Tariffs and Tangles: Can Protectionist Measures Strengthen the EU EV Industry's Competitiveness and Reduce Dependency?

Ilaria Fusacchia[1], *Luca Salvatici*[♦], *Alessandro Antimiani*[♠]

1. INTRODUCTION

The automotive industry is a key part of the European economy, contributing a significant share to the EU's GDP and employment. Known for its strong focus on research and development, the sector plays a central role in driving innovation and influencing consumers. However, the EU automotive sector faces two major challenges: staying competitive in a globalised market and overcoming structural weaknesses within its industrial system.

The rise of new global players, especially China, has changed the competitive environment. Through targeted industrial policies, significant investments, and control over supply chains, China has established itself as a leader in the electric vehicles (EVs) sector. Batteries, the most crucial input for producing EVs, are central to this transformation. They represent the most considerable cost in EV production and are also a critical element of the supply chain, making the European industry vulnerable.

The EU has introduced countervailing tariffs on imports of battery electric vehicles (BEVs) from China to respond to these challenges. These measures aim to restore fair competition by addressing the distortions caused by Chinese state subsidies. However, they also raise questions about their long-term effectiveness in reducing external dependency, supporting European manufacturers, and minimising the impact on consumers. At the same time, the EU is investigating potential subsidies for Chinese battery production, highlighting the strategic importance of batteries for the entire EV production chain.

The European Commission's report, "Protecting Competition in a Changing World," shows that in the past 25 years, leading companies have significantly increased their market concentration and profit margins. This is often the result of significant investments in research and intangible assets, combined with the ability to achieve economies of scale in global markets. While these changes have improved efficiency for the top players, they have also created high barriers to entry, limiting competition and raising concerns about the current system's sustainability. The Draghi Report on European Competitiveness (2024) underlines the importance of coordinated action to address global challenges such as decarbonisation, innovation, and supply chain security.

This study contributes to the ongoing debate about the relationship between trade policies and competitiveness, focusing on the EU automotive sector and its supply chain. By analyzing the

[♣] Università degli Studi della Basilicata. Corresponding author.
Email: ilaria.fusacchia@unibas.it.
[♦] Università degli Studi Roma Tre.
[♠] Commissione Europea.

impact of recent EU measures on Chinese imports, the study explores their potential to reduce external dependency, strengthen the European automotive industry, and protect consumers. It also examines how these policies might affect different Member States, given the differences in their production systems and levels of integration in global value chains.

Using a hybrid equilibrium model, this analysis evaluates the connections within the global economic system and provides a detailed assessment of the potential effects of EU tariffs. Specifically, the study looks at three main areas: how these measures might reduce external dependency (not only on China), how they could improve the competitiveness of European manufacturers, and what their impact on consumers might be. It also highlights the importance of understanding how trade policies affect supply chain relationships and production dynamics within the EU, given the diversity of production systems among Member States.

Although the EU's primary goal with these measures is not to "block" Chinese EV imports but to create fair competition, the resulting higher costs for Chinese BEVs in Europe are expected to reduce their market share. This could decrease Europe’s dependency on China, but it is uncertain whether this will lead to stronger internal production capacity or merely shift the source of imports to other countries. Additionally, the EU automotive industry faces several structural weaknesses, such as high production costs, slower innovation, and a fragmented battery supply chain, which might limit the effectiveness of these measures. This underlines the need for a broader industrial strategy that balances the interests of producers, consumers, and the supply chain.

2. THE CONTEXT BEHIND THE EU’S MEASURES

The automotive sector is crucial to the EU’s economy, directly supporting around 6% of total employment. Despite this, sales of European-made vehicles have not recovered to pre-pandemic levels. At the same time, the industry is undergoing a profound transformation, shifting from internal combustion engines to electric vehicles. Meanwhile, Chinese manufacturers have become dominant in EV technology, leveraging years of strategic planning and industrial support. Nearly two decades ago, China launched a state-backed plan to accelerate the transition to electric mobility, with two main objectives: addressing severe urban pollution and reducing reliance on foreign oil imports. Acknowledging that domestic manufacturers could not compete with Western companies in traditional gasoline vehicles, the government prioritised the electrification of its automotive sector.

