

August 21, 2023

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Testimony before the U.S.-China Economic and Security Review Commission
Hearing on “China’s Current Economy: Implications for Investors and Supply Chains”

China’s Electric Vehicle Industry’s Internationalization

Members of the Commission, I would like to thank you for the opportunity to appear before you today and testify on the state of China’s electric vehicle industry, its internationalization, and its implications for the United States and the world.

The shift towards electric vehicles (EVs) is already reshaping the automotive sector, calling into question the future of companies that have led the industry for decades, and bringing new geopolitical challenges to the fore. The shift has coincided and been fueled by China’s rise as an EV and EV component manufacturing hub and the rapid growth of Chinese companies in this sector. For several years we’ve seen these trends at play in China, the largest automotive market in the world, and now as exports grow, they will shape the industry globally.

The challenge posed to the United States by growing Chinese EV exports primarily pertains to cost. Vehicles made in China are affordable and of increasing quality, making them attractive to consumers worldwide. The cost of these vehicles could undermine production efforts underway in the United States and elsewhere as well as incumbent automotive companies. Solutions that aim to limit the negative impact of the growing importance of vehicles made in China should be evaluated on how they affect costs and competitiveness.

My testimony will proceed with discussing 1) the dynamics at play within China and the evolution of the industry 2) trends in exports 3) the internationalization of Chinese EV firms 4) implications for the United States and recommendations.

The Emergence of China’s Electric Vehicle Industry

China’s initiatives targeting the EV industry over the past 15 years are one of the most successful cases of industrial policy in the country’s recent history. Extensive government interventions, including subsidies, enabled the domestic industry and the market to grow at the same time.¹ The

¹ Ilaria Mazzocco, “Electrifying: How China Built an EV Industry in a Decade” (MacroPolo, July 8, 2020), <https://macropolo.org/analysis/china-electric-vehicle-ev-industry/>; Scott Kennedy, “China’s Risky Drive into New-Energy Vehicles,” CSIS Freeman Chair in China Studies and the CSIS Technology Policy Program, China Innovation Policy Series (Center for Strategic & International Studies (CSIS), November 2018).

timing of the policies was crucial because they coincided with and magnified technological advancements in battery technology and greater consumer acceptance of EVs. Importantly, many incumbent automotive companies dismissed EV technology until recently. Meanwhile, their Chinese competitors were quick to grasp the opportunity to technologically leapfrog multinational corporations with decades of IP accumulated in internal combustion engine technology.

There are challenges to replicating the experience gained in the EV sector in other industries. The hydrogen fuel cell vehicle industry may be an instructive case. The government has provided the industry with incentives similar to those made available to electric vehicle manufacturers for the same amount of time, but there have been no comparable breakthroughs in commercialization.

Other strategic sectors in China already receive significant industrial policy support, but the same type of large-scale commercialization strategy may not always be applicable. A cornerstone of EV policy was the deployment of subsidies that helped lower the cost of vehicles to consumers, combined with local government experimentation and support for producers. Catalyzing the consumer market will not be as easily applicable to other industries that the government considers strategic such as AI, advanced computing, or biotech. This does not mean that these industries will not continue to be the object of government interventions, but they will likely not be able to draw directly on lessons learned in the EV industry.

China is now by far the largest market for EVs, accounting for 60 percent of new vehicle registrations last year and 40 percent of the global electric car stock.² Most of the EVs sold in the country are produced there, as is a growing number of exported vehicles. China is also by far the main producer of lithium batteries globally, which are the main component in EVs. According to the IEA, the country accounts for 65 percent of battery production and 80 percent of cathode production, and the Department of Energy's estimate is even higher.³

As a result of policies supporting the industry, China is home to an outsized number of EV producers, as many as 300 in 2021, some successful, others less so.⁴ The industry should be heading towards consolidation, especially since the phasing out of purchase subsidies this year (sales taxes will continue to be waived until 2025).⁵ However, this may be complicated by the web of relationships between companies and local governments. Not only have local

² "Electric Vehicles," IEA, accessed August 10, 2023, <https://www.iea.org/energy-system/transport/electric-vehicles>.

