

Dialogue, Debate, and Discussion

New Industry Paradigms May Overwhelm Dynamic Capabilities: Different Competitive Dynamics Around Tesla and Chinese EV Start-Ups

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ABSTRACT This is a follow-up discussion about the Chinese electric vehicle (EV) sector, in particular the relative prospects of traditional automotive manufacturers and new ‘species’, four years after our last conversation on this topic (Jiang & Lu, 2018). It is also a response to Murmann and Vogt’s (2022) latest article, which goes beyond Teece’s (2019) focus on dynamic capabilities and constructs a systematic framework of firm capabilities to understand the competitive dynamics during a transformational shift of products.

KEYWORDS dynamic capabilities, electric vehicle, industry paradigm, startup

ACCEPTED BY Deputy Editor Can Huang

INTRODUCTION

This is a follow-up discussion about the Chinese electric vehicle (EV) sector, in particular the relative prospects of traditional automotive manufacturers and new ‘species’, four years after our last conversation on this topic (Jiang & Lu, 2018). It is also a response to Murmann and Vogt’s (2022) latest article, which goes beyond Teece’s (2018) focus on dynamic capabilities and constructs a systematic framework of firm capabilities to understand the competitive dynamics during a transformational shift of products.

While acknowledging the predictive implications of integrating both dynamic capabilities of incumbents and ordinary capabilities of entrants, Lu notes that the on-going paradigm (Dosi, 1982) shift may outweigh dynamic capabilities in reshaping the prospects of different players in the EV industry at least in China. As Chinese startups are turning the whole approach to conduct businesses around EVs in completely new directions at a very fast pace, no incumbent may have

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dynamic capabilities, especially sensing capabilities sufficiently strong to detect and exploit, so many new possibilities that may be unthinkable outside this country. As a result, competitive dynamics between new ventures, diversifying entrants, and incumbents are quite different in China and elsewhere. On this basis, Lu holds his previous prediction (Jiang & Lu, 2018) that local ‘new species’ – startups that strive to introduce a sweeping change of industry paradigm – are more likely to win out in the Chinese EV market if not globally.

HONG JIANG: Murmann and Vogt (2022) argue that the likelihood that an incumbent changes itself and takes a leadership position in new technologies via dynamic capabilities depends on how quickly startups and diversifying entrants build ordinary capabilities to offer the new technologies at scale. They take the EV industry as an illustrative example. They identify 26 ordinary capabilities required to offer EVs and evaluate the relative strength of VW (incumbent), Tesla (new venture startup), and Google (diversifying entrant) on each capability. In light of what you know about the Chinese EV scene, does their framework make sense?

FENG LU: I appreciate their integrated lens to consider simultaneously dynamic capabilities of incumbents and ordinary capabilities of entrants in analyzing the competitive dynamics around a new product. This is indeed a useful extension of Teece’s framework of dynamic capabilities. Teece (2018) links the fate of an automotive incumbent throughout the industry transformation from traditional automotives to EVs solely to whether it has strong dynamic capabilities to adapt to change. Murmann and Vogt (2022) go further to suggest that we compare the capabilities of incumbents versus entrants to understand the broad picture of dynamic competition. I applaud their new framework which allows us to more accurately predict which players will grow based on firm-level capabilities, but I would like to go even further away from firm-level capabilities when thinking about the forces shaping the competitive landscape of EV industry. One of the points Christensen makes in his works on disruptive innovation (1997, Christensen & Overdorf, 2000) is that previously successful big incumbents are not so good at coping with disruptive challenges. I expect what will take place in the Chinese EV sector resembles very much the situation Christensen describes: large Chinese traditional car makers would be less capable of and slower in accommodating the industry-level transformation initiated by startups. In dynamic capability terms, none of the incumbents can address the shift from traditional automotives to EVs via dynamic capabilities.

HONG JIANG: Murmann and Vogt (2022) list 26 ordinary capabilities in three broad categories needed for EV providers and find that incumbents overall are better positioned in terms of ordinary capabilities. It sounds that you don't think their assessment is realistic. Do you mean that industry paradigm shift will be so disruptive that incumbents cannot effectively jump from traditional trajectory to the new EV trajectory, even if they are stronger than entrants on ordinary capabilities?

