



The Renaissance of Electric Vehicles

In past quarterly pieces, we wrote about some of the long-term structural themes of digital and wireless communication continuous improvement across distances, data intensity and speed, and how in the ever-evolving digital age, the importance of datacenters has come to the fore. Analogous to this theme, our never-ending search for better ways of personal transportation have brought us to the point where electric vehicles (EVs) have become an integral part of this evolution. The invention of automobile as mode of transportation just over a century ago, freed us from the natural physical limitations of horses and carriages for long distance land travel. This allowed us to travel across distances longer, faster and more comfortably. And despite significant advances in automobile technology across a number of fronts, the basis of their motor power - fossil fuel based internal combustion engine - has remained largely unchanged. As cars run on petrol engines became affordable and increased in popularity, they proliferated across ever larger population centers, thus creating huge congestion and pollution problems for society. In many of our less developed Asian markets (i.e. India, Indonesia, Thailand, Vietnam etc.) this process is currently taking place with these unintended side effects of congestion and pollution exponentially accentuated by the even greater population density of major cities in the region. To tackle the pollution problem, automotive manufacturers have long experimented with many alternative fuels and after years of experimentation, battery-powered EVs have won to become the most viable option to displace petrol-engine cars. Now, it is not to say EV is the perfect solution; in fact, battery-powered EVs pose its own environmental challenges, but this is the path automakers (and consumers) have opted to pursue for the foreseeable future.

2019 - The Year of EV Proliferation

It is worth noting that electric vehicles are nothing new. In fact, as far back as 1898, the first car designed by Ferdinand Porsche was an electric vehicle, and a later version of the vehicle even became a hybrid, powered by an electric motor and a petrol engine generator. However, as petrol engines evolved with improved power efficiency and as fossil fuels became ever more readily available with the discovery of vast oil reserves in the Middle East, they won over the electric motor as the standard mode of powering cars for the coming century. Fast forward to 1996 and after various failed attempts to mass adopt alternative renewable fuels, General Motors (GM) introduced the EV1, which brought back EVs to the world. The vehicle proved popular with customers, but it was difficult for GM to achieve profitability in such a niche market segment at the time. Against protests from its customers, GM eventually canned the entire EV1 program, junking the majority of its EV1 fleet (which were available only through lease agreements in a few US states). Conspiracy theories abound that GM was pressured by the oil industry to quickly end this program and keep EVs off the road. In a twist of events, a few years later, entered Elon Musk, who tweeted: “few people know that we started Tesla when GM forcibly recalled all electric cars from customers in 2003 & then crushed them in a junkyard” and “since big car companies were killing their EV programs, the only chance was to create an EV company, even tho it was almost certain to fail”¹. Elon Musk did what most sane person would not do, entered an industry where he had little experience and developed a highly capital intensive loss-making product in the hope to bring it to profitability. Miraculously he built Tesla into a US\$45bn market capitalization company and despite its reputation as the auto industry innovator and disruptor, the company is still struggling to be profitable after all these years.



However, what Tesla did show to the auto industry is that the demand for EVs is proven, and with enough scale, it can become a profitable business. Add on the fact that by making the car more software rather than hardware dependent, future functionalities of the car (i.e. autonomous driving) can be better served by an EV. This eventually garnered the interests of other automakers, both traditional household names and new startups, to enter (or re-enter) the EV market. Despite the headlines generated by Tesla's Model 3 as its first mass volume model, the main production volume for EVs will come from traditional automakers introducing EVs across their brands and segments of their product portfolios. Many makers such as Daimler-Chrysler and GM, have already staked their future on EVs, having announced that much of their product offerings in about 5 years will be electric. After long years of research and development, and auto industry's extensive qualification and testing requirements, all stars are aligned for 2019 to be the big year for new EV model launches. Much like PCs and smartphones, EVs and the automation that is likely to follow, hold the promise of significantly transforming modern society's everyday life and with its product life cycle likely to extend over decades.

