

The rise of the electric vehicle in China and its impact in the EU

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Rationale

China's electric vehicle sector has recently aroused considerable interest thanks to its rapid growth and current dominance of the global market. Given the importance of the automotive sector in Spain and the European Union (EU), and the recent introduction of tariffs, it is worth exploring the factors behind this rise.

Takeaways

- Battery electric vehicle (BEV) market penetration in the EU has grown notably in recent years: in 2023 BEVs accounted for 15% of all vehicles sold (5.4% in Spain), a figure well above the 1.9% recorded in 2019 (0.7% in Spain).
- China has secured its status as the world's leading electric vehicle manufacturer and exporter, its output proving particularly popular in the European market. As a consequence, the market share of BEVs made in China rose from 0.4% of new BEV registrations in 2019 to 20% in 2023.
- The success of Chinese BEV exports rests on lower manufacturing costs, thanks largely to China's control over the supply chain, government support policies at various stages of production and the country's early embrace of electric vehicles.

Keywords

Electric vehicles, international trade, subsidies, China, input-output analysis.

JEL classification

F1, L52, L62.

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Introduction

China's remarkable rise as a battery electric vehicle (BEV) manufacturer and exporter has sparked considerable interest. The supply of relatively affordable Chinese electric vehicles could help fast-track the transition of the global, European and Spanish economies towards a decarbonised transport sector. However, many policymakers have voiced concerns over lavish public subsidies to the Chinese BEV sector and their potential adverse impact on manufacturers elsewhere (particularly in Europe).

Memories of the rapid decline of Europe's solar panel industry under pressure from Chinese competition a decade ago have only served to exacerbate these concerns.¹ This time, moreover, the economic fallout could be far worse, given that the automotive industry is much larger, representing around 10% of the EU manufacturing sector's gross value added and 8% of employment in 2021.

Against this backdrop, in October 2023 the European Commission initiated an anti-subsidy investigation to analyse state aid in the Chinese electric vehicle sector. In response to the findings of the investigation on subsidies outside the scope of the international rules² throughout the entire BEV value chain, in July 2024 the EU Commission presented a proposal to impose provisional duties on electric vehicles imported from China. Such duties have since been adjusted downwards. Thus, the proposal to impose definitive countervailing duties that could rise to 36.3% on such imports was ratified in October 2024.³ Other countries, such as the United States and Canada, have also applied or recently announced duties of up to 100%.

This article looks at China's recent rise as an electric vehicle manufacturer (Section 1), the factors behind its success (Section 2) and some possible implications for the EU (Section 3).

China's export boom

In 2023 China confirmed its status as the world's leading electric vehicle manufacturer and exporter. With more than 1.5 million units, China exported six times more BEVs in 2023 than in

1 GriEger (2023).

2 See the "Agreement on subsidies and countervailing measures" adopted as part of the Uruguay Round agreements: https://www.wto.org/english/docs_e/legal_e/legal_e.htm#subsidies.

3 On 4 October the EU Member States decided to support the European Commission's definitive countervailing duties proposal (European Commission, 2024a). Tailored to each manufacturer, the duties seek to offset the Chinese subsidies and restore a level playing field in line with World Trade Organization rules. Based on the definitive proposal published in August, these duties could stand between the 17% duty levied on BYD and the 36.3% imposed on the manufacturers who refused to cooperate with the investigation (European Commission, 2024b). Although the final text is pending publication, it is expected that these duties will be cut slightly in light of the submission of additional evidence by the affected firms.

2019. Worldwide, at end-2023 China accounted for 29% of all BEV exports, compared with South Korea (21%) and Germany (15%) (see Chart 1.a). The EU is the main export market for Chinese-made BEVs, representing around 40% of China's total BEV export revenues (see Chart 1.b).

