Ted and Logan Webinars on High-Tech Industries

Global EV Market: Blood on the Tracks?

Edward A. Snyder and Logan Bender

Guest Contributor Dr. Brian Gu (XPENG Motors)

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Edward A. Snyder

Ted is the William S. Beinecke Professor of Economics and Management at the Yale School of Management. He has applied IO frameworks to over thirty industries in his professional career. This set includes liquid crystal displays, video streaming, payment systems, pharmaceuticals, optical disk drives, and modem chips used in smartphones. He studied economics at the University of Chicago. He served as Dean of three business schools and founded the Global Network for Advanced Management.

Logan Bender

Logan is a CFA charter holder and Yale MBA (specialization in asset management). During his career as a global technology investor and research analyst at Putnam and First Analysis, Logan has specialized in high-tech industries including software, internet platforms, and semiconductors, with particular emphasis on the U.S. and China. Logan also has experience with venture investment focusing on series A and B stage investments in vertical SaaS, human capital technology, and other high growth differentiated software businesses.

Brian Gu 顾宏地

Dr. Brian Gu is the Vice Chairman and President of XPENG (NYSE: XPEV; HKEX: 9868). His responsibilities encompass corporate strategy, finance, legal affairs, and investments. He also leads XPENG's international market development, with a commitment to creating a smarter, better, and more sustainable mobility experience for XPENG's global customers. Under his leadership, XPENG has achieved significant milestones, including raising over $10 billion in capital, debuting on both the NYSE and HKEX, forming strategic partnerships with Alibaba, Volkswagen Group, and Didi, and receiving the highest ESG ratings among global automobile companies for four consecutive year.

Before joining XPENG, Dr. Gu was a Managing Director, Chairman of Asia Pacific Investment Banking, and a member of the Global Strategic Advisory Council at J.P. Morgan. He holds an MBA from Yale University, a PhD in Biochemistry from the University of Washington School of Medicine, and a bachelor's degree in Chemistry from the University of Oregon.

XPENG 小鹏

1) Founded by senior executives from a large automotive SOE (Guangzhou-based GAC Group) in 2014
2) Initially funded by a former Alibaba executive He Xiaopeng 何小鹏 (hence the name 'XPeng' 小鹏), and Lei Jun, the founder of Xiaomi
3) Alibaba's and Yale's Joseph Tsai joined its board in 2018 as Alibaba increased its investment
4) Produced its first vehicle in November 2018
5) IPO in August 2020 (NYSE)
6) Dual-listed on HK Stock Exchange in 2021
7) Its first exports went to Norway in August 2021
8) XPeng and Volkswagen Group signed a technology cooperation and joint development agreement in February 2024
9) Sold 482 vehicles in 2018; 190,000+ vehicles in 2024
10) According to public commentary, XPENG G6 competes with Tesla's Model Y