Initially, China relied on direct subsidies to stimulate EV purchases. Over time, this evolved into a broader strategy, including investments in charging infrastructure and research and production capacity support. Today, more than half of new vehicles sold in China are electric or plug-in hybrids, and the price of EVs in Chinese showrooms is comparable to gasoline-powered cars. Although 88% of EVs produced in China in 2023 were sold domestically, exports of EVs, including those from foreign brands like Tesla, grew dramatically—by a factor of 160 between 2019 and 2023. This rapid expansion has raised concerns in key importing regions, such as the USA, Canada, and the EU.

Chinese government support for the EV industry has increased significantly in recent years. Over the past five years, direct subsidies nearly tripled. In addition, the government provides indirect support, classifying EV manufacturers as “high-tech enterprises,” which benefit from reduced tax rates, preferential loans, and lower input costs for essentials like land and electricity. While the absolute value of subsidies has risen since 2018, their share of total sales has decreased due to rapid growth in overall EV production and sales.

China's approach highlights two major themes: (i) the critical role of industrial policy in shaping competitive advantage and (ii) the link between competitiveness and broader concerns such as sovereignty and security. Beginning in the 1970s, industrial policies lost favour globally due to inefficiencies and anticompetitive outcomes. However, events like the 2008 financial crisis, the rise of China and other emerging powers, and the need for green and digital transitions have revived interest in industrial strategies. Recent economic literature underscores this shift, proposing a renewed agenda for industrial policy in the 21st century (Aiginger and Rodrik, 2020).

On October 29, 2024, the European Commission introduced definitive countervailing duties on imports of battery electric vehicles from China, to remain in effect for five years. These measures followed an investigation that identified subsidies within the Chinese EVs supply chain, distorting competition and causing harm to European manufacturers. Given their strategic importance in the EV sector, the inquiry also addressed potential subsidies in Chinese battery production. However, thus far, only the investigation into BEVs has resulted in the imposition of tariffs, with duties averaging 30% depending on the manufacturer. For example, BYD, Geely, and SAIC were assessed individually, with duties ranging from 17.0% to 35.3%, while Tesla received a reduced rate of 7.8%. Non-cooperative companies face a maximum duty of 35.3%.

The EU's decision sparked significant debate among Member States. To block the measure, a qualified majority representing at least 65% of the EU's population was required but not achieved. Opposition was particularly strong from Germany and Hungary, driven by different considerations: Germany's dependence on trade ties with China, particularly in the automotive sector, and Hungary's desire to attract Chinese investment through closer economic relations.

Unlike U.S. trade measures, which often apply uniformly across companies, the EU's duties were calculated based on detailed analyses of individual firms. These "safeguard" measures differ significantly from traditional anti-dumping duties, as they address subsidies rather than price undercutting. In fact, Chinese EVs are sold in Europe at higher prices than in their domestic market, countering any allegations of dumping.

The EU's strategy reflects a more nuanced approach than the United States. U.S. tariffs, characterised by broad sectoral coverage and high rates, are often seen as geopolitically motivated, prioritizing national sovereignty and economic security. By contrast, the EU aims to balance its commitment to free trade and adherence to WTO rules with the need to protect its strategic industries and ensure greater autonomy in critical sectors. This careful equilibrium highlights the complex interplay of economic interdependence and geopolitical pressures in modern trade policy.