In the space of just four years, China's share of the EU's BEV imports rose from 1% in 2019 to more than half of all of the BEVs entering the EU in 2023 (see Chart 1.c), and almost 15% if intra-EU imports are taken into account. Chinese-made BEVs have secured a significant foothold in Spain, France and Germany.⁴ Thus, more than half of Spain's BEV imports come from China, as compared with 16% in Germany and France and around 5% in Italy.⁵ By contrast, the penetration rate of Chinese electric vehicles in the United States is more limited (2%) (see Chart 1.b).⁶

Meanwhile, the EU's BEV market has shown strong momentum in recent years. In 2023 BEVs accounted for over 15% of all vehicle sales in the EU (5%, 4%, 17% and 18% in Spain, Italy, France and Germany, respectively), compared with a mere 1.9% in 2019.⁷ Most of the EU's BEV sales are of vehicles made in the region. However, according to industry reports, the share of Chinese-manufactured BEVs in total BEV registrations in the EU rose from 0.4% in 2019 to 19.5% in 2023.⁸

Of these BEV sales, some are electric vehicles sold in Europe by Chinese-owned brands, while others are jointly owned by Chinese and European producers, or are US brands that supply the European markets from China.⁹ The latter account for a sizeable share of the EU's total electric vehicle sales: for example, in 2023 the electric vehicles manufactured in China by Tesla and Renault-Dacia represented 5.5% and 3.9%, respectively, of all BEVs sold in the EU. For its part, Chinese brands' EU market share was 8% in 2023.¹⁰

Factors behind the rise of China's EV industry

The success of China's exports rests on the country's early embrace of BEVs, its fully controlled supply chain (particularly in terms of raw material extraction and battery manufacture) and the roll-out of government support policies at different stages of production. All of this has enabled China to leverage economies of scale, technological advances and cost advantages.

4 In 2023 around 27% of China's BEV exports to Europe were made to Belgium, from where they are often delivered to other European countries. See Mazzocco and Sebastian (2023).

5 Battery electric vehicle imports (code HS 870380). Average of the imports recorded by European customs departments according to the Trade Data Monitor and the bilateral exports reported by the Chinese government.

6 The Inflation Reduction Act, passed in the United States in 2022, seeks to promote, among other matters, the manufacture of clean energy-related components, such as batteries for electric cars. Moreover, electric vehicle buyers qualify for a tax credit of up to \$7,500, provided they meet certain local content requirements. See Duthoit (2023).

7 Based on European Alternative Fuels Observatory data.

8 Note that while the trade data (exports and imports) referred to in the preceding paragraphs come from the Trade Data Monitor, the sales figures are based on new registrations, obtained from sources such as Dataforce and the European Alternative Fuel Observatory.

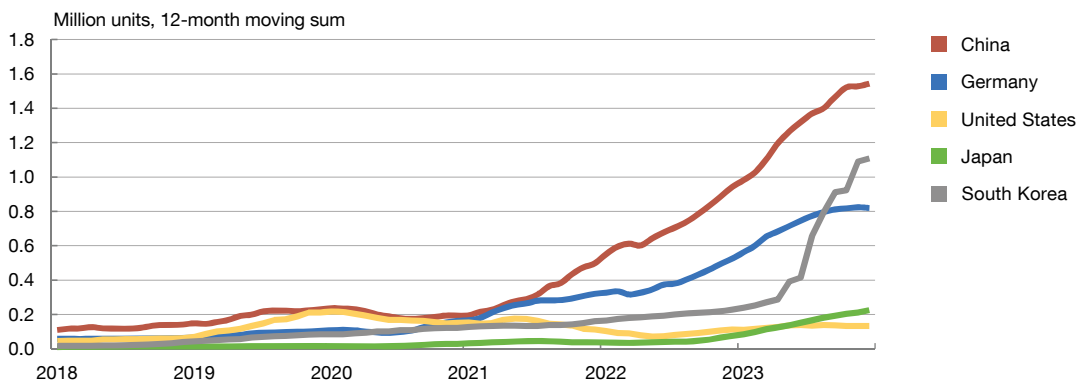
9 Examples of Chinese brands include BYD, MG and Polestar, alongside other smaller Chinese-owned firms. Brands jointly owned by Chinese and foreign capital exporting to the EU include Tesla, Renault-Dacia, BMW, Smart, Volvo and Cupra. See Transport & Environment, 2024b, for further details.