FENG LIU: You are picking up what I want to suggest. Categorization of ordinary capabilities of EV firms and comparison of capabilities across firms make sense, but I am afraid that such a categorization based on the capabilities identified presently may make us overlook some capabilities that are unforeseen but critical in the future. As Chinese EV startups try to fundamentally alter the playing field, it is highly possible that the capabilities required for what they are doing are not the sheer sum of ordinary capabilities in Murmann and Vogt's list. In addition, what distinguishes new ventures the most from other players are not ordinary capabilities but leaders' mindset and consequent strategic thinking about how things are related to produce value in the new ecosystem. Just as Christensen emphasizes, despite better resources and stronger capabilities for sustaining innovation, incumbents find it hard leveraging these resources and capabilities to beat startups in the foothold market due to bounded mindset, since many incumbents' most serious disabilities in coping with change reside 'in the less visible, background processes that support decisions' (Christensen & Overdorf, 2000).

HONG JIANG: It is enlightening to analogize the transformation in the automotive industry to a process of disruptive innovation. Christensen attributes the success of disruptive innovators – Chinese EV startups in your descriptions – to the fact that incumbents frequently overlook the foothold market disrupters target. Yet, this seems not to be the case between automotive incumbents and EV startups, as incumbents are aware of the significance of EV market and actively explored the new opportunities. Under this condition, why do you still think incumbents will be inferior to new entrants with respect to would-be disruptive strategic thinking?

FENG LIU: Because of the degree and the pace of industrial change, automotive incumbents are unlikely to reframe their strategic thinking to fit the ever-changing industry facts. EVs involve not only just electrification technologies but also a range of new directions such as AI (artificial intelligence)-based interconnectivity and autonomous

driving. These new directions, so closely related to ICT (information and communication technologies) and AI technologies, may lead to fundamental changes in the industry's technological base and the focus of technological competition. The technological distances between traditional automotives and IT-powered EVs are thus too great for incumbents to come up with innovative strategic thinking that rivals that of startups born with a new cognitive frame. Of course, the dazzling pace of change and ever-shifting industry paradigm challenged both incumbents and startups. One stage started and ended very soon, followed by another stage and a bunch of new entrants that replaced the previous ones. This is partly why I attach more importance to industry-level forces than Murmann and Vogt (2022). What we see in many other industries during the last century is that most successful companies a hundred years ago have disappeared from the success list today as a result of powerful waves of industry transformation. In the Chinese EV sector, this process of entering and exiting is compressed into an even shorter period of time.

HONG JIANG: What is your sense of the actual number of startups in China right now? Murmann and Vogt (2022), drawing on Song, Suzuki, and Aou (2019), write that 500 startups had registered in China to develop EVs by 2019. They also cite an article, reporting that there were 321,000 new Chinese businesses that registered themselves in the entire 'new energy vehicle' sector in mid-2021 after 78,000 entered in 2020 and 81,000 entered from January to mid-August in 2021. Yet, as intensive entries and exits characterize this sector, the overall number of new businesses may differ significantly from the actual number of active startups.

FENG LIU: I estimate that there are approximately 100–200 startups now trying to produce EVs in China. More importantly, as industry paradigm shifted quickly, early entrants and late entrants – even those starting businesses in 2020 and those in 2021 – can vary wildly in technological trajectory.

HONG JIANG: May I put it this way: Chinese EV startups, focusing on business model and service innovation, have explored many different innovative directions and experienced several paradigm shifts during a short period. While the sector is populated by new ventures, these startups belong to several subgroups that corresponded to different waves of entry and valued different trajectories.

FENG LIU: Yes. Their competition is not bounded within a dominant trajectory but across trajectories.