3. METHODOLOGY AND DATA

To conduct the ex-ante quantitative assessment of the potential impacts of the EU policy measures we rely on a counterfactual approach using an extended version of the GTAP model. GTAP is a comparative-static computable general equilibrium (CGE) model grounded in solid micro-theoretical foundations. It represents the interactions across sectors and regions, capturing both direct and indirect effects of policies on national or regional economies and on global production networks (Hertel, 1997; Corong et al., 2017). These features make it particularly suitable for applied economic analyses aimed at understanding the shifts in production chains and intermediate inputs, in addition to the more traditional focus on trade flows. Although CGE models are widely used to analyze policy changes (Anderson, 2004; Badri et al., 2021; World Bank, 2023), they are typically aggregated at the sector level, which can limit their effectiveness when evaluating detailed measures or exploring how new policies affect specific production processes at the product level. Conversely, partial-equilibrium models, often employed for highly disaggregated analyses (e.g., product-level studies), are less able to capture the spillover effects of policy changes on other segments of the economy.

To overcome these limitations, this study uses a hybrid version of the model, GTAP-HS (Narayanan et al., 2010; Aguiar et al., 2021). This approach merges a partial-equilibrium model for the sectors under examination (defined at the 6-digit Harmonized System, HS) with a general-equilibrium framework that fully takes into account interdependencies across economic variables, given resource constraints. The hybrid structure is particularly valuable when examining the organization of production processes across multiple stages. It offers the level of detail needed to assess specific product segments while still revealing how those decisions influence—and are influenced by—other sectors in the broader economy. For instance, raising tariffs on batteries might benefit domestic battery manufacturers, but could negatively impact national electric vehicle (EV) producers that rely on those batteries as inputs.

In the GTAP-HS framework, domestic consumption of goods is divided between national and imported products through a mechanism governed by the Armington elasticity (Armington, 1969), which differentiates between domestic and international markets. As a result, the model captures how local demand responds to international price variations (Grant et al., 2007; Narayanan et al., 2010). The total domestic absorption of a particular good consists of the sum of the demand for that good by firms, households, and government—whether produced locally or imported. The base price of a product is obtained from a weighted average of domestic and imported goods, while the purchase price for each agent also includes any specific taxes applied to it. This setup enables an examination of overall consumption by balancing demand between domestic and imported goods that compete at a disaggregated level. On one hand, we can reallocate demand among different agents using specific categorizations (for instance, the Broad Economic Categorization provided by the UN Statistics Division). On the other hand, we can trace how a policy change for a particular product reverberates throughout the economy and affects domestic and foreign production capacity. This detail is vital for analyzing supply chains, where the availability and costs of certain inputs can reshape the distribution of production stages.

From the production side, the model assumes a hierarchical structure. At the top level, each sector's equilibrium is governed by overall supply and demand. Beneath that level, domestic output is allocated to specific products (HS codes) based on a Constant Elasticity of Transformation (CET) and a calibrated transformation parameter. This makes it possible to see how producers decide between domestic and foreign markets for different stages of production in the value chain.

Another key element is how international trade is modeled. Here, a Constant Elasticity of Substitution (CES) function allocates aggregate imports among different exporting countries, taking into account bilateral import prices. Analyzing trade at the product level allows us to avoid "false competition," ensuring that only directly comparable goods are considered as substitutes (Brockmeier and Bektasoglu, 2014). This more accurate reflection of competition dynamics is particularly useful for understanding production chains, since it shows which inputs can realistically be replaced by alternatives from other countries or suppliers.

It is worth to explicitly outline the assumptions underlying the model that could constrain the analysis, even though this approach represents the state of the art and the most advanced methodology currently available within CGE modeling frameworks. First, the model operates under the premise of perfect competition with constant returns to scale, which may not fully reflect real-world conditions, particularly in industries with high market concentration. While this is a standard assumption in CGE models, it might oversimplify the dynamics of sectors where market power plays a significant role. Additionally, this study uses the static version of the model; without a temporal dimension, there is no mechanism to account for savings and investments, meaning that the potential impacts of the policy shock on investments, although discussed, are not considered. Another implication is the absence of dynamic adjustment costs or temporal effects, which could influence the long-term impacts of the restrictions. Finally, production factors and outputs are defined in the model on a territorial basis - that is, based on the location of production rather than the nationality of the brand or corporate groups. In other words, the analysis does not account for the role of Chinese production within the European Union or imports from China linked to EU-based producers and Tesla. This approach, however, aligns with the EU's definition of "industry" (see Official Journal L of 29.10.2024, p. 105). Despite these limitations, this approach remains the most sophisticated methodology available for understanding the complex interactions within production processes and global supply chains.