10 Transport & Environment (2024a, 2024b).

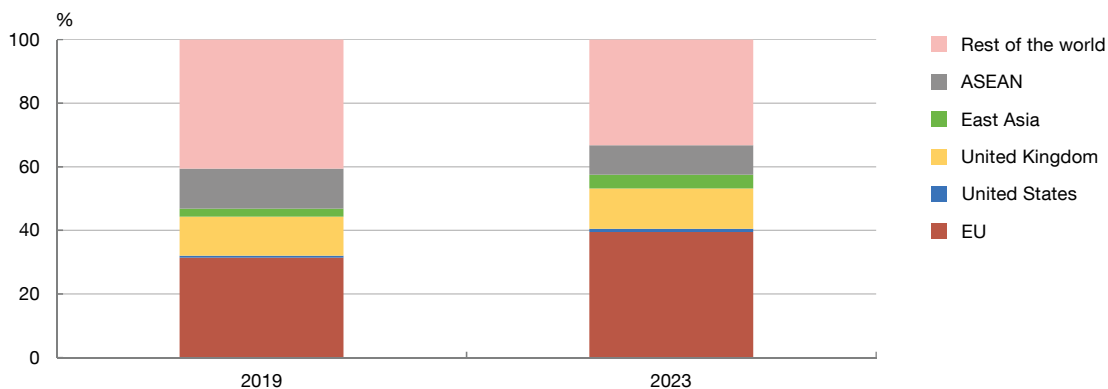
Chart 1

China has secured its position as a leading electric vehicle manufacturer and exporter

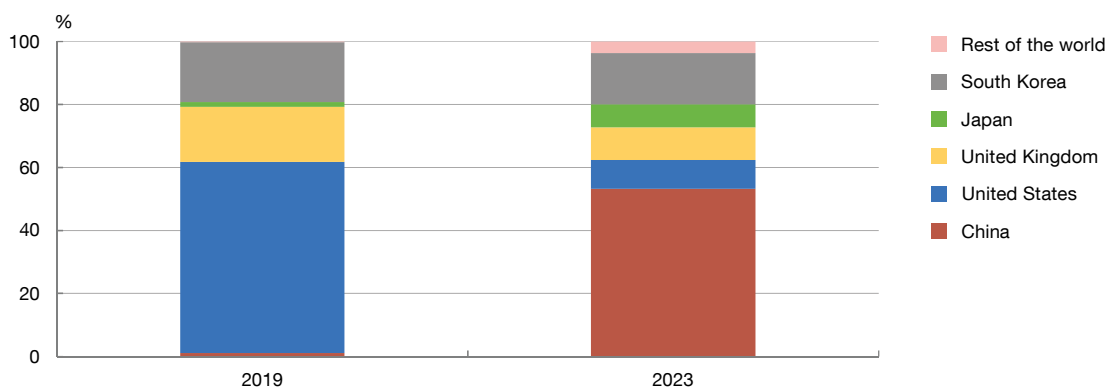
1.a Main exporting countries' battery electric vehicle exports



1.b Battery electric vehicle exports from China (a)



1.c Battery electric vehicle imports by the EU (b)



SOURCE: Trade Data Monitor.

a The aggregate "East Asia" includes all ASEAN Member States, and Taiwan, South Korea and Japan.

b Excluding intra-EU imports.

The Chinese government has been pushing electric mobility for more than three decades now. In its 10th Five-Year Plan (which covered the period from 2001 to 2005), China had already included “new energy vehicle” technology as a fundamental scientific research project.¹¹ Since then, the development of the electric vehicle industry has been the subject of numerous strategic plans, including the “Made in China 2025” plan unveiled in 2015, the 2017 “mid- and long-term development plan for the automobile industry” and, more recently, the 2020 “new energy vehicle industrial development plan”.¹² The Chinese government considers the BEV industry strategic for various reasons. Among these is the need to come up with a solution to the grave atmospheric pollution problems that affect quality of life in many Chinese cities. Moreover, support for the BEV industry is in keeping with the Chinese government’s desire to make China a global technology leader in emerging and high-tech industries. These efforts are also driven by the feeling that, in a context in which the traditional growth drivers (such as the real estate sector or investment in manufacturing infrastructure) are running out of steam, and given the country’s unfavourable demographic shift, the Chinese economy will increasingly depend on boosting its productivity to maintain its pace of growth.