- HONG JIANG:** Where do these startups' ordinary capabilities to make cars come from?
- FENG LIU:** NIO initially outsourced manufacturing from JAC. Now spinoffs are more and more in the sector and their founders are familiar with ordinary capability building in former employers. The founder of Hozon New Energy Automobile, one of the startups delivering the most EVs in China from January to March this year (see Appendix I), used to lead new energy vehicle projects when he worked in Chery Automobile. Many of the executives in Hozon, including the one in charge of manufacturing, were from Chery. As a result, it was not a challenge for Hozon to build ordinary capabilities. The challenge is how to reach a significant scale as soon as possible.
- HONG JIANG:** Given the large number of entries, do you think an industry-wide shakeout will come soon in the Chinese EV space similar to what Klepper (2005) documents for the US automotive industry in the early 20th century?
- FENG LIU:** It is too early to prejudge if there will be a shakeout in the near future. When you wonder whether a shakeout is coming, you make an implicit assumption that the technological trajectory will not change significantly today and beyond. If so, as a handful of early entrants assume leadership position following the existing trajectory, new entries will fall sharply, and previous entrants will be squeezed out in large quantities. Then we can witness a process of shakeout. However, I believe the technological trajectory and industry paradigm of Chinese EV sector will keep changing.
- HONG JIANG:** According to what you said, the Chinese EV sector is still far away from a shakeout considering the fast-shifting paradigm and resulting intensive entries. Or, in other words, this sector has already gone through several rounds of extensive local in-and-outs as paradigm shifted, but the shakeout stage is not yet to come since no dominant design has been established. By 'local' I mean these in-and-outs occurred around short-term popular trajectories rather than around the emergence of a promising industry-wide dominant design. Radical changes were introduced to technological trajectory every or every other year. Each new trajectory introduced caused a wave of local in-and-outs – a large number of new entries aiming at capturing the opportunities offered by the new trajectory and precipitous increase of exits under the formerly popular trajectory.

FENG LIU: Yes. In fact, I do not think Tesla has experienced so many rounds of paradigm shifts as Chinese startups although it was founded earlier.

HONG JIANG: Since you think the pace of EV paradigm shift is the fastest in China, where Chinese startups have to survive more variation and selection to thrive till the end, is there any chance that certain Chinese EV startups build as strong a brand as Tesla's after a shakeout? Now stock markets value Tesla more than all major international car companies combined (Companiesmarketcap.com, 2022). Investors believe that Tesla will beat incumbents and gain market share at their expense, while Ford, GM, VW, and Mercedes cannot change fast enough. While the major Chinese EV startups (NIO, Xpeng, and Li Auto) have seen high increases in their valuations, their valuations are still lower than Chinese incumbent firms such as SAIC and Great Wall Motors. Do you agree with the assessment?

FENG LIU: No, and I see the possibility of a Chinese EV brand comparable to, if not stronger than Tesla will emerge after frequent paradigm shifts and shakeouts. Among the Chinese automotive firms that produce only EVs, the most valuable in 2021 was BYD^[1], followed by NIO and Xpeng each of which had a market value higher than most traditional automotive makers. While SAIC and Great Wall Motors exceeded NIO and Xpeng in the market value, as you said before, all the other traditional automotive incumbents failed to do so. In addition to valuations, I suggest we pay more attention to the relative impact of different automotive firms on customer cognition in the Chinese market. If we ask an ordinary consumer to tell us the first EV brand that comes up to his/her mind, it is very much likely that local EV startups far outweigh incumbents. As far as I know, some industry insiders have conducted an investigation among children in primary schools and kindergartens to find out their impressions of automotive brands. These children thought of new brands such as NIO and Xpeng in the first place, whereas traditional brands were much less mentioned. An EV startup founder told me that he thought the long-established brands, for instance BMW and Mercedes-Benz, are 'declining aristocracy with final glory'. His view may be a bit biased but reflects the thoughts of some insiders at least.

HONG JIANG: So, some Chinese EV industry insiders do not think that new local EV brands are weaker than, if not superior to, existing automotive brands. How about the comparative strength of local startups against Tesla, which most people deem as a future global leader?

FENG LIU: Surviving Chinese EV startups have outperformed Tesla in terms of some innovative services after so many times of paradigm shifts and ‘local’ shakeouts. Tesla played the role of industry torchbearer and used to have predominance on the Chinese EV market. Chinese started public R&D on new energy vehicles long ago, but Tesla was the first to turn the idea of EVs into actual products and offer them at scale. Nevertheless, Chinese local startups are no longer peripheral and challenge the leadership position of Tesla. Some demonstrate potential advantages over Tesla in business model and services, particularly internet-based services tailored to Chinese needs. For example, Chinese customers reckon that the in-car navigation systems in EVs made by NIO and Xpeng are far more friendly than the one provided by Tesla. Some find that they can rely on in-car navigation alone when driving a NIO’s or Xpeng’s EV for a long distance but have to use their cell-phones for navigation when driving a Tesla’s car. (More detailed discussions about how leading Chinese EV startups differentiated themselves can be found in Appendix II.)