In terms of data, our application of the GTAP-HS model uses the latest GTAP Data Base (Aguiar et al., 2023), which incorporates data on production, interregional trade flows, and protection measures for the 2017 reference year. The model also integrates product-level data from the World Integrated Trade Solution (WITS), including tariffs and trade volumes at the HS level. The calibration ensures consistency with a reference scenario mirroring economic conditions prior to recent trade restrictions, thus establishing a baseline against which policy experiments can be conducted.

The markets for batteries and electric vehicles have experienced significant shifts in scale and structure in recent years due to changes in economic conditions, policy decisions, and supply-chain configurations (IEA, 2023). To align the baseline scenario with the changing EV landscape, we update the data to 2023 by applying macroeconomic shocks and policy changes.[2]

Turning to the specific scenario evaluated in this analysis, we focus on the final countervailing duty imposed on imports of electric vehicles -made effective on October 29, 2024- and lithium-ion batteries -currently in an advanced stage of investigation and discussion. Regarding electric vehicles, although the product's tariff line is readily identifiable, the measure varies depending on the producing company, ranging from 7.8% (Tesla Shanghai) to 35.3% (SAIC) depending on company-specific subsidy levels. Consequently, the average duty at the HS product level is assumed, weighted based on the market shares of the specific companies manufacturing in China and exporting to the EU.

With reference to the restrictions on batteries assumed in the scenario, we consider the imposition of an additional tariff of 30%, taking into account the ongoing discussions.

---

[2] In particular, these shocks include variations in gross domestic product, labor force (skilled and unskilled), and population between 2017 and 2023—a well-established procedure in the literature (Dellink et al., 2020; Fouré et al., 2020)- relying on the "Middle of the Road" scenario from the Shared Socioeconomic Pathways (OECD, 2020), which incorporates relevant socioeconomic developments during the period. We also include major policy events that directly shaped trade flows, such as new EU trade agreements (with Canada in 2018 and Japan in 2020), the trade war between the United States and China, and the sanctions imposed on Russia following its conflict with Ukraine. Finally, data from WITS are used to match the share of BEVs in the total automotive sector and those of the electric batteries on the total electric equipment sectors in observed trends.

By examining both direct and indirect connections among inputs, production processes, and final goods, our approach offers a deeper perspective than traditional trade-policy analysis. The GTAP-HS framework allows us to assess how a single policy intervention can cause ripple effects throughout the entire supply chain. These insights are critical for policymakers, manufacturers, and other stakeholders interested in understanding not only how the market for electric vehicles might evolve, but also how changes in one sector can affect upstream and downstream production in the broader economy.

4. DISCUSSION OF RESULTS

The findings from our simulations highlight the complex and uneven effects of a 30% tariff applied to electric vehicles and their critical input, batteries, across EU member states. While the EU implements a single trade policy with uniform external tariffs, the structural differences between member states result in highly divergent outcomes. This disparity stems from variations in production systems, supply chain structure and different foreign supply sources. By focusing on Italy and Germany - two economies that exemplify contrasting approaches to automotive manufacturing and trade dynamics - we can better understand how a uniform policy interacts with a fragmented industrial landscape.

