KIEL

# POLICY BRIEF

Gabriel Felbermayr, Klaus Friesenbichler, Julian Hinz, and Hendrik Mahlkow

## Time to be Open, Sustainable, and Assertive: Tariffs on Chinese BEVs and retaliatory measures

No. 177 | July 2024

Kiel Institute for the World Economy
ISSN 2195–7525

# OVERVIEW/ÜBERBLICK

- From 4 July, the EU will impose provisional countervailing tariffs of 21% on battery electric vehicles (BEVs) imported from China. It is the last large market — and in itself largest export market — to impose new substantial trade barriers against Chinese BEVs.
- According to simulations of a large-scale trade model (KITE model), this measure raises the car prices in the EU and lowers them in China in the long-run. Yet, the effects are small. Short-term effects are likely to be larger. Car imports from China are expected to fall by 42%, but this effect is largely offset by diversion of European sales to domestic markets and higher imports from other third markets. EU car exports are only marginally affected. Value added in the EU's car industry rises by 0.4%, while it falls by 0.6% in China. In most EU countries, welfare increases, but by less than 1/100th of a percentage point.
- The EU imposes regular (MFN) import tariffs of 10% on car imports from WTO members with which it does not have a free trade agreement. If it reduced the tariffs on BEVs to zero, prices in the EU could fall by as much as 0.8% (EU average). If the EU maintains the countervailing duties on Chinese BEVs, car imports from China would fall by more than 20% while those from third markets would go down by about 1%. EU car exports would be little changed. A combination of a reduction of MFN tariffs coupled with countervailing duties on Chinese cars would be a perfect implementation of the EU's new trade policy doctrine which is meant to be, at the same time, "*open, sustainable and assertive.*"
- An increase in the Chinese BEV industry's productivity by 50% would depress car prices in the EU by some 0.5%, and by 0.3% if these were coupled with countervailing duties. Imports of cars from China would increase by around 160%. EU car exports would decline about 7%; countervailing tariffs mitigate this effect, but only slightly. EU welfare falls.
- China has announced anti-dumping duties of 50% on EU pork. This measure has a very modest and qualitatively mixed impact on EU welfare.
- Given that the EU investigation has found evidence of WTO-incompatible subsidies for BEVs in China, the EU is right to respond with countervailing duties. However, the Commission should better explain its methodology and, if needed, make adjustments before imposing definitive

duties. Moreover, to avoid the risk of a spiral of escalation, the EU should make every effort to reach a negotiated outcome. To facilitate such an outcome and limit adverse price effects, the EU could offer to reduce its most-favored-nations tariffs on BEVs, which would address the issue of excessive Chinese subsidies while lowering BEVs as a whole.

**Keywords:** Countervailing Tariffs, Trade Wars, New Quantitative Trade Model

- Ab dem 4. Juli erhebt die EU vorläufige Ausgleichszölle in Höhe von 21% auf aus China importierte batteriebetriebene Elektrofahrzeuge (BEV). Damit ist sie der letzte große Markt — und zugleich der größte Exportmarkt — der neue erhebliche Handelsschranken gegen chinesische BEVs errichtet.
- Simulationen des mit Hilfe des KITE-Modells zeigen, dass diese Maßnahme langfristig die Autopreise in der EU erhöht und in China senkt, aber die Auswirkungen sind gering. Kurzfristig sind die Effekte wahrscheinlich größer. Die Einfuhren von Kraftfahrzeugen aus China gehen um 42% zurück, teilweise ausgeglichen durch höhere Einfuhren aus anderen Drittländern. Die EU-Autoexporte sind nur geringfügig betroffen. Die Wertschöpfung in der EU-Autoindustrie steigt um 0,4%, während sie in China um 0,6% sinkt. Der Wohlstand in den meisten EU-Ländern steigt um weniger als 1/100 eines Prozentpunkts.
- Die EU erhebt reguläre Einfuhrzölle (Meistbegünstigungszölle) von 10% auf Autoeinfuhren aus WTO-Mitgliedern ohne Freihandelsabkommen. Würde sie die Zölle auf BEVs auf Null senken, könnten die Preise in der EU um bis zu 0,8% (EU-Durchschnitt) fallen. Bei Beibehaltung der Ausgleichszölle auf chinesische BEVs würden die Einfuhren aus China um mehr als 20% zurückgehen, während die aus Drittländern um etwa 1% sinken würden. Die EU-Autoexporte würden sich kaum verändern. Eine Kombination aus Senkung der Meistbegünstigungszölle und Ausgleichszöllen auf chinesische Autos wäre eine perfekte Umsetzung der neuen EU-Handelspolitik, die "offen, nachhaltig und entschlossen" sein soll.
- Ein Produktivitätsanstieg in der chinesischen BEV-Industrie um 50% würde die Autopreise in der EU um 0,5% drücken, mit Ausgleichszöllen um 0,3%. Importe aus China würden sich um 160% erhöhen. Die EU-Autoexporte würden um 7% zurückgehen; Ausgleichszölle würden diesen Effekt nur geringfügig abmildern. Der Wohlstand in der EU würde sinken.

- China hat angekündigt, europäische Exporteure mit Antidumpingzöllen auf Schweinefleisch in Höhe von 50% zu belegen. Diese Maßnahme hat marginale Auswirkungen auf den Wohlstand in der EU.
- Da die EU-Untersuchung Beweise für WTO-widrige Subventionen für BEVs in China ergeben hat, reagiert die EU zu Recht mit Ausgleichszöllen. Die Kommission sollte jedoch ihre Methodik besser erläutern und gegebenenfalls Anpassungen vornehmen, bevor sie Anfang November endgültige Zölle einführt. Um keine Eskalationsspirale zu riskieren, sollte die EU ein Verhandlungsergebnis anstreben. Zur Erleichterung eines solchen Ergebnisses und zur Verringerung der negativen Auswirkungen auf die BEV-Preise in der EU könnte die EU anbieten, die Meistbegünstigungszölle auf BEVs zu senken.
- Da die EU-Untersuchung Beweise für WTO-widrige Subventionen für BEVs in China ergeben hat, reagiert die EU zu Recht mit Ausgleichszöllen. Die Kommission sollte jedoch ihre Methodik besser erläutern und gegebenenfalls Anpassungen vornehmen, bevor sie Anfang November endgültige Zölle einführt. Um keine Eskalationsspirale zu riskieren, sollte die EU ein Verhandlungsergebnis anstreben. Zur Erleichterung eines solchen Ergebnisses und zur Begrenzung der negativen Preisauswirkungen könnte die EU anbieten, die Meistbegünstigungszölle auf BEVs zu senken, was das Problem exzessiver chinesischer Subventionen adressiert und gleichzeitig Preise von Elektrofahrzeugen insgesamt senkt.