Our Analysis of the Global EV Market

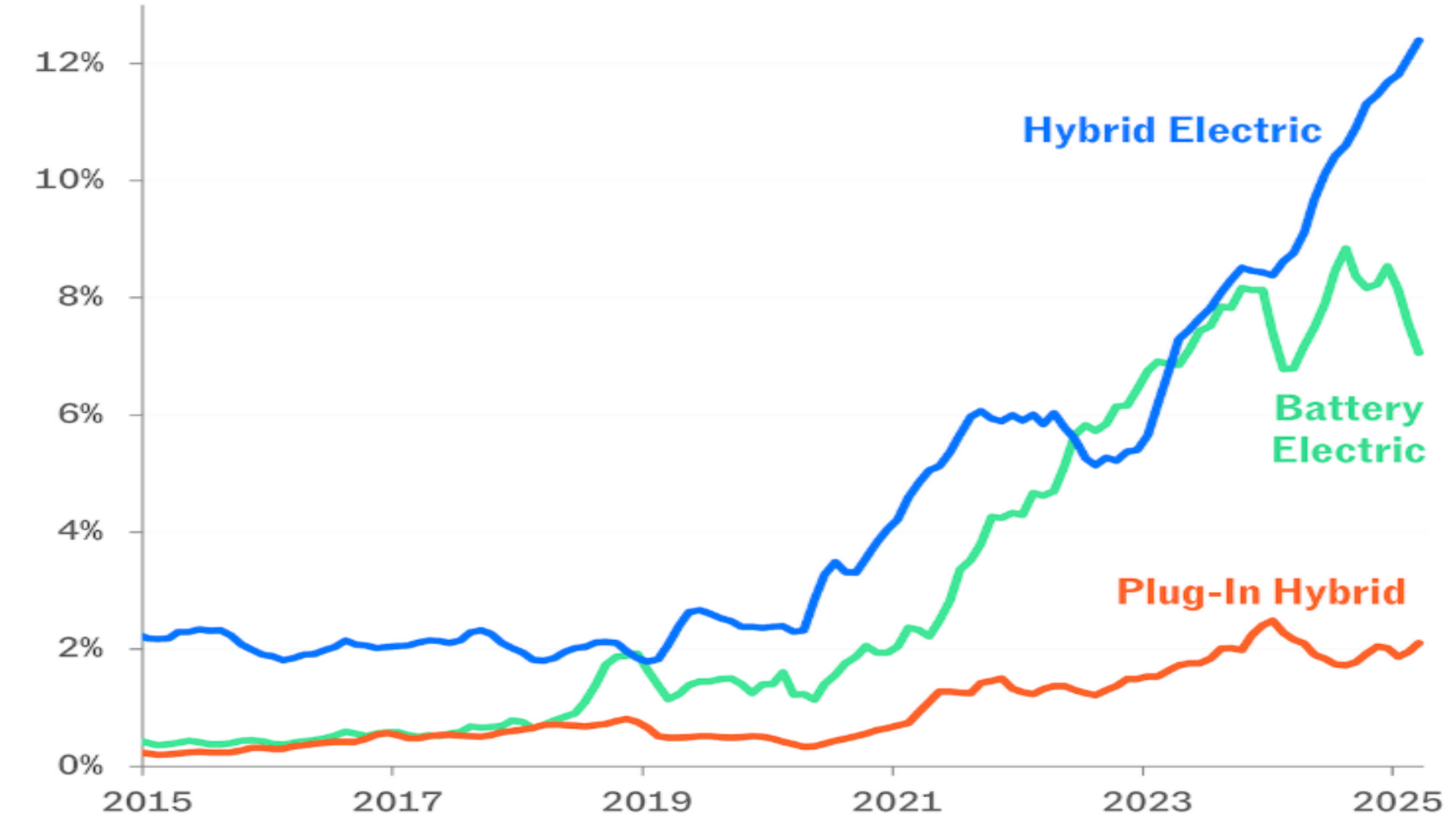
1. Economics of EVs
    i. Demand
    ii. Supply
        - Vertical integration strategies differ
        - Geography is very important
2. Major developments
3. Challenges and Innovations
4. Tariffs and Global Tensions
5. Implications / what to watch for

Global EV Market

1) Global EV sales exceeded 17 million in 2024, including ~11 million in China; Sales in this calendar year are projected to exceed 20 million;
2) More than 20% of new cars sold worldwide last year were electric or hybrids;
3) At the end of 2024, EVs on the road reached 58 million, about 4% of the total passenger car fleet;
4) China is the world's EV manufacturing hub and accounts for more than 70% of global production.

Hybrid Sales Continue To Soar

Light-Duty Vehicle Sales, By Powertrain [Rolling 3-month average, % of sales]



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Source: Argonne National Laboratory, Wards Intelligence, EIA

Why are EVs *high-tech* products?

1. EVs embody new technologies: electric motors and chargeable batteries
2. But another important reason: they have a different cost structure versus Internal Combustion Engine (ICE) vehicles