The Chinese authorities have used a wide range of interventions in pursuit of these electric mobility goals. Notable examples include the electrification of public transport in the form of electric buses and taxis, which began in the 2000s,¹³ when such initiatives still had very little take-up in the West and were restricted to a handful of forward-thinking countries such as Norway and Sweden.¹⁴ The Chinese authorities also placed restrictions on the purchase and registration of combustion engine vehicles, capping the manufacture and import of such vehicles and limiting fuel consumption.¹⁵ For instance, some major Chinese cities (including Beijing, Tianjin, Shanghai and Guangzhou) began phasing in restrictions on combustion engine vehicle traffic in the 1990s, even before their main European counterparts.¹⁶ According to numerous studies,¹⁷ these measures, combined with the roll-out of an extensive network of charging stations comparable only to those in countries at the forefront of electric vehicle adoption, such as Norway and South Korea (see Chart 2.a), contributed to the swift transition towards electric mobility. In this connection, it is important to note that China’s stock of BEVs was already larger than that of the United States or Europe in 2014 and that this gap has since widened. Thus, by 2023 China was home to around 60% of all of the electric vehicles on the world’s roads.¹⁸

Other public policies have also played a key role in the growth of BEVs in China. Support in the form of incentivised purchases has been considerable and bears comparison with that offered by

11 Tagscherer (2012) and European Commission (2024b).

12 See European Commission (2024c), page 671, for further details on the broad spectrum of policies targeting the development of electric vehicles in China.

13 World Bank (2021).

14 See, for example, World Resources Institute (2023) and Mersky, Sprei, Samaras and Qian (2016).

15 European Commission (2024c).

16 See Liu, Xzhao, Liu and Hao (2020) for a description of how traffic restrictions were introduced in China, and Fageda, Flores-Fillol and Theilen (2022) for a comprehensive overview of the low emissions zones and toll charges introduced in Europe.

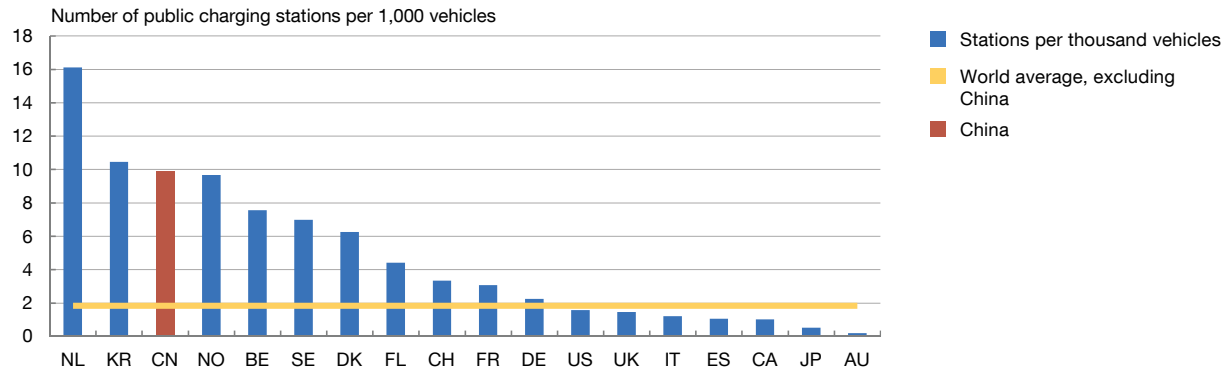
17 International Energy Agency (2024a, 2024b). See Sierchula, Bakker, Maat and Van Wee (2014), Egner and Trosvik (2018), Haustein, Jensen and Cherchi (2021) and Zheng, Menezes, Zheng and Wu (2022) for details of how investments in charging infrastructure impacted the take-up of electric vehicles, and Wang, N., Tang and Pan (2017) and Wang Y., Sperling, Tal and Fang (2017) on the effectiveness of restrictions on traffic and the sale of combustion engine vehicles.