HONG JIANG: Could you please provide a more detailed example of their potential advantages? In our last discussion you pointed to the example of a service that uses the trunk of EV as a delivery site for packages as a new kind of business model using automotives. How did these business models progress in the last four years?

FENG LIU: Chinese startups today design smart EVs to be an intelligent terminal of a new large service system. For instance, if a consumer is going to travel, an intelligent system will arrange a smart EV for him/her in advance. When the consumer lands at the destination, s/he will find the EV ready to go and all the services s/he needs during the tour will be provided by the system and via the smart EV. EV is just a component, or a subsystem, and not even the most important component of the overall service system. Just like the ecology around smart phones, a new ecosystem around smart EVs is what Chinese startups target.

HONG JIANG: Then smart EVs would be simply a hardware in a large system of internet-based solutions that cover a range of cross-sector services. It sounds that internet plays a pivotal role. How do you evaluate the competitiveness of diversifying internet giants into the EV sector?

FENG LIU: This is an obsolete question to which the answer is already quite clear. Diversifying Chinese internet giants such as Tencent and Alibaba have no chance to beat local new ventures. Industry insiders shared with me an interesting analogy: traditional automotive

incumbents competed in a one-dimension situation, diversifying internet companies are competing in a two-dimension scenario, and new ventures strive to create a new three-dimension competitive landscape. Local startups with disruptive strategic thinking are actively pursuing this direction. The likelihood that an ecosystem emerges and gets mature around EVs is much higher in China than in the US.

HONG JIANG: Who will capture more from the ecosystem, EV manufacturers or others? In the PC system, it was microprocessor (Intel) and operating system makers (Microsoft) that captured the most value.

FENG LIU: The firms that design and handle the overall system, of course.

HONG JIANG: What are the major players that seek to produce the overall system?

FENG LIU: Except integrators like NIO and Xpeng, there are also some specialized system developers. I know one that is called New Space. It was still in the very early stage of system development but has launched the first demo recently.

HONG JIANG: In the overall system that integrates every service, the autonomous driving platform is likely to be the hub. The majority of autonomous driving startups come from China and the US (Crunchbase, 2022). Do you foresee that there will be a winner-takes-it-all dynamic or do you think multiple autonomous driving system will coexist?

FENG LIU: So far, I do not see convergence in China between autonomous driving platforms. Every major player is scrambling to develop its own platform with the ambition to be the next unchangeable 'Intel Inside'. Some specialized autonomous driving platform developers were founded to explore this opportunity. For instance, Gansha Wu, the former Director of Intel Labs China, resigned from Intel and cofounded Uisee Technology in 2016 to dwell into autonomous driving. Huawei is also moving towards autonomous driving networks. Obviously, it has no plan to get involved in automotive manufacturing but attempts to attract EV manufacturers as users of its own driving networks. Automotive manufacturers, on the other hand, are all highly watchful of becoming replaceable parts in an ecosystem centered on someone else's driving platform and losing the opportunity to capture the value created. Since every player realizes 'those who dominate the system dominate the industry', everyone bears the ambition to become part of 'Wintel' in the EV sector and meanwhile avoids contributing to the emergence of other players as 'Wintel'. As

far as I can see, driving platforms will not converge unless mandated by the government.

HONG JIANG: So, multiple autonomous driving platforms will coexist under market forces in the short term. Considering autonomous driving systems collect a large amount of data and naturally generate many issues of digital security, is it possible that the government intervenes to coordinate the development of one or more industry-wide standards for driving platforms, which eventually lead to a few dominant but interconnected platforms?