³ IEA, "Global EV Outlook 2023" (Paris: IEA, April 2023), <https://www.iea.org/reports/global-ev-outlook-2023/trends-in-batteries>; White House, "Building Resilient Supply Chains, Revitalizing American Manufacturing, And Fostering Broad-Based Growth," 100-Day Reviews under Executive Order 14017 (White House, June 2021), <https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf>.

⁴ Automotive News China, "China to Consolidate Overcrowded Electric Vehicle Industry, Minister Says," *Automotive News*, September 13, 2021, sec. China, <https://www.autonews.com/china/china-consolidate-overcrowded-electric-vehicle-industry-minister-says>.

⁵ Mengnan Jiang, "China Ends Electric Vehicle Subsidies," *China Dialogue*, January 12, 2023, <https://chinadialogue.net/en/digest/china-ends-electric-vehicle-subsidies/>.

governments supported companies every step of the way through various types of support mechanisms, including tax breaks, and preferential procurement contracts, but they also are quite literally invested in their success. Several investment funds owned by local governments are stockholders or investors in EV companies. The Hefei city government's intervention to save the startup NIO in early 2020 when it was on the verge of bankruptcy is a good example of how this works.⁶

Chinese EV companies have different kinds of ownership structures including state-owned enterprises (for example SAIC or BAIC), private firms that are publicly traded (for example BYD or NIO), and a variety of joint ventures with foreign companies (for example Wuling-SAIC-GM). Several companies are listed on US stock exchanges (for example, NIO, XPeng, Li Auto, Polestar), although listing on other exchanges has not been an obstacle to raising funds internationally. For example, the American holding company Berkshire Hathaway owns a 10 percent stake in BYD, which is listed on the Hong Kong stock exchange. It is hard to say exactly how much access to international financial markets and foreign investment has contributed to the rise of these companies, but it would have likely been insufficient without other supporting factors.

There are other sources of domestic financing that have and continue to benefit EV manufacturers in China as well as companies in other strategic sectors. In addition to government investment funds (guidance funds), which have been particularly important in the semiconductor industry, below-market credit is widespread although challenging to quantify.⁷ Access to below-market equity and credit is not unique to the EV industry and is part of the broader Chinese ecosystem aimed at promoting manufacturing domestically.

Non-Chinese companies have benefitted from many of the same incentives aimed at supporting manufacturing as Chinese companies, especially at the local level. For example, Tesla's Gigafactory was granted a beneficial tax rate from the Shanghai government.⁸

Other sectors that have benefitted from industrial policy in China have followed a pattern of overinvestment and overcapacity followed by intense competition, which eventually led to a more select number of firms emerging as global leaders. This was the case in the solar industry for example, and the EV industry may be headed in a similar direction. Many companies that have benefitted from government support in China are now navigating the most competitive EV

⁶ Tom Hancock, "China's Communist Officials Are Turning Into Venture Capitalists," *Bloomberg Markets*, February 6, 2022, <https://www.bloomberg.com/news/features/2022-02-06/where-is-china-investing-communist-leaders-are-becoming-venture-capitalists>.

⁷ Gerard DiPippo et al., "Red Ink: Estimating Chinese Industrial Policy Spending in Comparative Perspective," May 23, 2022, <https://www.csis.org/analysis/red-ink-estimating-chinese-industrial-policy-spending-comparative-perspective>.

⁸ Craig Trudell, "Tesla Shanghai Factory Granted Beneficial Tax Rate Through 2023," *Bloomberg Tax*, February 8, 2021, <https://news.bloombergtax.com/daily-tax-report-international/tesla-shanghai-factory-granted-beneficial-tax-rate-through-2023>.

market in the world. It is indicative that several Chinese EV manufacturers have been reporting losses for years.⁹

The highly competitive field, combined with low consumer sentiment in China is contributing to a “price war” between EV companies. For example, the cost of a Model 3 Tesla in China fell by more than \$4,500 since January and NIO lowered prices by \$4,200 in June.¹⁰ This competition also provides a further incentive for companies to internationalize and gain a foothold in new markets where competition is less intense.