Table 1. Price effects on batteries and electric vehicles

a) Domestic prices (% change)

	Batteries	EV
Italy	2,90	0,87
Germany	2,76	0,88

b) Import prices (% change)

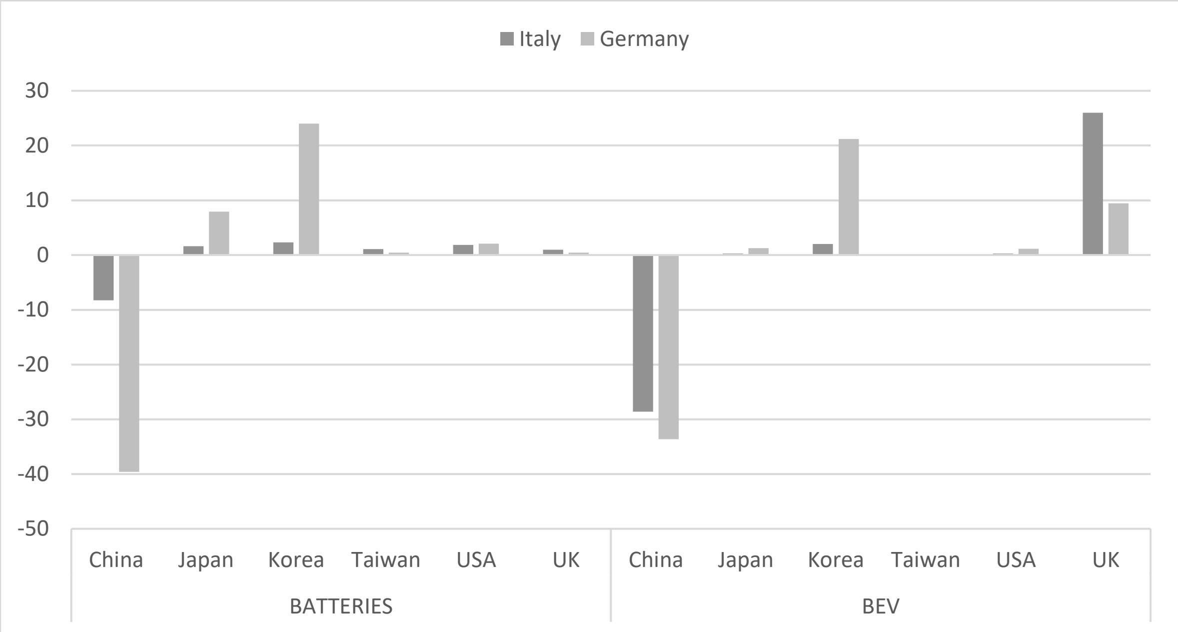
	Batteries	EV
Italy	26,4	5,78
Germany	20,5	10,4

Source: Authors' elaborations using the GTAP-HS model.

Italy, characterised by its reliance on Chinese battery imports, experiences a stark 27% increase in batteries cost as the tariff is fully absorbed into import prices. This reveals the vulnerability of Italian EV manufacturers, who depend heavily on China for batteries, a key component in the value chain. Italy's limited domestic battery production capacity and its inability to diversify sourcing exacerbate this dependency, leaving the sector highly exposed to external shocks. This reliance raises production costs and diminishes the competitiveness of Italian EVs, particularly in price-sensitive markets, where even small cost increases can significantly impact demand.

Germany, on the other hand, demonstrates greater resilience due to its more diversified supply chain, at least for batteries as an input. The same external EU tariff results in a comparatively smaller increase in production costs - 20% - as Germany benefits from access to a broader range of suppliers, including domestic and intra-EU producers. This supply chain integration enables German manufacturers to absorb part of the cost-price shock, highlighting the strategic advantage of maintaining strong backward linkages within the EU. However, when moving to the EV market, the structure of Italy and Germany is different, and, in this case, leading to the opposite impact than the batteries one. Germany’s reliance on external markets for both sourcing and selling EVs introduces vulnerabilities of its own, particularly as global trade tensions reshape traditional supply routes. A 30% tariff on EVs results in a relatively modest 5% increase in import prices for Italy, reflecting its lower dependency on Chinese EV imports compared to batteries. Germany, however, faces a 10% rise in import prices, indicating a higher exposure to Chinese EV exports.