**Schlüsselwörter:** Ausgleichszölle, Handelskriege, neues quantitatives Handelsmodell

**Gabriel Felbermayr**
Austrian Institute of Economic Research (WIFO) & ASCII & Research Center International Economics (FIW)
*gabriel.felbermayr@wifo.ac.at*

**Klaus Friesenbichler**
Austrian Institute of Economic Research (WIFO) & Supply Chain Intelligence Institute Austria (ASCII)
*klaus.friesenbichler@wifo.ac.at*

**Julian Hinz**
Bielefeld University & Kiel Institute for the World Economy
*julian.hinz@ifw-kiel.de*

**Hendrik Mahlkow**
Austrian Institute of Economic Research & Kiel Institute for the World Economy & FIW
*hendrik.mahlkow@ifw-kiel.de*

The responsibility for the contents of this publication rests with the authors, not the Institute. Any comments should be sent directly to the corresponding author. The present work has been carried out pro bono by the authors on their own initiative. The Kiel Institute and WIFO work together to maintain and develop the Kiel Institute Trade Policy Evaluation (KITE) Model and are supported by a grant from the Austrian Research Center International Economics (FIW); see https://www.fiw.ac.at/en/kite-model/ or https://www.ifw-kiel.de/institute/research-centers/trade/trade-policy/kite-kiel-institute-trade-policy-evaluation/ for details.

# Time to be Open, Sustainable, and Assertive: Tariffs on Chinese BEVs and retaliatory measures

Gabriel Felbermayr, Klaus Friesenbichler, Julian Hinz, and Hendrik Mahlkow

## 1 Introduction

In September 2023 the president of the EU Commission, Ursula von der Leyen, announced that her services will launch an anti-subsidies investigation into battery electric vehicles (BEVs) coming from China. In her State of the Union Speech at the EU Parliament in Strasbourg on September 13, she said that global markets are now "*flooded*" with "*cheaper Chinese electric cars and their prices [are] kept artificially low by huge state subsidies [...] This is distorting our market and as we do not accept this distortion from the inside in our market, we do not accept this from the outside.*"[1] Investigations started formally on October 4th, 2023.

Indeed, evidence collected by Bickenbach et al. (2024) shows that Chinese manufacturers of cars receive very substantial direct and indirect subsidies. The report shows that, over the last few years, there has been a massive increase in direct government subsidies to some of the dominant Chinese green-tech companies. For example, direct subsidies to the car maker BYD increased from about 0.2 bn Euros in 2020 to 2.1 bn Euros in 2022. The company also benefited from subsidies provided to battery producers (cheaper input components) and from purchase incentives to BEV buyers (higher domestic demand). Because these subsidies concern a sector where the EU has a traditional comparative advantage, they deteriorate the EU terms-of-trade, potentially resulting in welfare losses.

### Legal Framework and Previous Actions

The Commission regularly engages in anti-dumping and anti-subsidy investigations, following the rules of the EU and the pertinent texts of the World Trade Organization (WTO) — Art. VI of the General Agreement on Tariffs and Trade (GATT) and the detailed Agreement on Implementation (anti-dumping); Art. XVI GATT and the Agreement on Subsidies and Countervailing Measures

[1] https://apnews.com/article/eu-china-electric-vehicle-subsidy-investigation-15ec926e756a36a7612a66623ccea51f

(anti-subsidies). In fact, since 2010, the EU has initiated 270 separate anti-subsidies investigations involving China.[2]

By the end of 2022, 177 definitive trade defense measures (151 anti-dumping measures, 25 anti-subsidies measures, 1 safeguard measure) were in place, typically involving additional duties (European Commission, 2023). Roughly two-thirds of the measures affect EU imports from China; Russia, Korea, and India are frequent other targets. Since 2018, for example, the EU has applied measures against e-bikes from China. Countervailing duties meant to compensate for illegal subsidies are currently set at up to 17.2% of the value of imports, while anti-dumping duties are up to 62.1%. Both apply cumulatively and on top of the usual most-favored-nation (MFN) tariff.

Anti-subsidies measures apply to an entire foreign industry, but countervailing tariffs may vary across exporters. Anti-dumping measures target specific foreign firms. The third type of trade remedies contained in the WTO's rule book is safeguard tariffs (Art. XIX GATT). They are meant to temporarily protect a specific domestic industry from a sudden increase in imports of any product that causes or threatens to cause, serious injury to the industry. Safeguard tariffs are applied *erga omnes*, i.e., against all trade partners.

In each case, to meet WTO standards, the EU Commission has to conduct an in-depth investigation which (i) establishes the presence of illegal subsidies, (ii) demonstrates that there is damage in the EU (injury), (iii) proves causality, and (iv) demonstrates Union interests. Tariffs are supposed to 'remedy' the damage done, not to punish foreign firms or governments. The term 'punitive' tariffs, often used in public discussions, is both wrong and potentially dangerous as the use of the word insinuates that the EU wants to 'punish' Chinese firms, thus breaching WTO-rules.

## Current Investigation

In the case of BEVs from China, the EU opted for an anti-subsidies procedure. This allows to target a specific country while allowing for firm-level differences. In an unusual move, the Commission initiated the investigation *ex officio* and not based on an industry complaint as is normally the case. Indeed, major car makers, especially OEMs from Germany, have been opposing the investigation. According to press statements, European original equipment manufacturers (OEMs) were only very partially consulted by the Commission. A 2023 analysis reveals that EU carmakers, through joint ventures, produce 55% of BEVs manufactured in China and sold in the EU. This share is substantial,

[2] See Francis, 2023.

even though it declined from 68% in 2022, which is in line with China's 5-year strategy. Hence, these companies will be directly affected by the tariffs. However, the vast majority of the suppliers to the OEMs is located in China (85%, Klimek et al., 2024) so that the amount of European value added affected by the trade remedies is bound to be limited.

In determining the subsidy margin, i.e., the illegitimate cost advantage foreign producers enjoy due to government subsidies, the Commission has decided to sample three car makers. Interestingly, it chose not to sample the Shanghai plant of US carmaker Tesla, the largest but also (presumably) least subsidized exporter of electric cars from China to Europe. This move is likely to inflate the average subsidy margin on which the average countervailing tariff will be based. In making these choices, the EU Commission has followed the European rules which are, in turn, based on the respective WTO provisions. However, there is a political discussion on procedural questions regarding the Commission's anti-subsidies investigation.

At the outset of the investigation, according to the Commission, electric vehicles manufactured in China had around 8% market share, with a doubling of that share expected within two years. Figures from the European car association ACEA show that Chinese brands of electric vehicles made up just 3.7% of total electric car sales in the EU in 2023. In 2019 this figure stood 0.4%. The commission expects manufacturing capacity for electric vehicles in China to increase from 5.7 million units in 2021 to around 15 million units. These rapid and potentially disruptive developments *per se* are no justification for an anti-subsidies probe; rather, they would call for safeguard tariffs. However, in autumn 2023, the Commission cited evidence of subsidies at various levels of government in China and across the supply chain. These subsidies concern raw materials, battery production, vehicle production, and software components. The broad nature of government aid calls for an anti-subsidies investigation rather than for anti-dumping proceedings. In particular, the commission investigated (i) direct transfer of funds and potential direct transfers of funds or liabilities, (ii) government revenue forgone or not collected, and (iii) government provision of goods or services for less than adequate remuneration.

On June 12th, the EU communicated its provisional findings.[3]. Chinese subsidies that are assumed inconsistent with WTO-rules take various forms. The EU investigation strongly focuses on the lithium prices paid by Chinese producers, as this input to batteries is key in explaining international price differences. It recommends countervailing duties on BEVs manufactured in China amounting to 21% on average. Thus, the assumed illegal cost advantage of Chinese producers amounts to 17.35%.