The Rise of EV Exports

In 2022, 35 percent of all exported electric cars originated from China, ten percentage points higher than the previous year. Most of the vehicles, and the batteries they are powered with, were destined for Europe where 16 percent of batteries and vehicles sold were made in China in 2022.¹¹

The data include non-Chinese companies. For example, the single largest exporter from China is the American company Tesla. The latter accounted for 40.25 percent of EV exports from China between January and April 2023, up from 36.5 percent in 2022.¹² Several other multinationals are expanding their presence in China and are already exporting or planning to export to other markets, including BMW, Renault, and Volkswagen.

This points to two concurrent trends: China is becoming a manufacturing export hub for multinational companies and Chinese-owned firms are becoming increasingly competitive and exporting more to new markets. The latter trend is leading some Chinese firms to seek manufacturing outside the country to better access those new markets as well.

There are two factors that fuel China’s rise as a manufacturing hub. First, there are cost advantages to producing EVs in China. Exact estimates are challenging because of differences in quality and size but as an example in 2022, 20 percent of electric car models on offer in China were priced at less than \$15,000. By comparison in 2022 in the United States and Europe there were no electric models on sale for less than \$20,000. According to some industry insiders,

⁹ For example, see: NIO, “NIO Annual Report on Form 20-F,” April 28, 2023, <https://ir.nio.com/static-files/a5408c40-1840-488c-9658-dcf5e21c9665>.

¹⁰ Evelyn Cheng, “Nio Cuts Prices for Its Cars — and Delays Business Expansion Plans,” *CNBC*, June 12, 2023, <https://www.cnbc.com/2023/06/12/nio-cuts-prices-for-its-cars-and-delays-business-expansion-plans.html>.

¹¹ IEA, “Global EV Outlook 2023.”

¹² Ilaria Mazzocco and Gregor Sebastian, “Electric Shock: Interpreting China’s EV Export Boom” (Center for Strategic & International Studies (CSIS), Forthcoming).

production in China may mean up to \$10,000 in savings.¹³ In 2022, battery pack prices were 24 percent lower in China than in the United States.¹⁴

Second, many multinationals operating in China have built up extensive manufacturing capacity in the county but have lost market share in recent years due to competition with Chinese brands. This means that they may continue to redirect production from China to other countries, especially while capacity in other markets is unable to meet soaring international demand.

Chinese firms also have large manufacturing capacity and are under increased pressure due to growing competition, which may be a further driver for exports. Exports by Chinese firms can be broken down into two large categories. Most exports to Europe consist of Western brands owned or produced by Chinese companies, such as Volvo, Polestar, Smart, and MG. In many cases, these brands were acquired years ago by Chinese firms.

Some Chinese brands are building on their successes at home and entering new markets. BYD is now the largest EV producer in the world, surpassing Tesla, and is expanding rapidly abroad.¹⁵ Chinese brands are especially popular in emerging markets, such as Southeast Asia. For example, Thailand was the third largest recipient of Chinese EV exports by quantity in 2022. This trend is driven by the availability of affordable and attractive car models. BYD has recently released a \$11,000 electric hatchback model, the Seagull, which is likely to appeal to many consumers.

As several countries in the Global South adopt EV promotion policies, Chinese firms are especially well-positioned to expand rapidly there given that non-Chinese manufacturers do not have low-cost offerings. Even in the more expensive segments, however, Chinese branding is gaining increasing popularity. In other words, these vehicles are not just cheap, they're attractive and functional. It is worth noting that foreign multinationals such as Volkswagen and GM used to dominate the Chinese market for internal combustion engine vehicles but are finding it hard to compete in the EV segment.

China is likely to continue to grow as an exporter of EVs thanks to the increasing competitiveness of Chinese EVs, cost advantages of production, and large production capacity in China. Since cost remains one of the biggest challenges to the adoption of EVs, an expansion of Chinese models will likely facilitate further penetration of EVs in the global market.