FENG LIU: Highly possible. Governments in every country realize the need to enhance digital security. The US government now takes smartphones, tablets, and personal computers supplied by Chinese firms as risky carriers of applications that collect sensitive data and threaten national security, as shown in Trump's and Biden's Executive Orders (The White House, 2021). The Data Security Law of China, which took effect in September 2021, also includes stringent data localization clauses. Tesla announced the establishment of local data center in China before this law was enacted. However, witnessing more and more Chinese high-tech companies subject to tighter scrutiny in the US, the Chinese government may reasonably strengthen regulation on foreign autonomous driving platform developers and complementary suppliers. Moreover, as Chinese startups push autonomous driving platforms to become a system connecting everyone and everything, I guess Tesla, or any foreign companies, will find it difficult to become the most central player in China. This has nothing to do with firm capabilities, but the sensitivity of data collected by autonomous driving platforms – indeed an internet of things which include not just personal data but geographical data and so on.

HONG JIANG: Since we are talking about system and software, I wonder to what extent leading Chinese EV firms have developed their software, including the autonomous driving software, in house, and to what extent they rely big tech companies such as Tencent and Alibaba for software. As a point of references, Tesla went alone in its software, while VW only made 10% of its software in 2019 and wants to increase its in-house software production to at least 60% by 2025.

FENG LIU: The leading Chinese EV firms you mentioned can match Tesla in terms of in-house software development. First, Tencent and Alibaba are falling behind in EV software. They used to have advantage in the previous stage featured by internet-connected EV software, which I summarized as a two-dimension competitive

scenario before. As EVs evolve from internet-connected vehicles to smart vehicles, they fail to maintain previous advantages. Second, the three leading startups set themselves apart by having the autonomous driving software developed in house. Each of the firms hires thousands of software developers and has established R&D centers in the US and Europe. Overall, they are not inferior to Tesla in software at all.

HONG JIANG: Given your high evaluation of Chinese EV startup's capabilities, how do you think of their prospects in the global market?

FENG LIU: Their global position can be partly reflected by the fact that many neighboring countries are seeking for collaboration with them. These countries include but not limited to Bangladesh, Hungary, Pakistan, and Serbia. Comparatively, Korean and Japanese automotive incumbents cannot keep up with the change according to some industry experts. European automotive manufacturer – the last aristocracy – will also decline in coming paradigm shifts due to their limited strategic thinking as I said before.

HONG JIANG: If we turn to Europe, we can find even stronger regulation over digital security that may keep foreign EV makers out of the door. In our last discussion, you said that US internet giants and automotive manufacturers, constrained by history and routines, distrust each other and can hardly collaborate to develop EVs. Can large European automotive incumbents accelerate EV software development and delay decline via external collaboration with local internet companies, which are weaker than their US peers? Or is collaboration between automotive incumbents and internet companies in Europe as hard as that in the US?

FENG LIU: Non-technical factors may play a major role there. Besides industry-level forces I emphasized before, social factors such as laws, policies, and consumer cognition are also significant. European automotive incumbents can maintain their market shares in Europe market if consumers' habits and cognition remain the same. Yet, there is no way they gain an advantageous position in the Chinese EV market. China is likely to become the lead market (Beise, 2004) of EVs and Chinese EV startups may successfully lead the next industry paradigm shift across the world, followed by other countries.

NOTES

- [1] BYD used to produce both internal combustion engine (ICE) automobiles and EVs. On April 3, 2021, the firm announced that it would quit from ICE automotive manufacturing starting in March 2022.

- [2] For instance, Fuquan Zhao, who is the honorary life president of FISITA (Fédération Internationale des Sociétés d'Ingénieurs des Techniques de l'Automobile) and the former vice president of the Geely Holding Group Ltd., has explained why and how software defines EVs on a couple of occasions. One report in Chinese can be found at <https://www.eet-china.com/mp/a115617.html>
- [3] 'Full-stack' is a term borrowed from the IT industry. 'Full-stack' development means that all the development of a focal product is conducted in house without external collaboration. According to an industry expert, the 'full-stack' development of an automatic driving system should include at least in-house development of high precision digital maps, development of software algorithms, and integration of software and hardware. From this view, Xpeng can hardly be deemed as a 'full-stack' developer since it sources part of algorithms from Desay SV, the largest Chinese automotive electric company.