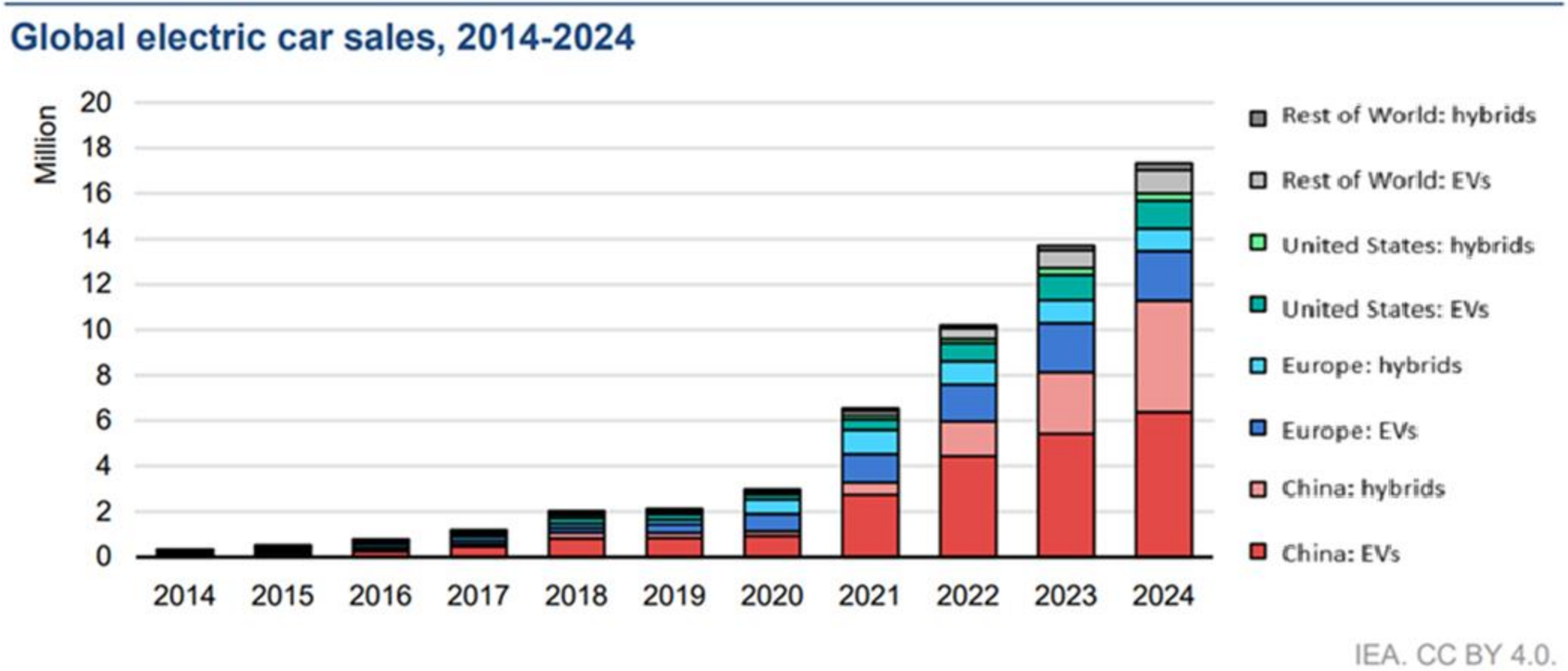
We believe that this intensifies EV competition