Figure 1. Effect on market shares’ reallocation among non-EU suppliers



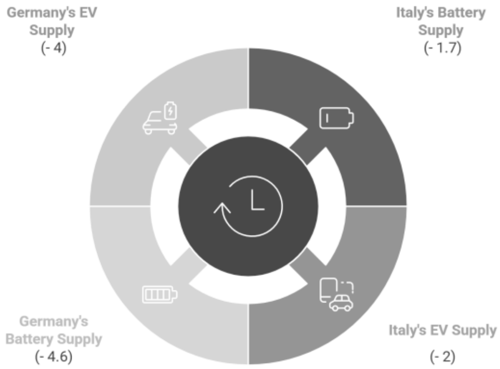
Note: The values represent percentage point changes in each supplier's share of total extra-EU imports in each national market.
Source: Authors’ elaborations using the GTAP-HS model.

The differential transmission of the tariff increase on production costs and electric vehicle prices is clearly reflected in the foreign market, where Italy and Germany adjust their sourcing strategies for batteries and EV imports.

For batteries, Italy shows a strong dependency on China, with nearly the full tariff impact being transmitted to prices due to its inability to diversify its supply sources. In contrast, Germany shifts its procurement strategy towards other Asian markets such as Japan and South Korea, leveraging a more flexible and diversified supply chain.

In the case of electric vehicles, the tariff impact is significant for both Italy and Germany. However, the two countries exhibit distinct patterns in their sourcing adjustments. Germany increases its share of imports from South Korea, highlighting its reliance on extra-EU suppliers. Meanwhile, Italy relies more on imports from within the EU, particularly from the United Kingdom. These differing sourcing strategies underline the divergence in price transmission mechanisms and market dynamics between the two economies.

Figure 2. Impact on extra-EU supply of EVs and batteries (scenario – baseline, pp change)



Source: Authors' elaborations using the GTAP-HS model.

The effects on domestic production show how the same policy has different impacts on Italy and Germany. Overall, EU production of EVs and batteries is expected to grow under the tariff scenario, but the growth rates differ between the two countries because of their different industrial setups. For batteries, Germany has stronger growth in total supply, domestic consumption, and exports compared to Italy. This is because Germany has a more diversified supply chain and a stronger industrial base. Italy, on the other hand, relies heavily on a few foreign suppliers, making it harder to increase domestic production and meet growing demand. For EVs, Germany, as the biggest producer in Europe, sees moderate growth in supply, domestic consumption, and exports. Italy shows smaller growth rates due to its less developed EV manufacturing sector, with fewer advanced facilities and a weaker supply chain. This makes it harder for Italy to take full advantage of the shift in demand toward EU-made EVs. The growth in production comes mainly from higher demand for EU-made EVs and batteries and a shift in exports away from Chinese suppliers. However, Figure 2 also shows that both countries are less competitive in markets outside the EU, like the United States, where Chinese producers may gain more market share. Germany's stronger industry helps it adapt better to these changes, while Italy continues to face challenges in growing its battery and EV sectors.

A closer look at input costs shows that tariffs have a much greater impact on batteries than on EVs. As a key component, batteries drive up production costs across the entire value chain. A 30% tariff on batteries places a significant burden on manufacturers, especially in countries like Italy, where supply chains are weaker and less integrated. This raises questions about the effectiveness of a uniform trade policy in addressing the diverse realities of the European automotive sector. Policymakers should consider tailored approaches that account for structural differences among member states while ensuring that protective measures do not harm less competitive economies.

These findings highlight the challenges of balancing protectionism with the EU's goal of a competitive, integrated single market. While tariffs may boost domestic production and reduce foreign dependence, they also reveal the fragility of Europe's production systems and the uneven ability of member states to adapt. How can the EU achieve strategic autonomy without exacerbating internal disparities? Should future trade policies focus on harmonisation or adapt to each member state’s unique situation? Addressing these questions requires a flexible policy framework that tackles current weaknesses and builds long-term industrial resilience and sustainable growth.