18 International Energy Agency (2024b).

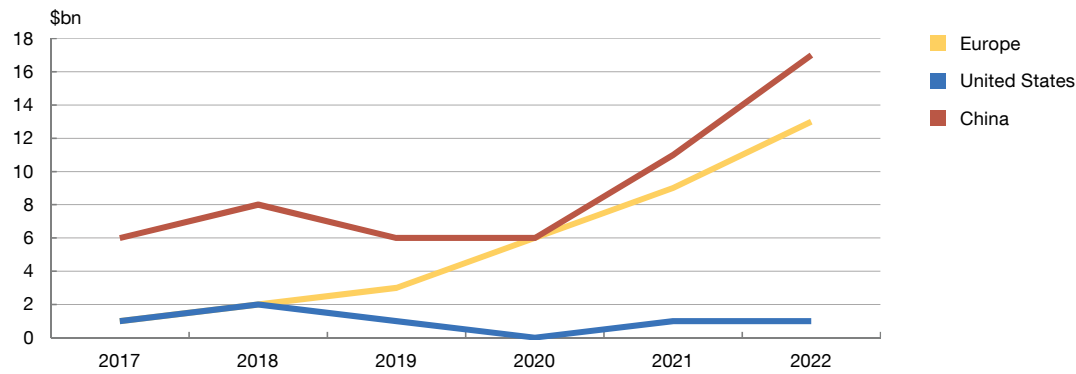
Chart 2

The early embrace of electric vehicles in China contributed to the success of its exports

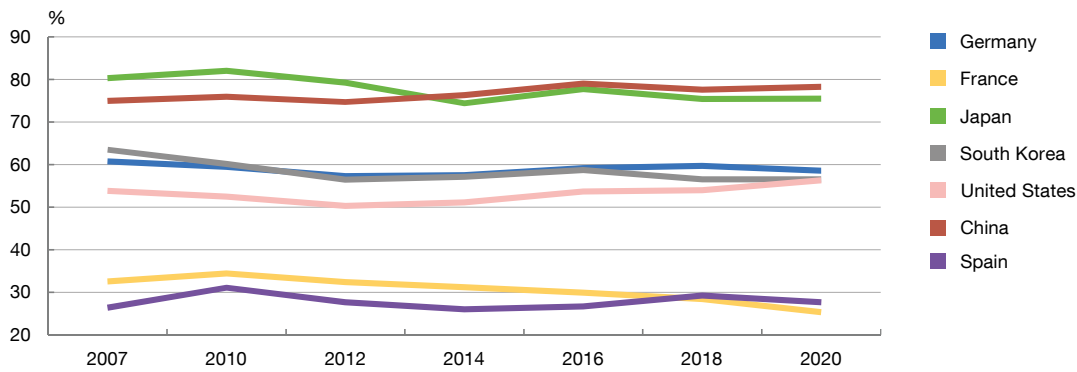
2.a Public charging infrastructure in the main electric mobility markets



2.b Public spending on incentives for battery electric vehicle purchases



2.c Share of domestic value added in the vehicle manufacturing sector (a)



SOURCES: IEA and OECD.

a The vehicle manufacturing sector includes both combustion engine vehicles and the various categories of electric vehicles (for instance, plug-in hybrids and BEVs) and those powered by alternative fuels (such as hydrogen and liquified petroleum gas, among others).



some Western economies (see Chart 2.b). However, unlike in other countries, in China only Chinese-made vehicles are eligible for most incentives. This largely benefitted domestic manufacturers¹⁹ and discouraged the acquisition of imported electric vehicles.²⁰ The Chinese BEV industry also benefitted from the support provided by various tiers of government. According to the European Commission, this includes land for setting up factories sold on favourable terms, direct government financial intervention and special treatment for domestic firms.²¹ The European Commission has also gathered evidence of other forms of less direct support, such as certain distortions of competition, the arbitrary application of bankruptcy laws and preferential access to funding.²²

Lastly, the local integration of much of the supply chain has been another feature behind China's success in BEV manufacturing. In particular, the share of domestic value added in Chinese car production rose from 75% in 2007 to almost 80% in 2020. This percentage is higher than that seen in other important car manufacturing countries, such as Germany and the United States (below 60%) and Spain and France (below 30%) (see Chart 2.c).