[3] https://ec.europa.eu/commission/presscorner/detail/en/ip_24_3231

The countervailing tariff remedies that distortion. The average is based on the three car-makers sampled: the countervailing duty on BYD models is set at 17.4%, on Geely models at 20%, and on models by SAIC, a joint venture with the US brand General Motors and the German carmaker Volkswagen, at 38.1%. Other BEV producers in China, which cooperated in the investigation but have not been sampled, would be subject to the weighted average duty of 21%. All other BEV producers in China that did not cooperate in the investigation would be subject to a 38.1% duty. The duties are brand and firm-nationality-neutral. EU-branded and US-branded electric cars would be hit if their production origin is China and their exports go to the EU. Those tariffs could be provisionally applied by July 4th. Definitive measures are to be imposed within 4 months after the imposition of provisional duties. Within this timeframe, the EU Commission should better explain its methodology and potentially make adjustments to avoid the seemingly paradoxical situation that EU-owned carmakers in China face higher tariffs than their China-owned competitors.

Following a request, the OEM Tesla may receive an individually calculated duty rate at the definitive stage. Any other company producing in China not selected in the final sample that wishes to have its particular situation investigated can ask for an accelerated review, just after the imposition of definitive measures (i.e. 13 months after initiation). The deadline for concluding such a review is nine months. Thirteen Chinese auto groups are in a similar situation as Tesla, including some with joint ventures with European firms such as BMW or Peugeot. It remains to be seen whether the OEMs apply for differential treatment as such a decision could lead to duties above 21% while forcing the companies to reveal precious information.

## Potential Concerns

While the rationale for the measures is clear, there are two concerns about imposing anti-dumping duties on Chinese electric vehicles in the EU. First, the Chinese authorities are expected to respond with retaliatory measures. There is no legal basis in the WTO texts for such action unless it is claimed that the EU has reached its conclusions in disregard of WTO law. However, as the investigation of anti-subsidy or anti-dumping cases and the decision to impose remedies are political decisions, there is some political room for maneuver.[4] Indeed, China already has announced to possibly hit EU exports of pork with its own anti-dumping investigation and possible duties, thereby hurting EU producers.[5] Interestingly, though, both the absolute level of pork exports to China (at about 3 bn

[4] There is a substantial literature investigating this question; see G. Felbermayr and Sandkamp, 2020.

[5] See https://www.reuters.com/markets/china-may-take-anti-dumping-measures-against-eu-pork-imports-official-says-2024-06-20/. As the EU and in line with WTO law, China has launched a proper investigation and can impose

Euro in 2023) and the EU's share in Chinese imports has already fallen substantially over the last years so that the action may be only a minor nuisance to Europe. But, of course, China could go further and farther in its retaliatory measures. Retaliation in a sector different from the one targeted in the first place is not uncommon in trade disputes. In the last section of this policy brief, Section 4, we argue that the risk of retaliation is not a valid argument for the EU not to impose the duties once an anti-subsidies investigation is launched. Ideally, the parties to the conflict should engage in negotiations to avoid escalation. We will make suggestions that could facilitate such a bargain. In any case, if negotiations fail, China and the EU will meet before the WTO dispute settlement bodies. Both are parties to the Multiparty Interim Appeal Arbitration Agreement (MPIA) which substitutes for the dysfunctional WTO Appellate Body. Therefore, if contained within the limits foreseen by WTO-law, escalation could be contained even if negotiations fail.

A second concern relates to the pricing of BEVs in the EU. Depending on demand and supply elasticities, EU consumers will have to bear a share of the duties. The exact incidence of duties is difficult to pin down, not least because of complicated supply networks that link the Chinese and the EU car sectors. To make progress, one needs a fully-fledged economic model. However, it is ex-ante clear that the additional duties can only increase the consumer price in the EU, adding to inflation and making the desired electrification of individual mobility more costly. If this is indeed a valid concern, the EU should lower the 10% MFN-tariff applied to all imports of BEVs into the EU from third countries with which the EU has no preferential trade agreement. Such a move could also help strike a bargain with China — more in Section 4. Another question about the incidence of the burden relates to the supply side. While EU car manufacturers may be indirectly affected by EU tariffs, evidence on the value chain structures presented below suggests that EU-based suppliers seem to be involved to a rather limited extent.

The remainder of this paper is structured as follows. Section 2 presents descriptive evidence on the EU's trade in BEVs specifically and cars more generally, as well as the supply networks underlying global BEV production. Section 3 uses a large-scale general equilibrium trade model with detailed intra- and international input-output linkages to simulate the effects of various scenarios, including decisions that precede the EU's investigation such as the 100% tariffs on BEVs applied by the Biden administration from July 1st onwards. Also, we offer a scenario that tries to shed light on future developments by assuming a substantial increase in Chinese sector productivity. Section 4 concludes with policy recommendations.

provisional tariffs once it thinks to have sufficient evidence.

## 2 Descriptive evidence

We start by providing the background against which the current investigations and discussions are taking place. We examine the state of exports and imports of cars (and car parts) in general, and BEVs specifically. The analysis provides essential context for understanding the implications of the EU's anti-subsidies investigation into Chinese BEVs and the status-quo when discussing possible outcomes of the simulation exercises conducted in Section 3. We also briefly discuss relevant key characteristics of the supply chains for electric vehicles, as well as trade in pork, as China has threatened to retaliate to EU actions by targeting these products.