3. Economics of Scale, Economies of Scope, and Network effects are important in the EV industry.

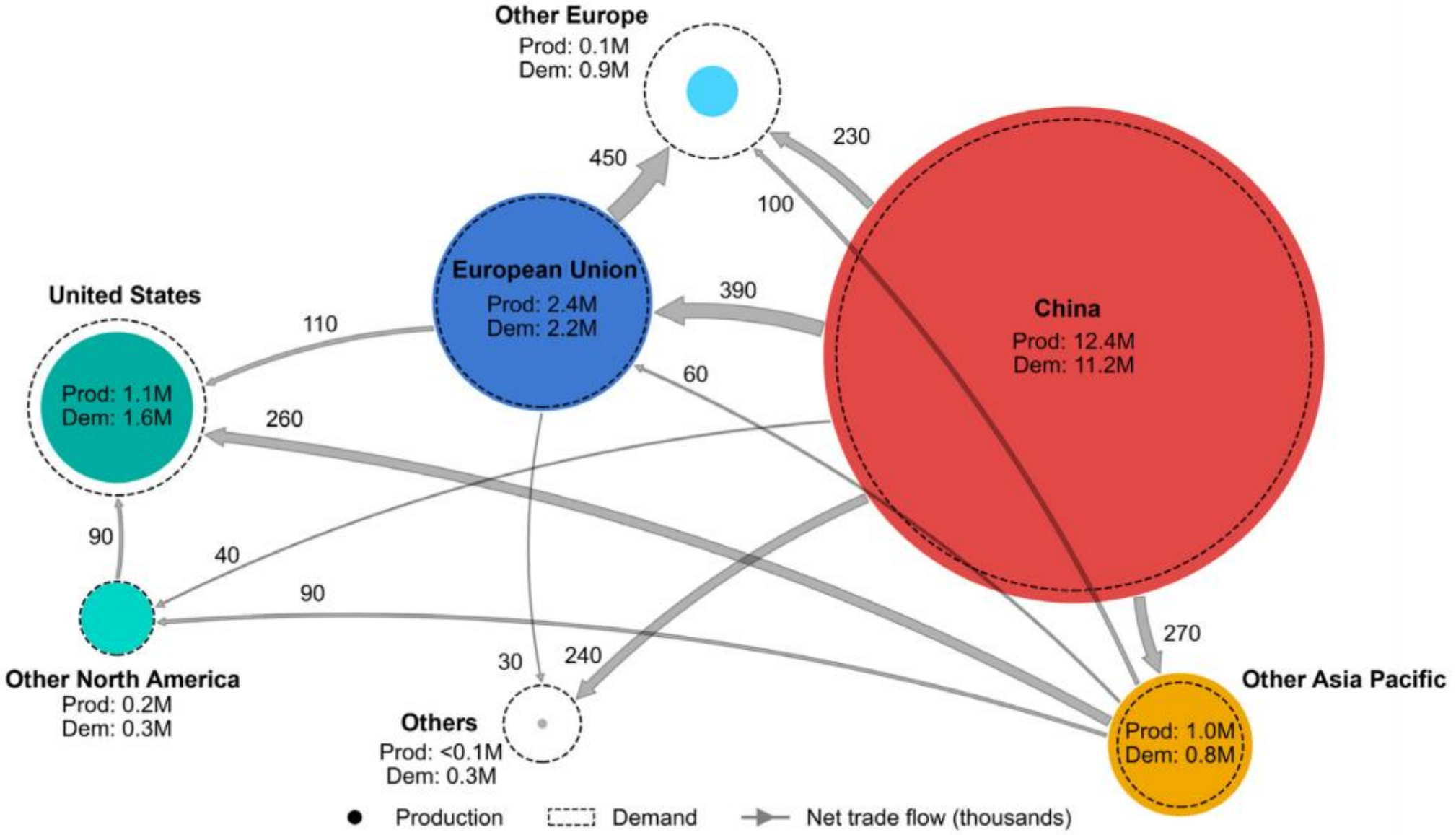
Demand Factors

1) Convincing customers to choose EV over ICE
2) Increasing the range
3) Shortening charging times
4) Reducing safety concerns with EVs
5) Potential for other substitutes: robotaxis, autonomous vehicles, Mobility-as-a-Service