Building Portfolio Exposure to the EV Theme

We do not profess ourselves as being unique nor amongst the firsts to invest in the thematic of EVs. In fact, the market has already been jumping into this theme and pushing valuations of some of these EV-related companies to extremes. However, we do pride ourselves in searching for companies that can capitalise on popular themes with an already tangible earning base and higher earnings growth visibility but without paying for excessive valuations. Many investors have sought to invest in EVs, somewhat blindly without much consideration of risks associated with such new venture (i.e. Tesla being the poster child of this) nor the materiality of this new EV segment to a target company's overall business. Some popular investment options range from EV start-ups (e.g. Lucid, Faraday Future, NextEV/NIO, but these are mostly not listed and restricted to private equity space) to listed diversified companies with limited or no exposure to EVs but claiming to be entering this market mainly to excite investors and drum up their valuations. Even traditional automakers, especially those with a more aggressive EV product launch portfolio, have had their earnings outlook and valuations boosted on the EV theme. The car industry is already rather competitive and EV vehicle manufacturing itself won't be any different. We can already foresee the large number of new product introductions next year bringing down the premium that today's EV models command in the market (especially Tesla's). Add to the fact the high capex intensity and low margins (at best, high single digits) of the industry, we do not believe it would be profitable nor safe to invest in automakers.

The other obvious choice for investors is to invest in the raw materials that are crucial to producing EV batteries. These main commodities include lithium, cobalt, nickel and graphite, whose prices have all sky rocketed as the market anticipates an explosive demand for these raw materials in the coming years. While it has been an attractive opportunity to invest in these commodities, either directly or through a listed miner/producer, getting the timing right and predicting the commodity price trajectory is very difficult, and often, the risk-return profile is unjustified in our view. Commodities, as the term suggests, eventually become commoditised... we anticipate similar dynamics of a typical material cycle to prevail for these commodities: whilst, the expectations for significant increase in demand volume for these



materials have driven prices higher, we do not believe these will be sustainable. At current prices and with expectations for future tightness in supply, these drivers are already enticing operators to plough in investment into further capacity expansion and new reserve exploration. As it is often in a commodity cycle, capex into expansion and new reserve explorations take place when the commodity prices are high and often at their peak, but due to the long project cycles, rarely it is the case that such new capacity arrives in time to benefit from higher commodity prices. As new capacity enters the market, inevitably prices quickly adjust down and negotiating power shifts against suppliers/producers, who then fails to capture the elusive high prices and struggles to recoup the sunk investment costs. Project execution and capital discipline are key for raw material producers/miners and we have yet to see a credible mining operation in our space with meaningful exposure to these commodities.

There is one additional factor to consider on IT supply chain commodities: the rapid pace of innovation in this space often pushes manufacturers to find ways to improve input efficiency ratio and/or alternative materials to avoid paying excessive peak prices for raw materials. Case in point, we are already seeing leading battery makers developing ways to increase energy density (i.e. increasing power storage per unit of raw material used), developing alternatives to graphite by switching to silicon, and sourcing cobalt through recycled materials. At the current juncture, we believe the long-term price trend is most likely down for these commodities, but we have less conviction on their trajectory paths. Thus, we prefer not to expose the portfolio to investments that are mostly dependent on factors that can be highly volatile and that we cannot forecast.

Our investment philosophy has always been to invest in sustainably profitable companies rather than solely on the promise of distant future earnings. The key is to seek companies in these high growth industries with better operational visibility which we can invest without overpaying for such opportunities. Extending our thought process and looking deeper into this theme, we focused our efforts in identifying companies with meaningful revenue/earnings exposure to EVs now or in the foreseeable future. In terms of actionable ideas identified in this area, we are presently invested in the following:

Samsung SDI (006400 KS): a world-leading battery maker, amongst the industry top 3 technologically with Panasonic and LG Chem, but it is the most pure-play exposure to batteries amongst the three. The Company started mainly producing smaller-sized batteries for consumer electronics (e.g. smartphones) before making in-roads into EV batteries and it also holds a 15.2% stake in Samsung Display that is the near monopoly player in smartphone OLED screens. The EV battery world will likely evolve and split into China vs the rest of the world. China currently has the largest EV volume production in the world, but the vehicles are mostly low-end, and their lower specs batteries are supplied by Chinese battery makers. However, non-Chinese automakers will mostly continue to source their batteries from the three aforementioned Japanese and Korean companies. We acknowledge that recent news of Volkswagen (VW) announcing the enlisting of one of the China's largest battery makers, Contemporary Amperex Technology Limited (CATL) as a future supplier, can cast doubt to this assumption but it is our view that VW being a global producer with significant exposure to many price sensitive emerging markets, has done so for purposes of supplying its lower-end EV models designed for such markets. Currently, Samsung SDI's