### Car trade

**Figure 1:** Flows of exports of cars (HS 8703) by origin and destination in 2022

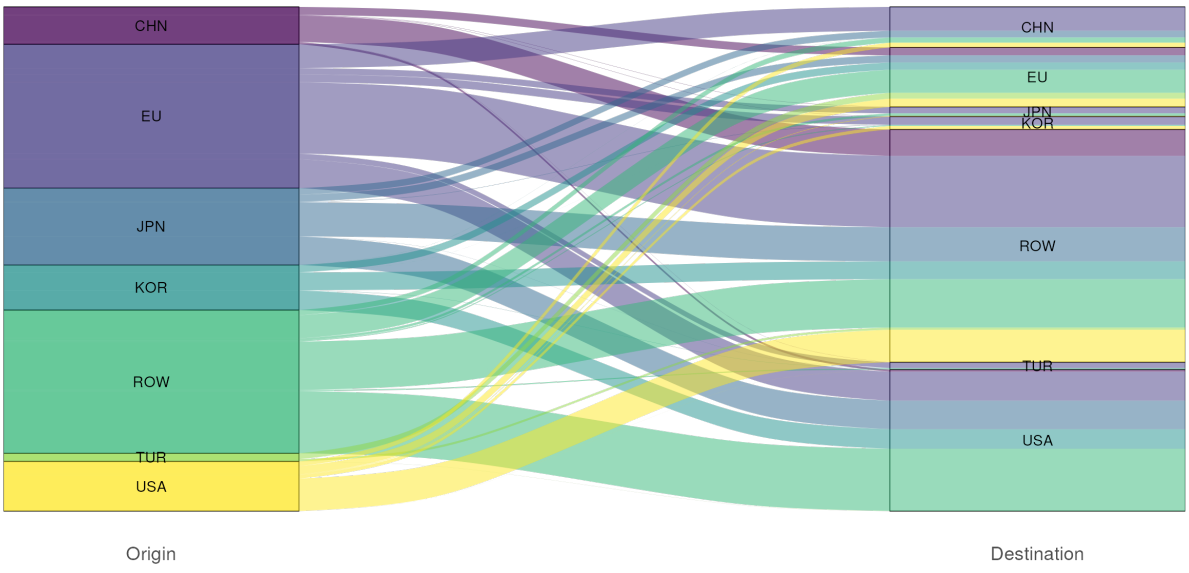
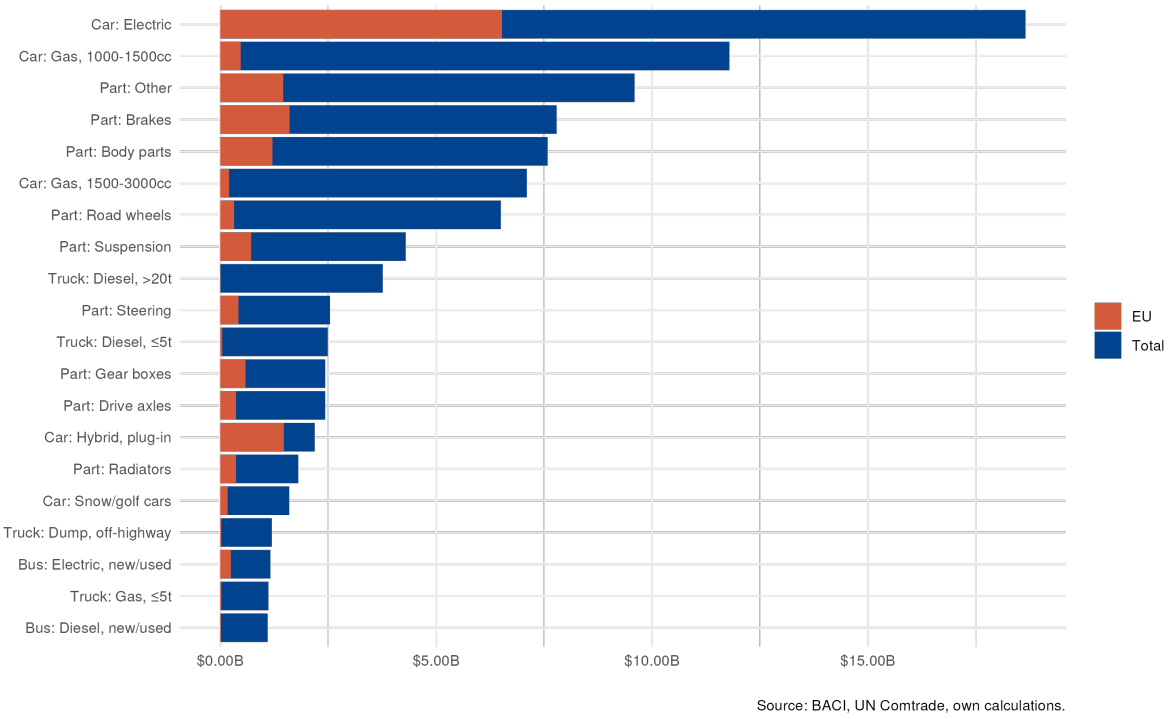



Figure 3 illustrates the global flows of car exports by origin and destination in 2022 in relative terms. The figure highlights the major car exporting and importing regions, with the EU, China, Japan, Korea, and the USA being key players in the global automotive trade. The EU, Japan, and China are the preeminent exporters, with substantial export flows to various regions including the USA, the rest of the world (ROW), and intra-region trade within the EU. The flows also show the interconnectedness of the global automotive market, emphasizing the extensive trade relationships

between these regions.

**Figure 2:** Chinese exports of cars and car parts, top 20 products by export value in 2022



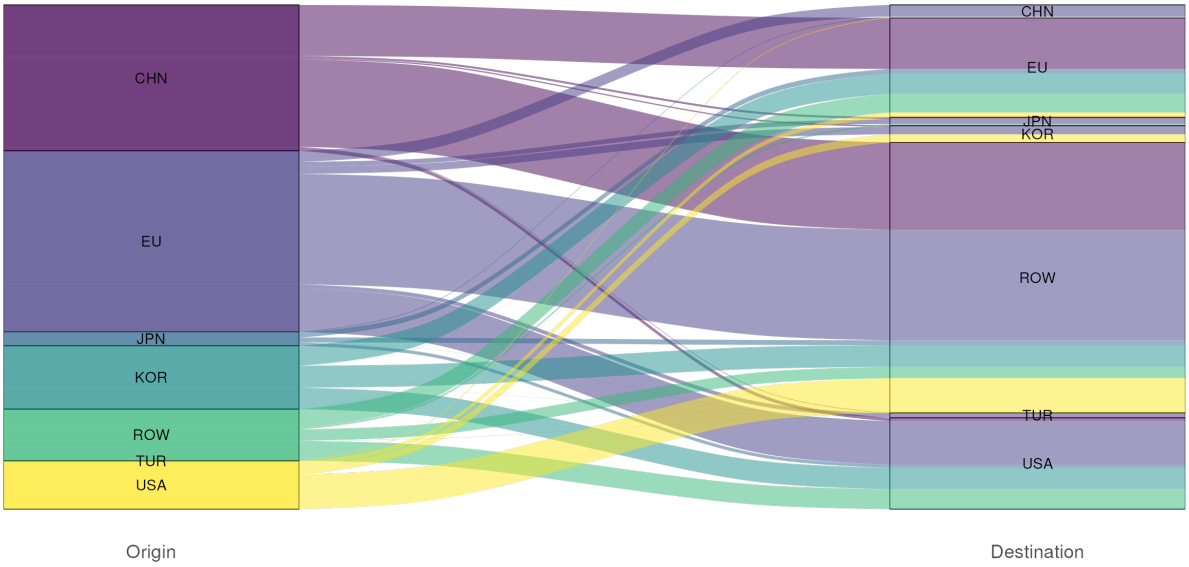

Source: BACI, UN Comtrade, own calculations.

Figure 2 illustrates the top 20 Chinese export products in the automotive sector by export value in 2022. Electric cars are by far the most significant export product, surpassing other vehicle categories and parts such as gasoline cars, brakes, and body parts. This dominance highlights China's strategic focus on electric vehicles, supported by substantial government subsidies. The figure also reveals that while traditional car parts remain important, the shift towards electric vehicles is evident. Compared to the rest of the world, the EU is a major destination for these exports, emphasizing the importance of understanding the potential impacts on the EU market.

## Electric vehicle trade

Figure **??** illustrates the global flows of battery electric vehicle (BEV) exports by origin and destination in 2022 in relative terms. The figure highlights the major exporting and importing regions for BEVs, showing significant flows from China and the EU to various parts of the world. In contrast to overall car trade flows, China stands out as the leading exporter, with substantial exports directed towards the EU, and the rest of the world. De-facto — and notably — absent as an export destination for