Demand for EVs and Hybrids is *Robust*

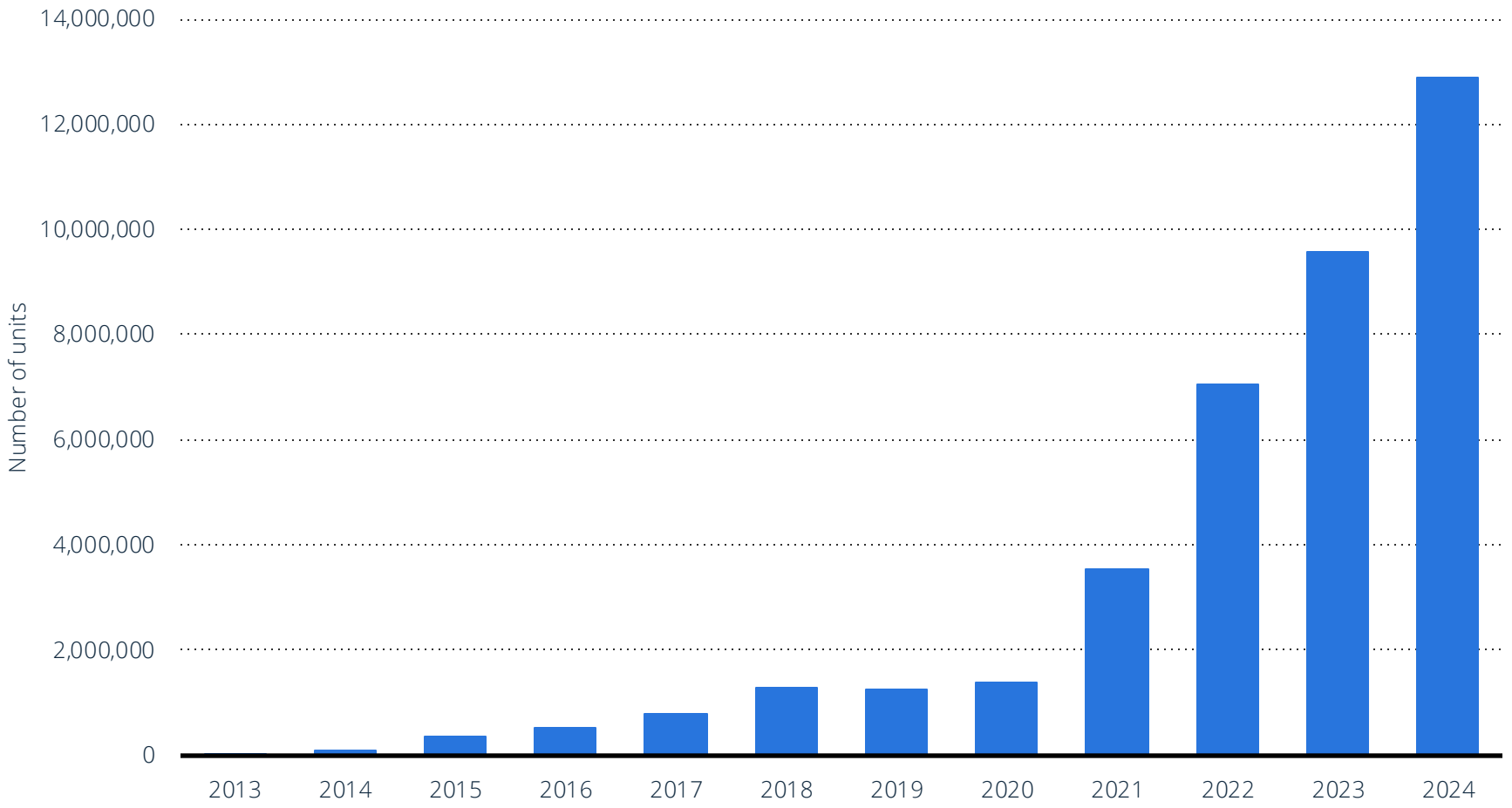


Production, demand and net trade of electric cars in major global markets, 2024



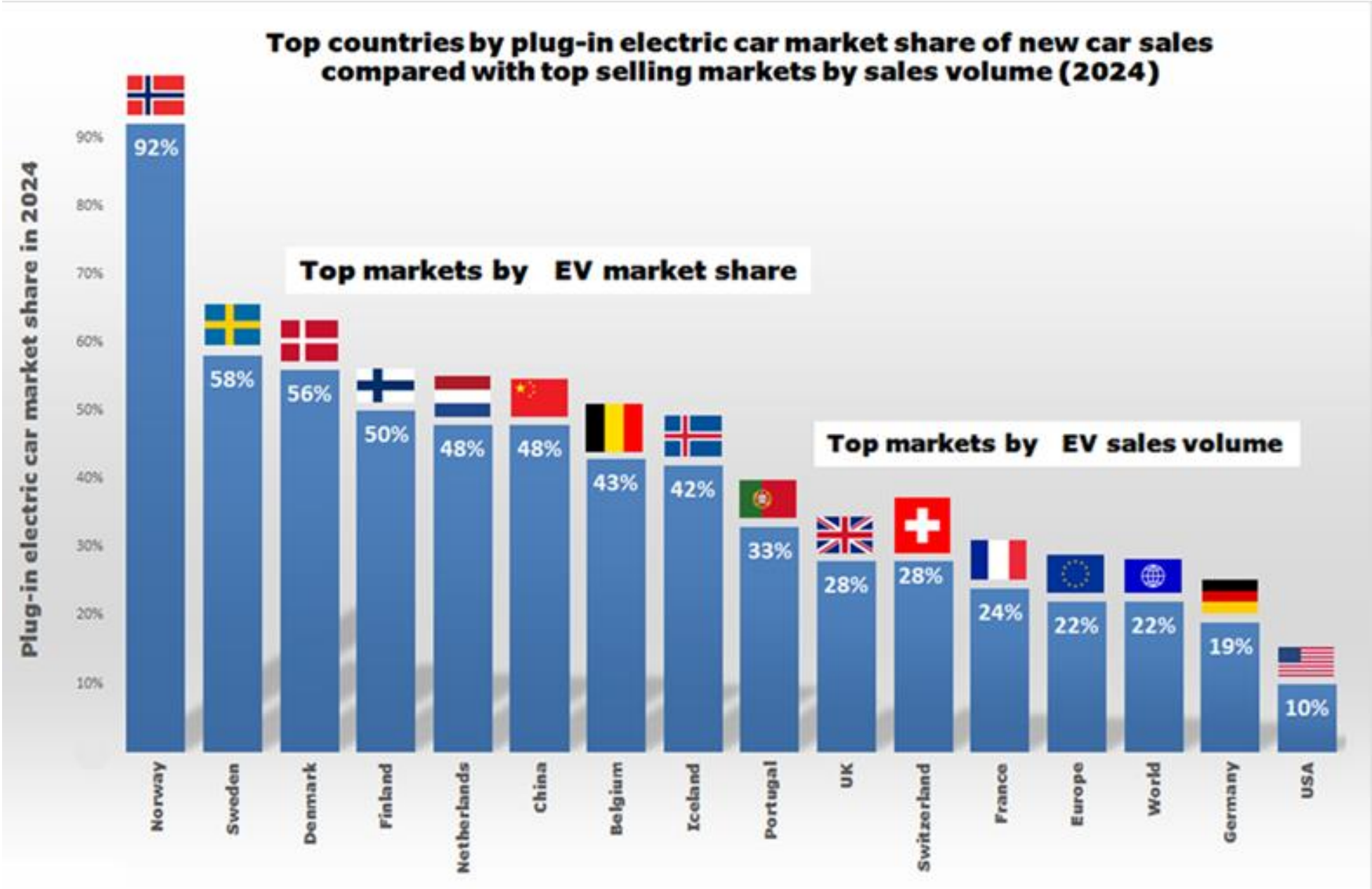
Rise of Chinese EV industry is *spectacular*

Annual EV production in China from 2013 to 2024



Note(s): China; 2013 to 2023; includes both passenger cars and commercial vehicles.
Further information regarding this statistic can be found on page 8.
Source(s): CAAM; Statista; OFweek; ID 425481

Economics – rates of adoption vary greatly by country



World – 22%

Norway – 92% (!!)

China – 48%

United States – 10%

Vertical integration

1) Backward into batteries / rare earth minerals
2) Forward into charging stations
3) Forward into dealerships, servicing, upselling, financial services

Source: …

Profiles of BYD and Tesla

	BYD	Tesla	XPENG
Batteries	Makes its own batteries	Manufactures its own, though through partnerships with Panasonic	
Semiconductors	Yes, designs and manufactures its own	Yes, designed in-house but manufactured by TSMC	
Electric motors	Yes	Yes	
Software	Yes	Yes	
Distribution	Mainly yes	Yes	
Sales	Mainly yes	Operates its own stores in most countries	
Charging stations	Building its own network	Yes, a leader in many countries via a network of Superchargers	
Servicing and repair	Yes, in key markets	Operates its own service	
Financial services	Yes	Yes	
Geographic scope	9 factories in China, facilities in Uzbekistan and Thailand, investments in Hungary and Mexico – but also a bus factory in California	Factories in US, Germany and China	

How much do EVs cost? United States

Models	Prices in USD
Nissan Leaf (2025)	Starting at $29,280
Hyundai Kona Electric (2025)	Starting at $34,425
Chevrolet Equinox EV (2025)	Starting at $34,995
Tesla Model Y (2025)	Starting at $37,490+ (incl. the $7,500 Federal Tax Credit)
Hyundai Ioniq 6 (2025)	Starting at $39,045

