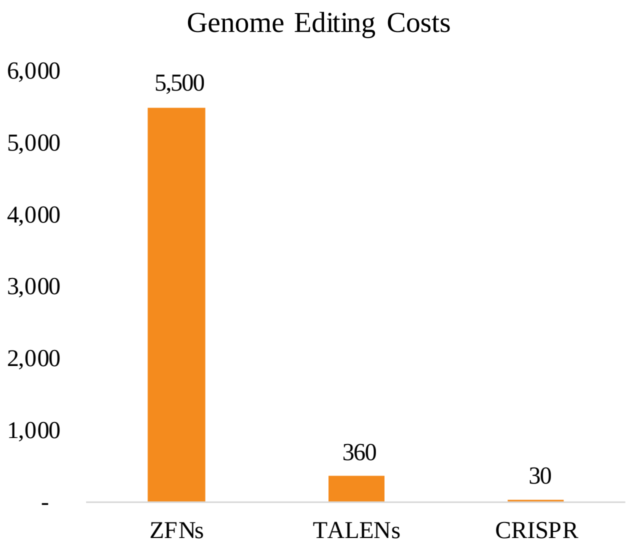
THE MEDICAL REVOLUTION

Curing the chronic:

DNA sequencing and CRISPR are at the heart of ground-breaking advancements that have enabled medical science to cure some of the previously incurable diseases. We believe entire genome supply chain is set to benefit with hundreds of billions in revenues and trillions in market capitalizations unlocking over the next decade.

Costs reduction should fuel wide scale adoption:

The cost of sequencing a whole human genome has fallen from USD 2.7 BN in 2003 to less than a thous dollars, which is projected to come down further to c a hundred dollars over the next five years thereby fueling wide scale adoption of diagnostics instrumen as well as gene-therapies..



Targeted drug development should boost ROIs:

Conventional drug development techniques have had a very low success rate. Gene-targeted drug development has the potential to transform economics on R&D spending completely through a combination of higher pricing for chronic situations, lesser time to market, and reduced testing phase failures.

	Years	Test population	Purpose	Success rate
Drug Discovery & pre-clinical testing	3.5	Laboratory and animal studies	Assess safety and biological activity	5000 compounds evaluated
File IND at FDA				
Phase I	1	20 to 80 healthy volunteers	Determine the safety and Dosage	5 enter trials
Phase II	2	100 to 300 patient volunteers	Evaluate effectiveness and look for side effects	
Phase III	3	1000 to 3000 patient volunteers	Verify effectiveness and monitor adverse reactions from long- term use	
File NDA at FDA				
FDA	2.5	Review process and approval		1 approved
Phase IV	Additional post marketing testing required by FDA			

Key Risks:

- Numerous companies have entered the space; thus, competition is strong.

- Genome stocks have already rallied significantly thereby creating the risk of a bubble.

Source: National Human Genome Research Institute (NHGRI), ARK Investment Management LLC

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