While the domestic content of China's automotive industry had already been growing before 2020, this trend has gathered pace in step with progressive electrification, thanks to China's well-controlled battery supply chain. In this field, China's dominance begins with the extraction and processing of the raw materials essential for battery manufacturing. China is the world's largest importer of lithium. In 2023 Chile, the number two lithium carbonate producer worldwide (with a 30% share of global production),²³ exported over 60% of its output to China (see Chart 3.a). Moreover, two of the leading lithium producers, which together represented 68% of the global production of this mineral in 2020, are under the control of Chinese state enterprises, while another Chinese firm has recently acquired a 24% stake in Sociedad Química Minera, a Chile-based firm that accounts for 16% of production.²⁴ Similarly, much of the cobalt originating in the Democratic Republic of the Congo (the number one global producer, with a 74% market share in 2023)²⁵ and up to 98% of the world's graphite are processed in China.²⁶ In addition, the world's leading battery manufacturers (CATL and BYD) are of Chinese origin and are Chinese-owned, with Chinese manufacturers accounting for 64% of the global battery market in 2023 (see Chart 3.b).²⁷

All told, based on data from the International Energy Agency, battery prices in China are 17% lower than in the EU, giving the country a significant edge over European producers, since batteries account for up to 40% of the price of a BEV. Similarly, China's lower labour costs also

19 The top 10 beneficiaries were BYD, Tesla, GAC, Geely, Anhui Jianghuai, Hozon, Changan, Zhaoqing Xpeng, Dongfeng and SAIC. Of these, Tesla is the only foreign-owned undertaking, while the rest are considered Chinese firms. See Bickenbach, Dohse, Langhammer and Liu (2024), Figure 4.

20 Zhang, Burke and Wang (2024) and Zheng, Menezes, Zheng and Wu (2022).

21 Bickenbach, Dohse, Langhammer and Liu (2024).

22 European Commission (2024c).

23 See, for example, U.S. Geological Survey (2024, p. 111) and International Energy Agency (2024b).

24 Leruth, Mazarei, Regibeau and Renneboog (2022).

25 U.S. Geological Survey (2024, p. 63).

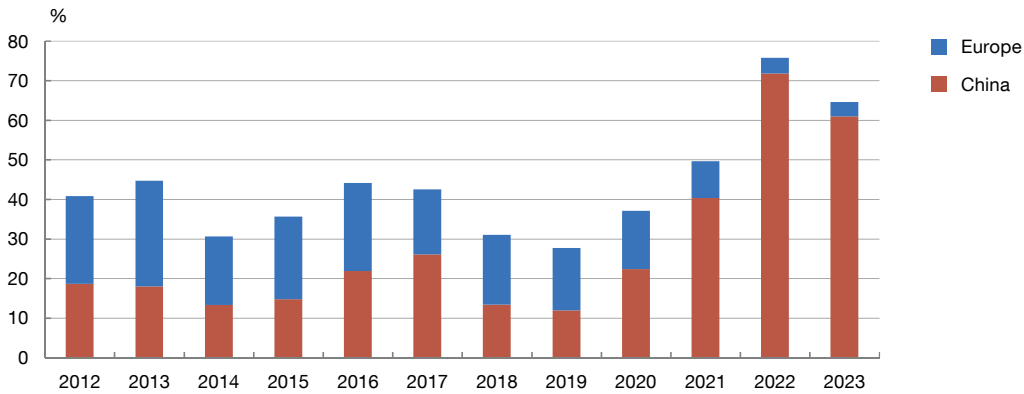
26 Institute for Energy Research (2023).

27 Chinese producers have expanded overseas. Thus, in 2023 Chinese firms represented 40% of the battery manufacturing capacity forecast in the EU (International Energy Agency, 2024b; European Commission, 2024c).