How much do EVs cost? China

Tesla Model Y

Starting at 263,000 yuan (~$37,000)

How much do EVs cost? China

BYD Song Plus EV

Starting at 159,800 yuan (~$22,200) for 520km range version in 2025

How much do EVs cost? XPENG in China and Other Countries

XPENG 小鹏G6

China:

- Starting at 176,800 yuan (~$25,000)
- 198,800 yuan (~$27,700) for 725-km range version

Australia

- Starting at A$54,800 (~$35,200)

Norway

- Starting at NOK 387,778 (~$38,000)

Malaysia

- Starting at 168,000 MYR (~$39,500)

Many U.S. startups are in trouble

1) Rivian – produced 50,000 vehicles in 2024;
2) Nikola, founded in 2014, with a market cap of $25 billion in 2020, filed for bankruptcy and is seeking to sell most of its assets – its founder and former CEO was indicted for fraud in 2021, and the company never delivered more than 500 vehicles;
3) Fisker – delisted from NYSE in 2024, filed for bankruptcy in 2024, sold assets and ceased operation;
4) Canoo – filed for Chapter 7 bankruptcy in January 2025

Rivian R1T, the first modern electric pickup in US

How are Chinese EV manufacturers doing?

1) BYD
2) XPeng Motors
3) NIO
4) Li Auto

Major developments in the global EV market

1. Rise of BYD versus Tesla's stagnation
2. Erosion of margins
3. Low marginal costs lead to dramatic price competition
4. Role of Protectionism – Complex / Requires Detailed Analysis
5. Role of Public Policy

Innovations

1) Improved batteries
2) Battery swaps
3) Fast charging stations
4) Autonomous vehicles

Nio's Battery Swap – company-specific

Autonomous vehicles

5-minute charging

1) In March, BYD said that its new charging technology is capable of providing 250 miles of range in five minutes.
2) CATL's and BYD's technologies illustrate that China is substantially ahead of the U.S. in EV technologies.

Source: https://www.wsj.com/business/autos/five-minute-ev-charging-is-here-but-not-for-u-s-made-cars-6881ec57

Public policy

1) Subsidies
    1) Federal $7500 EV Tax Credit in the US likely ending
    2) China?
    3) Quasi-subsidies: EVs exempt from fees for entering city center areas in many places
2) Standardization of charging interfaces
3) Congestion charges
    - Many major cities limit access to city centers (London, Manhattan since recently, Beijing, etc.), but EVs are often charged no fees

Tariffs and Global Tensions

1) Tariffs

   Focus in on China and US

   But EU, UK, and others have also imposed tariffs on Chinese EVs

2) Access to resources:

   Rare earth minerals

   Semi-conductors s

Source: …

Access to Resources

Is the West dependent on China for rare earth minerals?

1. "In its retaliation against U.S. tariffs, China slowed exports of several rare-earth minerals and magnets this month, setting off a panic among U.S. automakers."
2. "China is the source of over 90% of the world's supply of rare-earth minerals, and thus far no other country has been able to produce them at the same scale and cost, according to experts."