**Figure 3:** Flows of exports of BEVs (HS 870380) by origin and destination in 2022

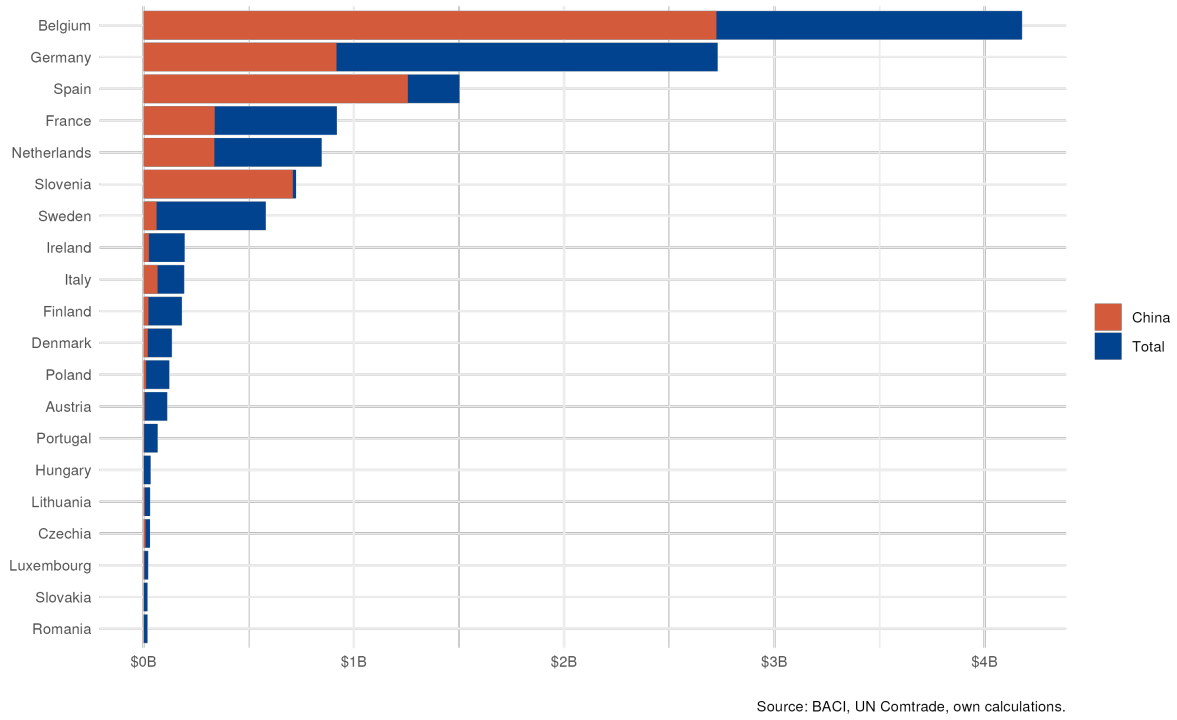



Chinese firms is the US, which recently announced additional measures (100 % tariffs). The EU is also a major exporter, with significant intra-EU trade as well as exports to other regions. The interconnectedness of BEV trade flows underscores the global nature of the electric vehicle market and the importance of understanding these trade networks in the context of the EU's anti-subsidies investigation and potential trade policies.

Figure 4 shows the top 20 countries importing electric vehicles (EVs) into the EU by import value in 2022, with the orange bars representing the portion imported from China. Belgium and Germany are the leading importers, with substantial import values that significantly surpass those of other EU countries.[6] Spain, France, and the Netherlands also feature prominently, indicating strong demand for electric vehicles in these markets. Notably, a significant portion of these imports comes from China, as evidenced by the orange sections of the bars. Countries like Belgium, Slovenia, and Spain also show a vast majority of these imports coming from China, highlighting the growing market share that Chinese companies have been able to capture. Imports of Chinese electric cars have increased significantly, by a factor of 35 between 2018 and 2022.

[6]Note that imports to Belgium likely do not translate directly into sales in Belgium. A large share of these imports is likely shipped further to other European countries. This phenomenon is regularly referred to as the *Rotterdam effect*.

**Figure 4:** EU imports of electric vehicles, top 20 countries by import value in 2022




## Supply chains for electric vehicles

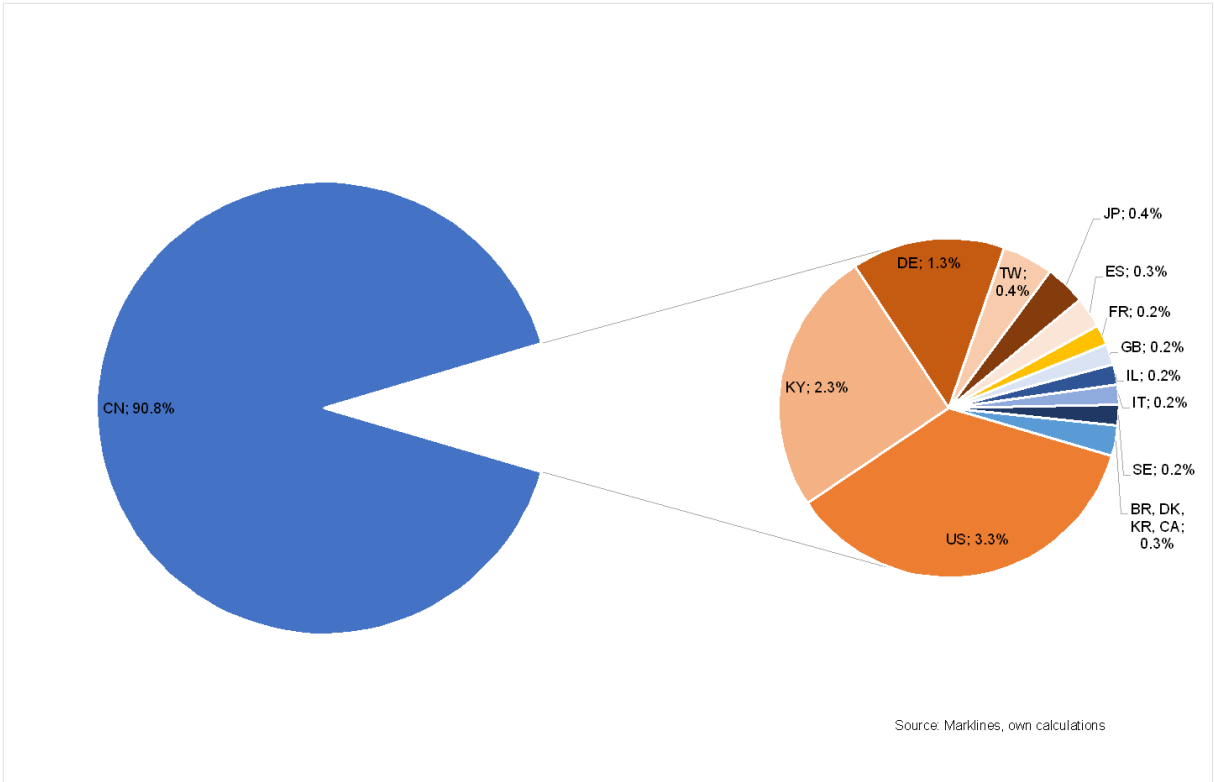
Insights into China as a production location are provided by MarkLines, an automotive industry portal.[7] Recent work using data from component manufacturers first lists all components needed to build a car and divides them into components for (i) electric vehicles, (ii) internal combustion engines, and (iii) components not related to the powertrain (e.g. tires). In total, 921 components were identified, of which only 74 are needed for electric vehicles and 232 for internal combustion engines. The remainder were classified in the category not related to powertrain technology. This suggests that electric vehicles are less complex than combustion engines in terms of component complexity. Using these products in a trade competitiveness analysis, it is clear that China has strong comparative advantages in exporting electric vehicles and related components. China's competitive advantage is visible in almost all electric vehicle components, including permanent magnets needed for AC and DC motors or climate control parts. The picture also shows that producers in the EU have competitive advantages in specific components, indicating a diversified production portfolio. The picture is reversed for components of internal combustion engines, where the EU leads in trade competitiveness,

[7] See https://www.marklines.com/.

followed by the US and China (see Friesenbichler et al., 2024). This reflects China's industrial policy of technological leapfrogging, skipping internal combustion engine technologies where Western manufacturers have a technological advantage.