EV battery production is not yet a profitable business due to the sub-scale volume, but with the upcoming wave of EV launches, the company will gain scale and through its superior technology, enjoy a more competitive cost/kWh structure. Profitability should improve quarter on quarter, translating into significant margin expansion and thus making it an attractive investment.

Our preference in seeking exposure to EV through a technology leader in batteries is anchored on the fact that its operation offers higher earnings visibility. Its final product is imperative for an EV as it anchors many of the performance features that consumers assign a high degree of importance to: travel distance range, speed of re-charging, reliability and safety, amongst others. The Company's technology expertise adds value over the raw material commodities, thus enhancing its industry competitiveness and earnings sustainability. In addition, its stake in Samsung's OLED business offers investors a high-quality earnings stream with visible growth and the overall listed entity reasonably profitable. We believe that a Company with a strong competitive position in a segment of the market with significant disruption potential and trading at 12x FY18 P/E offers a far more compelling investment case than any raw materials producer or automaker that we have yet to come across.

Nexteer Automotive (1316 HK): a world-leading steering component supplier to the global automakers, the Company started as a division within GM that was later spun off as an independent entity to supply to other automakers and had since diversified their customer exposure to automakers in Europe and Asia. Currently, the main driving force behind the Company's sales is the transition from Hydraulic Power Steering (HPS) to Electronic Power Steering (EPS), which has a higher selling price and gross margin. Naturally, the Company being a steering specialist, has already invested in R&D in upcoming technologies such as steer-by-wire and Advanced Drive-Assistance Systems (ADAS) that will be increasingly adopted by EVs in the future. As oppose to some other components in the petrol-powered vehicles, such as exhaust pipes, engine blocks etc., the steering mechanism will not be displaced in an EV. Contrary to common misconception, steer-by-wire eliminates the steering column (i.e. mechanical linkage from the steering wheel to the steering rack), but not all mechanical linkages to the point where steering components are not needed. In addition, the Company has been developing technologies such as Quiet Wheel (i.e. the steering wheel does not turn in autonomous driving mode), Steering-on-Demand (i.e. steering wheel can be stowed when not needed), cyber security (i.e. guard against hacking by prioritizing true motion commands) etc. All these are potential functions that will be fully utilized and highly valued, in an autonomous driving world in the not too distant future. The Company has a large backlog order book to support its business growth even before EV/ADAS related revenue became the majority of its revenue sources, and it currently trades at 10x FY18 P/E.

We are continuously in search for more companies exposed to the EV theme, and as the cars become increasingly electrified, what we found is that companies that have built a high competence and large scale in the smartphone industry can transfer their technology into the automotive sector. We have already invested or previously invested in some of these companies, for example, WIN Semiconductors produces communication and optical sensing chips (cars will be able to communicate, transmit data, and optical sensing will be used as 'eyes' for artificial intelligence analytics), Samsung SDI's equity stake in Samsung Display (not-listed) which is mostly exposed to OLED screens (OLED's flexible features allow a better and more



packaging for touch screen user interface in an EV interior), FLEXium and Zhen Ding produce flexible PCB (allows better electrical packaging), SK Hynix and Silicon Motion are exposed to memory storage (demand will increase as the cars become more data driven). Most of these companies' current EV/ADAS related revenue is limited, and to the extent they are held in the portfolio (i.e. FLEXium, Zhen Ding, SK Hynix and Silicon Motion), it is for reasons/drivers independent of their EV exposure and related future revenue potential. However, we will closely monitor the progress of the industry and of these companies' individual operations and calibrate our weight in these holdings accordingly.

¹ Google search "Elon Musk Tesla five tweets" for more information