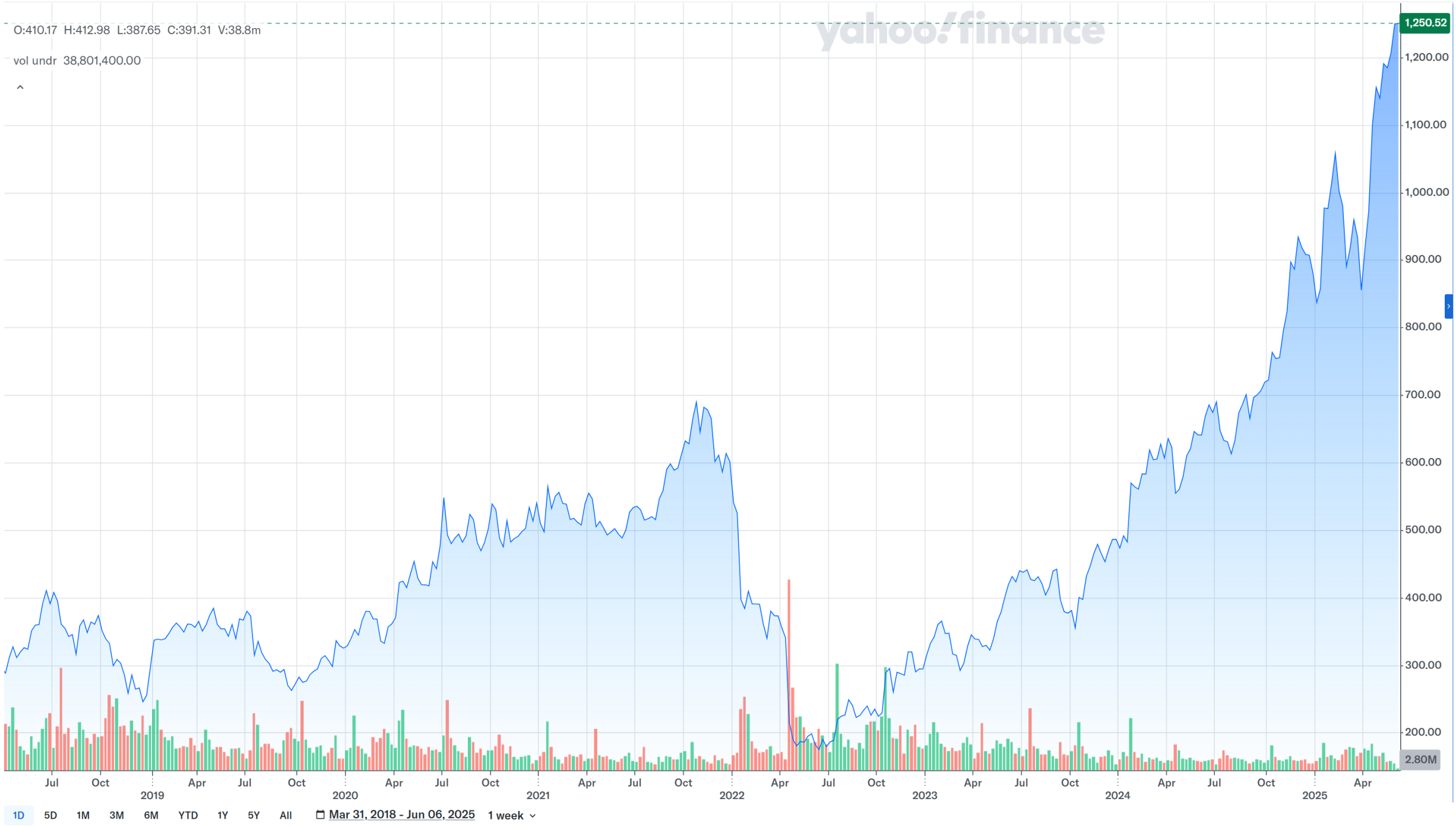
Is China dependent on the West for chips?

1. Beijing in late April exempted eight categories of U.S.-made chips from the 125% tariffs
2. American products include chips used in cars such as microcontroller units
3. China's imports of semiconductors hit $412 billion in 2024
4. WSJ reported "Beijing has told China's carmakers that it would like them to ensure at least a quarter of the chips in their vehicles are made in China as of this year"

Source: https://www.wsj.com/world/china/trade-war-exposes-chinas-dependence-on-u-s-for-auto-chips-41df1ae7, https://www.wsj.com/business/autos/dyspro-what-why-an-obscure-element-has-the-ev-industry-in-a-panic-70623bf4

Insights

1) China has emerged as leader in EVs
2) Tariff policies will protect EV manufacturers in other countries
3) Within China, U.S., and EU low marginal costs are leading to intense competition
4) We should continue to see more exits
5) Demand across countries is highly variable
6) Public policy on EVs matters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Mar 31, 2018 - Jun 06, 2025
1 week

What to watch for

1) Promising innovations will increase demand: faster charging, longer ranges, cheaper batteries. But what are the limits of innovation in EVs?
2) Will shared AVs compete with passenger-owned Evs?
3) Infrastructure rollout – how fast will US build out its infrastructure?
4) What will be “equilibrium” tariffs?

Possible Next Topics

1. Semiconductors
   - What do market shares mean?
   - Will tariffs slow down China?

2. Online Travel Industry

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