The component approach was also used to paint a picture of the automotive supply industry in China. The picture is rather mixed. While 48% of parts are supplied by Chinese producers, EU producers account for 25%, comparable to the US share of 26%. However, the market appears to be segmented by ownership when looking at the value chains of specific car brands. Suppliers to Chinese carmakers are largely Chinese (90.8%; incl. Hong Kong). Within China, US suppliers account for 3.3% of all components, while German suppliers account for 1.3%, and French suppliers for only 0.2%. EU suppliers therefore seem to be involved to a rather limited extent (see also Klimek et al., 2024).

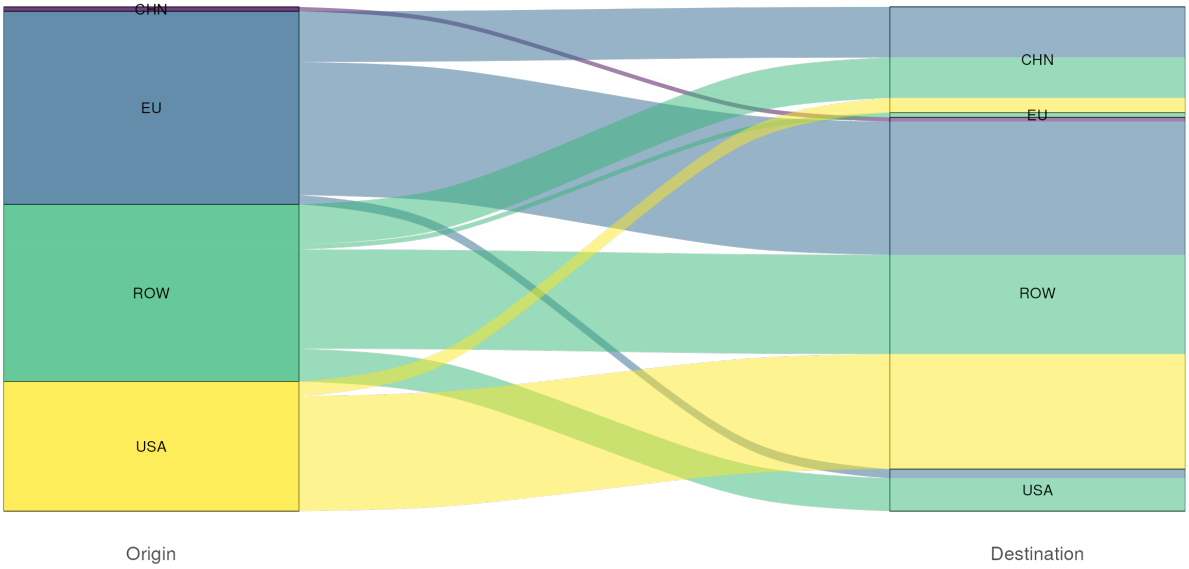
**Figure 5:** Origin of suppliers of components used by Chinese car makers




## Pork exports

Figure 6 depicts the global trade flows of pork exports in 2022, showcasing the major exporting and importing regions. The EU and the USA dominate as leading exporters, supplying significant

**Figure 6:** Flows of exports of pork (HS 0203) by origin and destination in 2022




quantities of pork to various regions worldwide, with China emerging as the principal importer. The substantial export volumes from the EU to China highlight the importance of this trade relationship. In light of China's potential retaliatory actions against EU agricultural products, specifically targeting pork, this figure underscores the potential vulnerability of the EU's pork industry to international trade disputes.

## 3 Simulation Analysis

In the following, we use a large-scale international trade model – the KITE-model – to quantify the effects of tariffs on trade flows, sectoral value-added, and the overall welfare of countries. The model is based on Caliendo and Parro (2015) and has been customized by researchers at the Kiel Institute and at WIFO to incorporate the latest available data. Aichele, G. J. Felbermayr, and Heiland (2014) and Chowdhry et al., 2024 provide the elements of the model, more details are found in the Appendix. Here it suffices to say that the model belongs to the class of so-called New Quantitative Trade Models (NQTM). It combines Ricardian elements with product differentiation and features perfect competition in all markets. The results reported below relate to the long-run effects of tariffs; in the short-run, effects can overshoot — we discuss this possibility when applicable below.

## Data and calibration

The model is calibrated to replicate the observed trade flows, sector-level outputs, and aggregate income for 160 countries or regions and 65 sectors. The data on input-output linkages is taken from the GTAP 11 dataset (Aguiar et al., 2023), while data on trade flows from the BACI dataset (Gaulier and Zignago, 2010) and tariffs from MacMap (https://www.macmap.org/).

Starting from the baseline data for the year 2017, in a first step, we adjust the model such that it captures salient features of the situation as of 2024. In particular, we incorporate the tariffs being applied by countries in June 2024, including the tariffs on BEVs from China imposed by the US Administration (100%), by India (70%), by Turkey (40%), and by various other countries. In fact, until now, the EU has remained one of the few big markets that have remained relatively open to Chinese BEVs. This serves as a "benchmark" scenario against which all subsequent scenarios are calculated. Deviations from this benchmark are calculated as changes.

We look at the following scenarios.

**S1** In scenario 1, the EU imposes an additional 21 percentage point countervailing tariff on Chinese BEVs, on top of the currently applicable 10% MFN tariffs. Such tariffs will apply by July 4, 2024.

**S2** In scenario 3, the EU reduces its MFN tariffs from 10% to zero for imports of **(a)** BEVs and **(b)** all passenger cars from all trading partners. This policy is meant to lower the prices of BEVs in the European market to facilitate the transition to zero-carbon mobility.

**S3** Scenario 3 combines S1 and S2 by reducing MFN tariffs on (a) BEVs and (b) all passenger cars to zero for all trading partners, but maintaining tariffs on Chinese BEVs at 21% Here, we assume that the EU wants to react against Chinese subsidies while avoiding an increase in car prices in the EU.

**S4** In scenario 4, China experiences an increase of total factor productivity in motor vehicle production by 50%, **(a)** without **S1** tariffs and **(b)** with **S1** tariffs on Chinese BEVs. This scenario reflects the fear that China's production capacity in the BEV sector is growing very fast so that the effect of current tariffs should be measured against future levels of competitiveness.

**S5** Scenario 5 is based on a combination of EU tariffs on Chinese electric cars from **S1** and China's (potential) retaliatory tariffs on EU pork imports of 50 percentage points.

### 3.1 Scenario 1: Current tariffs and tariff proposals on Chinese BEVs

In Scenario 1 we assume that the EU imposes an additional 21 percentage point countervailing tariff on Chinese BEVs. Because of data limitations, no distinction between BEVs and cars with internal combustion engines can be made. Instead, we apply a weighted tariff of an additional 21% on the relative share of battery electric vehicle imports from China by country according to BACI's 2021 data. Across the 5 EU states for which we report results, price increases are indeed positive but small; they lie in the interval 0.03% to 0.09% (see 1). Under the assumption that BEVs make up a share of 12% of all new car sales in the baseline equilibrium and that prices of "ordinary" cars do not change,[8] the price of BEVs goes up by between 0.3 and 0.9%.[9] In the very short run, the effects could be twice as high. In China, prices would go down because cars not sold to Europe remain on the domestic market and depress prices there. However, the price effects are very small. The reason that effects are not greater arises from the fact that many countries produce BEVs and can sell them in the EU. Moreover, the constellation of demand and supply elasticities in the model implies that Chinese car makers absorb the largest share of the additional tariff themselves.