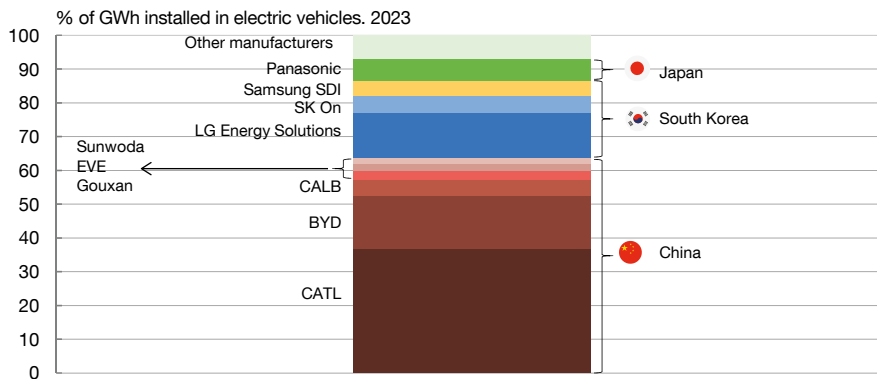
Chart 3

The high degree of integration of its supply chain has awarded China relative advantages in terms of production costs

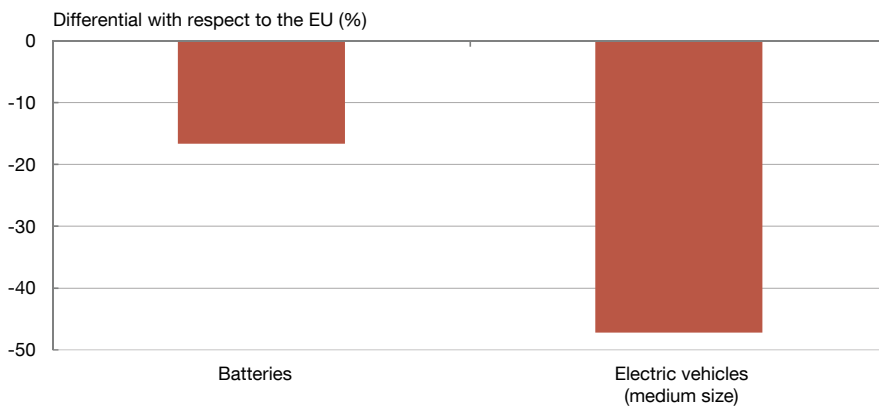
3.a Destination of Chile's lithium production



3.b Global market share of the top 10 battery manufacturers



3.c Relative prices of Chinese cars in 2023 (a)



SOURCES: IEA, OECD and SNE Research.

a Analysis by the International Energy Agency (2024a, 2024b) based on data from EV Volumes, MarkLines and various sources on retail sale prices. Car prices are for base models with no additional options or equipment.



enhance its competitive advantage in BEV manufacturing. All of this, combined with a high level of competition in its domestic market, appears to have led BEV sale prices to end consumers in China to be almost 50% lower than in Europe in similar electric vehicle segments (see Chart 3.c).

Conclusions

The rise of the electric vehicle in China poses challenges and opportunities. First, affordable BEVs from China (including models produced there by foreign firms) can help accelerate the transition towards electric mobility in Europe and globally, thus facilitating the achievement of environmental goals. Second, there are concerns about the possible adverse impact on other international car manufacturers and, more generally, on the European industry as a whole, of the notable current predominance of the Chinese BEV sector, which has in part been supported by significant public subsidies.

Against this backdrop, the duties recently imposed by the European Commission on Chinese BEV imports aim to restore a level playing field and fair competition between producers.²⁸ However, other undesirable effects, such as higher prices and a slower uptake of electric vehicles in Europe, are likely to materialise at the same time. Another potential side effect of the introduction of these duties could be the expansion of European production capacities by Chinese brands.²⁹ In this scenario, European car manufacturers would in any event be exposed to foreign competition, although an increase in production and employment in Europe could be expected. Lastly, new barriers to trade could increase the risk of wider trade disputes and retaliation measures, which would probably not benefit any of the parties involved.³⁰

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28 European Commission (2023, 2024c).

29 BYD's recent investment plans in Hungary are in line with this experience. See Mayer, Vicard and Wibaux (2024).

30 Campos, Estefania-Flores, Furceri and Timini (2023), Campos, Heid and Timini (2024), Campos, Estefania-Flores, Furceri, Ostry and Timini (2024) and Panon et al. (2024).

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