¹³ Joseph White, "China Has a 10,000 Euro Cost Advantage in Small EVs, Auto Supplier Says," *Reuters*, January 5, 2023, sec. Autos & Transportation, <https://www.reuters.com/business/autos-transportation/china-has-10000-euro-cost-advantage-small-evs-auto-supplier-says-2023-01-05/>.

¹⁴ "Lithium-Ion Battery Pack Prices Rise for First Time to an Average of \$151/KWh," *BloombergNEF* (blog), December 6, 2022, <https://about.bnef.com/blog/lithium-ion-battery-pack-prices-rise-for-first-time-to-an-average-of-151-kwh/>.

¹⁵ Meaghan Tobin and Lyric Li, "Chinese EV Giant BYD Overtakes Tesla, but Can It Crack the U.S. Market?," *Washington Post*, June 14, 2023, <https://www.washingtonpost.com/world/2023/06/13/china-byd-electric-vehicle-tesla-rival/>.

The Internationalization of China's EV Firms

In addition to leveraging economies of scale for export, Chinese companies are beginning to expand their manufacturing presence in third countries. Most new investments are planned in Europe, Southeast Asia (especially Thailand), and Brazil.¹⁶ The decision to open factories outside of China seems to follow from the increasing number of exports. By producing vehicles and batteries locally, companies can avoid tariffs and high transportation costs, benefit from host government incentives, and mitigate political backlash.

Some countries have been proactively trying to attract investment. For example, the Thai government announced several incentives for EV manufacturers including temporary corporate tax waivers last year.¹⁷ As a result, announced investments have reached \$2.2 billion so far in 2023, largely thanks to Chinese companies.¹⁸ At least six Chinese companies have opened or plan to open a factory in Thailand in the next couple of years. Other Southeast Asian countries, for example, Malaysia, are also trying to attract more Chinese investment as well. In Brazil, the current government has been openly championing a deal that will see BYD take over an old Ford plant.¹⁹ Great Wall Motors also has plans to open a factory in the South American country.²⁰ In both Thailand and Brazil, Chinese manufacturing plants could serve the broader region building on the existing manufacturing base and trade networks.

Even in Europe, imports from China are far more contentious than FDI, which is soaring in the battery segment. It is not immediately clear, however, whether Chinese firms will be able to maintain the same low prices abroad, especially in regions like Europe with high energy and labor costs.

Chinese battery manufacturers have expanded internationally far more quickly than EV manufacturers because they supply multinationals as well as Chinese companies.²¹ The battery industry is also more concentrated than the automotive one, and some players like CATL have expanded rapidly as demand soars.

¹⁶ Mazzocco and Sebastian, "Electric Shock: Interpreting China's EV Export Boom."

¹⁷ International Trade Administration of the United States of America, "Thailand Duty for Electric Vehicles," Market Intelligence, March 21, 2022, <https://www.trade.gov/market-intelligence/thailand-duty-electric-vehicles>.

¹⁸ Danny Lee and Patpicha Tanakasempipat, "Detroit of Asia Targets Battery Makers to Stay Ahead in EV Race," *Bloomberg*, July 17, 2023, <https://www.bloomberg.com/news/articles/2023-07-17/detroit-of-asia-targets-battery-makers-to-stay-ahead-in-ev-race>.

¹⁹ Simone Preissler Iglesias and Leonardo Lara, "Ford Shuts down in Brazil, and China's Top EV Maker Comes to the Rescue," *Bloomberg*, August 9, 2023, sec. China, <https://www.autonews.com/china/chinas-top-ev-maker-replaces-ford-brazil>.

²⁰ Gabriel Araujo, "China's GWM to Start Brazil Plant Operations in May 2024," *Reuters*, April 27, 2023, <https://www.reuters.com/business/autos-transportation/chinas-gwm-start-brazil-plant-operations-may-2024-2023-04-27/>.

²¹ Ilaria Mazzocco, "Domestic Incentives and the Internationalization of Chinese Manufacturing in the Wind, Electric Vehicle, and Battery Industries," Working Paper (UC Institute on Global Conflict and Cooperation, February 2023).