However, the small price reaction does not mean that quantity effects are small. The simulation results show that imports of Chinese BEVs go down by about 42% in the EU, while imports from the rest of the world go up by 0.8%. Most of the drop in Chinese imports is compensated by domestic European production, with value-added growing by 0.4% on average in the EU. Together with tariff revenue quite substantially increasing by 2.2%, overall welfare in the EU is also rising — albeit modestly — by 0.008% by levying the tariffs on Chinese BEVs.

**Table 1:** Change in domestic car prices (in %).

| Scenario | CHN | AUT | DEU | ESP | FRA | ITA |
|---|---|---|---|---|---|---|
| S1. tariffs on Chinese EVs | -0.01 | 0.03 | 0.07 | 0.06 | 0.09 | 0.09 |
| S2.a zero MFN tariffs on EVs | 0.01 | -0.03 | -0.07 | -0.08 | -0.06 | -0.04 |
| S2.b zero MFN tariffs on all cars | -0.01 | -0.35 | -0.72 | -0.53 | -0.24 | -0.32 |
| S3.a zero MFN on EVs but tariffs on Chinese EVs | -0.01 | 0.01 | 0.01 | -0.05 | 0.05 | 0.05 |
| S3.b zero MFN on all cars but tariffs on Chinese EVs | -0.02 | -0.32 | -0.63 | -0.51 | -0.13 | -0.21 |
| S4.a Productivity gain in China | -10.25 | -0.33 | -0.50 | -0.44 | -0.53 | -0.53 |
| S4.b Productivity gain with tariffs on Chinese EVs | -10.28 | -0.24 | -0.31 | -0.27 | -0.29 | -0.30 |

[8] See https://alternative-fuels-observatory.ec.europa.eu/general-information/news/100-electric-vehicles-12-new-car-sales-europe-january

[9] $0.03/0.1 = 0.3$.

## 3.2 Scenario 2: Zero MFN tariffs on BEVs and all passenger cars

Scenario 2 explores the effects of reducing the EU's Most-Favored-Nation (MFN) tariffs from 10% to zero on imports of (a) battery-electric vehicles (BEVs) and (b) all passenger cars from all trading partners. This scenario is divided into two sub-scenarios to assess the differentiated impacts of tariff removal on BEVs alone versus all passenger cars.

### Scenario 2.a: Zero MFN tariffs on BEVs

In Scenario 2.a, the elimination of MFN tariffs on BEVs results in a notable decrease in domestic car prices across the EU member states. Specifically, prices decrease by 0.03% to 0.08% in countries like Austria, Germany, Spain, France, and Italy. This reduction in tariffs would lead to an increase in imports of BEVs from China by approximately 21.1% across the EU. Additionally, imports from the rest of the world show a modest increase of 0.4%. However, domestic production within the EU is adversely affected, with a slight decline in value added in the automotive industry by 0.3% on average. This shift in trade patterns results in a decrease in tariff revenue by 2.61%. Overall, the welfare impact in the EU is positive but minimal, showing an increase of 0.006%.

### Scenario 2.b: Zero MFN tariffs on all passenger cars

In Scenario 2.b, the removal of MFN tariffs on all passenger cars amplifies the effects observed in Scenario 2.a. Domestic car prices in the EU drop more significantly, with reductions ranging from 0.24% to 0.72% across the reported countries. This policy leads to a substantial increase in car imports from China, which rise by 24.5% overall in the EU. Imports from other regions also increase considerably by 14.8%. As a result, the value added in the EU's automotive industry declines by 2.1% on average, indicating a significant displacement of domestic production. The loss in tariff revenue is pronounced, with a drop of 45.51%. The welfare effects are negative, with an overall reduction of 0.004% in the EU. Car tariffs are partially borne by foreign car producers (who lower their prices) while EU countries pocket the tariff revenue, so that the elimination of tariffs leads to a terms-of-trade deterioration for the EU.[10]

Overall, Scenario 2 highlights the trade-offs involved in tariff reduction policies. While lower tariffs

[10] This is an optimal tariff argument; note, however, that a matching liberalization in a partner country can neutralize the effect on terms-of-trade wo that welfare in the EU goes up.

on BEVs and all passenger cars reduce consumer prices and increase imports, they also lead to a significant decrease in domestic production and tariff revenue, with mixed effects on overall welfare. They would, of course, further the objective of a cheap(er) green transition, a policy objective that cannot be adequately modeled explicitly in this framework.

**Table 2:** Change in car imports from China (in %).

| Scenario | EU | AUT | DEU | ESP | FRA | ITA |
|---|---|---|---|---|---|---|
| S1. tariffs on Chinese EVs | -41.9 | -42.6 | -42.4 | -42.4 | -42.3 | -42.4 |
| S2.a zero MFN tariffs on EVs | 21.1 | 2.8 | 19.9 | 41.1 | 21.7 | 5.2 |
| S2.b zero MFN tariffs on all cars | 24.5 | 3.8 | 26.2 | 34.9 | 23.8 | 29.5 |
| S3.a zero MFN on EVs but tariffs on Chinese EVs | -20.4 | -41.1 | -31.7 | 38.6 | -30.6 | -39.6 |
| S3.b zero MFN on all cars but tariffs on Chinese EVs | -19.1 | -40.7 | -28.5 | 35.6 | -29.5 | -26.6 |
| S4.a Productivity gain in China | 159.6 | 168.7 | 161.3 | 166.8 | 168.6 | 168.4 |
| S4.b Productivity gain with tariffs on Chinese EVs | 54.2 | 55.5 | 52.6 | 55.8 | 57.2 | 56.9 |

**Table 3:** Change in car imports from Rest of World (in %).

| Scenario | EU | AUT | DEU | ESP | FRA | ITA |
|---|---|---|---|---|---|---|
| S1. tariffs on Chinese EVs | 0.8 | 0.4 | 0.7 | 0.7 | 0.7 | 0.7 |
| S2.a zero MFN tariffs on EVs | 0.4 | 0.0 | 1.0 | 0.2 | -0.4 | 0.1 |
| S2.b zero MFN tariffs on all cars | 14.8 | 9.0 | 25.4 | 12.1 | -0.2 | 2.8 |
| S3.a zero MFN on EVs but tariffs on Chinese EVs | 1.2 | 0.4 | 1.8 | 0.6 | 0.4 | 0.8 |
| S3.b zero MFN on all cars but tariffs on Chinese EVs | 15.6 | 9.4 | 26.4 | 12.5 | 0.6 | 3.7 |
| S4.a Productivity gain in China | -3.9 | -2.3 | -5.0 | -3.1 | -2.5 | -2.8 |
| S4.b Productivity gain with tariffs on Chinese EVs | -2.0 | -1.4 | -3.2 | -1.5 | -0.6 | -1.0 |

*Note:* Rest of World without China.

## 3.3 Scenario 3: Combined tariffs on Chinese BEVs and zero MFN tariffs

Scenario 3 combines the effects of Scenario 1 and Scenario 2 by reducing the EU's MFN tariffs to zero on imports of (a) battery electric vehicles (BEVs) and (b) all passenger cars from all trading partners while maintaining a 21% countervailing tariff on Chinese BEVs. This scenario is divided into two sub-scenarios to examine the differentiated impacts.