APPENDIX I

Five Chinese Startups Delivering the Most EVs in March 2022

<i>Company</i>	<i>No. of EVs delivered in March</i>	<i>No. of EVs delivered in the first quarter</i>
Xpeng	15,414	34,561
Hozon Auto	12,026	30,152
Li Auto	11,034	31,716
Leapmotor	10,059	21,579
NIO	9,985	25,768

Data source: Electric Vehicle Users Alliance.

APPENDIX II

Chinese EV Startups Seeking For Localized Differentiation

There is a growing consensus among industry experts^[2] that EVs will be software defined, whereas traditional automotives are hardware defined. Differentiation of EVs thus mainly depends on software design and software-enabled services, rather than the quality of hardware. As a Deloitte report (2022) summarizes, given the rapid technological progress, practical range, and accessibility to charging infrastructure are no longer the key factors that influence user experience. Instead, the development of AI-enabled and internet-enabled functions based on special local needs and context, as well as a brand that highlights these functions, increasingly becomes the key factors for differentiation in the Chinese EV market. We find from secondary materials that NIO, Xpeng, and Li Auto, the three most well-known Chinese EV startups, have differentiated themselves from Tesla and between each other in terms of brand image, function design, sales model, navigation system, in-car intelligent virtual assistant, and connection to local life service platforms.

NIO, Xpeng, and Li Auto have successfully developed distinguished brand identities that help to establish relationships with target customers and to carve out a place in the competitive Chinese EV market. Unlike Tesla that aims to take lead position in top luxury brands, the three Chinese EV startups offer more affordable models and meanwhile differ from each other. NIO targets the upper middle class by providing high-quality personalized service throughout an EV's lifecycle. Xpeng stands out by emphasizing 'intelligence' as it is one of the earliest local EV companies to publicize the 'full-stack'^[3] development of an automatic driving system. Li Auto targets family users by producing mainly mid-size six-seat SUVs.

The three leading startups catered product designs to their special brand images. For example, Li Auto designed the functions of its first model, LI ONE, to be particularly appealing to family users. Considering families care more about long-distance traveling, LI ONE was designed to be an extended-range EV, of

which the NEDC (New European Driving Cycle) range reaches 1,080 km. To improve the experiences of family members other than the driver, Li Auto made not only the driver's seat but also the two second-row seats in LI ONE (a six-seat SUV) power seats. In addition, LI ONE is the first and so far the only EV model with hands-free voice assistant available in the entire space of a car, so that every family member finds it easy and comfortable to help themselves without asking the driver for help.

Chinese EV startups also launched a new sales model to improve the affordability of customers. NIO launched its battery leasing service in 2019. As battery pack is one of the most expensive EV components, this new model lowers the starting price of its EVs sharply. Take its ES6 SUV, for example, its starting price can drop from CNY 358,000 to 288,000 if a customer chooses to lease a battery. The rent of a 70 kWh battery pack is CNY 980 per month, which means that the price of buying a battery pack is the equivalent of about six-year rents.

Regarding AI-based and internet-based services, Chinese customers find that native EV startups have already done better than Tesla in some way. We find many online comments that the in-car navigation systems in EVs made by NIO and Xpeng are far more friendly than the one provided by Tesla. Some find that they can rely on in-car navigation alone when driving a NIO's or Xpeng's EV for a long distance but have to use their cellphones for navigation when driving a Tesla's car. Another service on which Chinese EV makers have outperformed Tesla in China is the in-car voice assistant. Some customers complain that they cannot even control the air conditioner using the 'useless' voice assistant in Tesla's cars, while they can 'do almost everything without touching any buttons' by talking directly to the voice assistants in NIO's cars and Xpeng P7. It may be because Tesla does not pay much attention to tailoring its AI to Chinese habits.

Tesla also seems to lag behind in satisfying Chinese users' need for connecting cars with daily life entertainments and services, especially for younger generations born to 'live on line'. As one industry expert said, Chinese EVs are now 'essentially smartphones on four wheels' (Shirouzu, 2022). Young Chinese EV users find that foreign brands are too far from their daily life and lifestyle. They are thus naturally attracted by native EVs, which can connect them to Alipay (payment app), Taobao (online shopping marketplace), music applications, and other popular local applications smoothly via in-car intelligent systems.

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