Europe has been the biggest recipient of these investments, with multiple battery companies investing or planning to invest in several countries in the region. For example, CATL owns a factory in Germany and is building another in Hungary. The expansion of battery companies was so significant that it was the driver of growth in greenfield investment from China into Europe in 2022.²² The United States has also become a destination for Chinese battery companies since the passing of the IRA, most notably the CATL-Ford collaboration and the planned Gotion factory in Michigan.

Battery manufacturers like CATL and to a lesser extent BYD, as well as some carmakers like NIO, have become more vertically integrated and making more investments to secure critical minerals. Investments into mineral mining and refining operations, mostly lithium, especially outside of China appear to have accelerated after 2017—consistent with growing demand for batteries and EVs.²³

The move towards vertical integration is not unique to Chinese automakers. Several Western carmakers have been trying to expand into the battery industry to capture more value-added as well. One of the more vertically integrated American companies, Tesla, has also invested in lithium refining.²⁴

Conclusion and Implications for U.S. Policymakers

Growing exports from China create a dilemma for policymakers: on the one hand, production in China can help reduce costs, benefiting consumers and enabling the electrification of the transportation sector. On the other, automotive manufacturing continues to be an important sector for many advanced economies, including the United States, and if more production were to relocate to China this could undermine domestic job creation and potentially lead to de-industrialization.

Opting to slow down the transition to electric vehicles and reduce incentives or cancel mandates for American automakers to invest in EVs would be counterproductive. The transition is well underway globally and the United States would be even more of a laggard if it tried to reverse it domestically. Complete insulation from competition would likely also make American companies even less competitive in the long term. Instead, policymakers should provide more incentives to advance a diversified and competitive industry and promote innovation—in line with the IRA. This will require a realistic assessment of supply chains as well as the trade-offs attached to trade policies. To this end, I recommend that policymakers:

- 1- Identify under what conditions Chinese companies can play a role in American EV supply chains

²² Agatha Kratz et al., “Chinese FDI in Europe: 2022 Update” (Merics, May 9, 2023), <https://rhg.com/research/chinese-fdi-in-europe-2022-update/>.

²³ Ning Xu, “一年布局三个项目，宁德时代手里到底有多少矿？ [Three Projects in One Year, How Many Mines Does CATL Actually Own?],” STCN, March 23, 2023, <https://www.stcn.com/article/detail/822782.html>.

²⁴ Tesla, “Tesla Lithium Refinery Groundbreaking,” Tesla, May 8, 2023, <https://www.tesla.com/blog/tesla-lithium-refinery-groundbreaking>.

The current position of Chinese firms (especially in the battery segment) means that it will be extremely challenging to create affordable, competitive products in the United States or elsewhere without any reliance on Chinese supply chains in the medium term. Clarifying when and under what conditions, and for how long such integration is acceptable could be helpful for companies navigating this space. In practice, this may mean welcoming some Chinese FDI into the United States when it meets high standards for labor and environmental conditions and helps meet supply chain diversification goals.

- 2- Explore trade tools to promote supply chain diversification in the EV sector without raising costs further

The United States already levies relatively high tariffs on car imports from China, 27.5 percent. This barrier will make it hard for Chinese companies to export to the United States but not impossible. There are other mechanisms that could be used to incentivize diversification, including a potential carbon tariff which would have the benefit of incentivizing manufacturers in China to lower their carbon footprint. However, given the current inflationary environment and the imperative to maintain competitive costs, any additional tariffs should be considered against the type of cost increase it would impose on consumers and gains in potential domestic investment and de-risking.

- 3- Coordinate with partner countries that are facing a similar dilemma to avoid a tariff war that could undermine broader diplomatic relations

This is not a uniquely American challenge. The European Union and Britain, which have lower tariffs and higher sales rates of EVs, are already facing an influx of imports from China. There may be further opportunities for coordination and dialogue with countries that the United States is already engaging with on the topic of de-risking.

Ultimately, policymakers will need to balance policies aimed at capturing greater shares of the economic benefits from decarbonization by incentivizing further domestic innovation without slowing the deployment of EVs and while maintaining a stable international system.