5. CONCLUSIONS

The scale of investment required for the green transition, combined with uncertainties surrounding ecological and technological changes, makes strong public intervention essential. Securing access to resilient global value chains that can withstand market turbulence remains a key challenge. However, the balance between large-scale planned investments and protectionist policies can create unintended consequences. These measures, while aimed at boosting domestic production, can lead to unfair competition and undermine multilateral trade commitments, which are increasingly overlooked. The EU faces a delicate challenge: fostering strategic autonomy while remaining open to global trade—a "reluctant unilateralism" that relies on unilateral actions to achieve strategic goals. The tariffs on Chinese EVs illustrate this approach, prioritizing autonomy over trade liberalization. This study explored three key areas of these countervailing measures: their impact on foreign dependence, the competitiveness of the European EV sector, and consumers. First, the tariffs are likely to significantly reduce China's role as a major exporter of EVs to Europe. However, this reduction is partially offset by increased market shares for other trading partners like the United Kingdom and South Korea. These shifts depend on the EU's trade relationships, showing how interconnected global trade is.

Second, while the tariffs encourage domestic production, the benefits are uneven across member states. Germany's strong industrial base and integrated supply chain allow it to benefit more from reduced Chinese competition, while Italy struggles to take advantage due to its weaker production capacity and export presence. Intra-EU trade strengthens, boosting regional competitiveness, but Italian and German exporters face tougher competition in markets outside the EU, such as the United States, where Chinese manufacturers might gain ground. This demonstrates the double-edged nature of protectionist measures: they can strengthen internal production but also reduce global competitiveness.

Third, the increase in import prices raises concerns about affordability. Higher costs for both imported and domestic EVs could slow consumer adoption, potentially jeopardizing the EU's decarbonization goals. While these measures aim to protect local industries, they risk making EVs less affordable and delaying the transition to sustainable mobility. Policymakers must carefully balance these trade-offs by pairing protectionist measures with investments that lower production costs and enhance affordability over time.

The study also highlights potential challenges. Chinese manufacturers may respond by relocating production to the EU, which could weaken the effectiveness of the tariffs. Additionally, European producers operating in China could face new trade barriers, further complicating global trade dynamics. These factors suggest that the benefits of tariffs may be overestimated and underline the need for a broader, more cohesive strategy. The EU’s industrial strategy must address these complexities. As noted in the Draghi Report on Competitiveness, the EU’s ambitious green transition goals require a coordinated industrial policy framework. Moving beyond reactive trade policies, the EU needs a forward-looking strategy that promotes collaboration among member states. Investments in R&D, support for emerging technologies, and the development of a resilient internal supply chain are essential. Instead of focusing solely on defending industries against global competition, the EU should prioritize strategic capabilities like battery production, raw material processing, and infrastructure development.

The collapse of companies like Northvolt highlights the fragility of Europe’s supply chain efforts. To succeed, the EU must invest not only in production but also in the raw materials and technologies that underpin the EV sector. Without targeted consumer incentives, higher

EV prices could slow adoption, delaying the economies of scale needed to reduce costs and make EVs accessible to all. Trade policies alone cannot solve the structural challenges facing Europe's EV sector. Industrial policies must complement trade measures by addressing long-term competitiveness through innovation, productivity growth, and public investments. As Juhász et al. (2023) argue, industrial policies should aim to reshape economic activity to achieve public goals, from technological leadership to sustainable job creation. he European automotive industry stands at a crossroads. Without stronger interventions focused on innovation, infrastructure, and workforce development, the sector risks falling behind. At the same time, higher consumer costs could delay the transition to sustainable mobility, putting the EU's climate goals at risk. Effective industrial policy must address these interconnected challenges, ensuring that the green transition benefits both producers and consumers while maintaining Europe's global competitiveness.

The shift to electric vehicles reflects broader changes in how cars are designed, produced, and consumed. In Europe, stagnant vehicle demand underscores the urgency of innovation and emission reductions. While the transition to electrification is already underway, driven by global trends in the United States and China, the EU must act decisively to close the investment gap in EV-related technologies. By preparing its workforce and supporting businesses strategically, the EU can secure its place as a global leader in sustainable mobility.