### Scenario 3.a: Zero MFN tariffs on BEVs but maintaining tariffs on Chinese BEVs

In Scenario 3.a, the elimination of MFN tariffs on BEVs is combined with the imposition of a 21% tariff on Chinese BEVs. This results in mixed effects on domestic car prices within the EU. While

the overall reduction in MFN tariffs leads to lower prices in some countries, the specific tariff on Chinese BEVs mitigates these effects. Domestic car prices change slightly, ranging from a decrease of 0.05% in Spain to an increase of 0.05% in France and Italy. Imports of Chinese BEVs decrease by 20.4% across the EU — only half the reduction compared to Scenario 1. Imports from the rest of the world increase modestly by 1.2%, as here trade barriers are now significantly smaller than before. The value added in the EU automotive industry shows a slight positive change, averaging 0.1%. The tariff revenue sees a minimal increase of 0.10%, and overall welfare in the EU rises modestly by 0.008%.

### Scenario 3.b: Zero MFN tariffs on all passenger cars but maintaining tariffs on Chinese BEVs

In Scenario 3.b, the reduction of MFN tariffs on all passenger cars is combined with the imposition of the 21% tariff on Chinese BEVs. This scenario leads to a more pronounced decrease in domestic car prices in the EU, with reductions ranging from 0.13% in France to 0.63% in Germany. Imports of Chinese cars decline by 19.1% overall, while imports from other regions rise significantly by 15.6%. The domestic automotive industry experiences a decrease in value added by 1.8% on average across the EU. Tariff revenue drops considerably by 42.68%. The welfare impact in the EU is slightly negative, showing a reduction of 0.002%.

Overall, Scenario 3 illustrates the ambiguous impacts of maintaining targeted tariffs on Chinese BEVs while reducing MFN tariffs on a broader scale. While these measures help to manage domestic car prices and thus further the green transition, they also lead to reduced imports from China by addressing artificially lower prices due to the high subsidies. However, a combination of lower MFN tariffs on "green" BEVs and countervailing duties on Chinese BEVs would square very well with the EU's new trade policy doctrine which is meant to be, at the same time, "*open, sustainable and assertive.*"[11]

Figure 7 underlines this point. Comparing the situation between Scenario 1 and Scenario 3.a, the former case results in EU producers largely stepping in to replace foregone Chinese car sales. On average, in the EU average roughly 80% of the new sales would stem from own increased or rerouted production. In contrast, in Scenario 3.a, previous Chinese car sales are being replaced to a smaller degree by domestic production and to a larger degree by imports from other origin countries, most

[11] See https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_645.

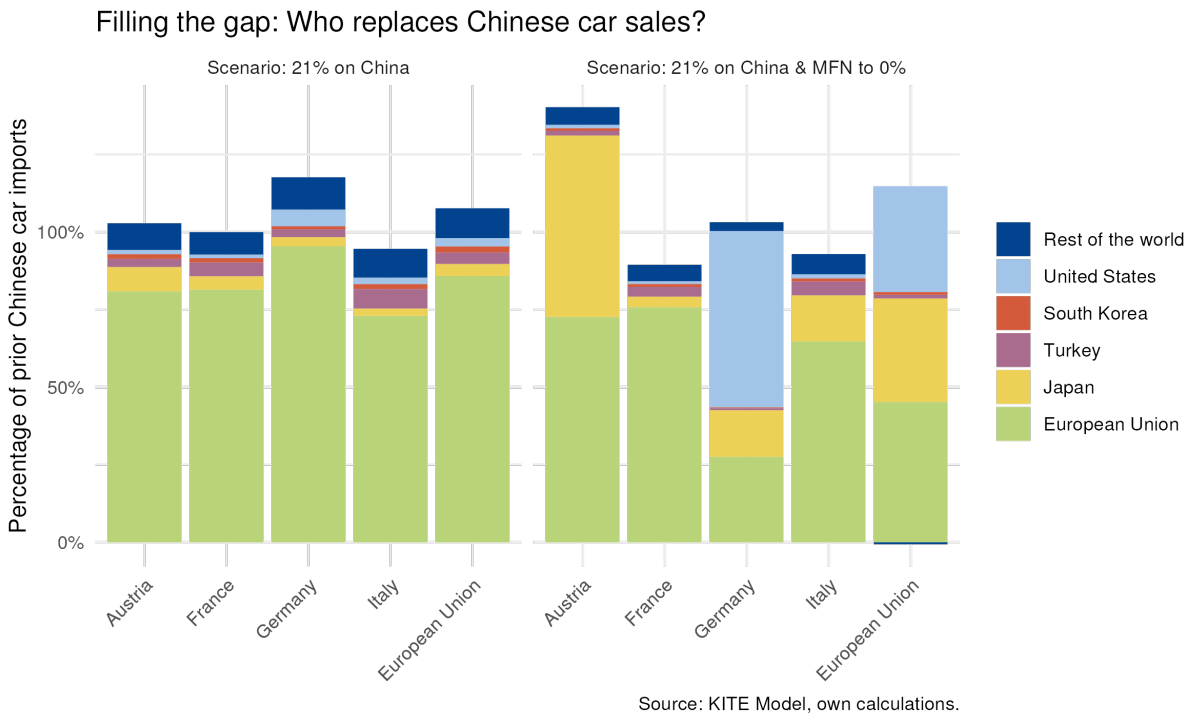



**Figure 7:** Replacement of Chinese BEV sales by other origins

notably the United States and Japan.

**Table 4:** Change in car exports (in %).

| Scenario | EU | AUT | DEU | ESP | FRA | ITA |
|---|---|---|---|---|---|---|
| S1. tariffs on Chinese EVs | 0.2 | 0.4 | 0.1 | 0.3 | 0.4 | 0.3 |
| S2.a zero MFN tariffs on EVs | -0.2 | -0.3 | -0.1 | -0.2 | -0.4 | -0.3 |
| S2.b zero MFN tariffs on all cars | -0.9 | -2.4 | 0.3 | -1.5 | -3.6 | -1.8 |
| S3.a zero MFN on EVs but tariffs on Chinese EVs | 0.1 | 0.1 | 0.0 | 0.3 | -0.1 | -0.0 |
| S3.b zero MFN on all cars but tariffs on Chinese EVs | -0.7 | -2.0 | 0.4 | -1.0 | -3.2 | -1.6 |
| S4.a Productivity gain in China | -7.3 | -7.6 | -8.9 | -4.7 | -5.9 | -8.2 |
| S4.b Productivity gain with tariffs on Chinese EVs | -6.7 | -6.6 | -8.5 | -3.8 | -4.9 | -7.5 |

*Note:* This table also accounts for intra-EU exports.

## 3.4 Scenario 4: Increased productivity in Chinese motor vehicle production

Finally, Scenario 4 examines the impact of a hypothetical 50% increase in the productivity of motor vehicle production in China. This scenario is analyzed in two sub-scenarios to assess the effects both without and with the 21% countervailing tariffs on Chinese BEVs as described in Scenario 1. The

**Table 5:** Change in value added in the automotive industry (in %).

| Scenario | CHN | EU | AUT | DEU | ESP | FRA | ITA |
|---|---|---|---|---|---|---|---|
| S1. tariffs on Chinese EVs | -0.6 | 0.4 | 0.4 | 0.3 | 0.4 | 0.5 | 0.4 |
| S2.a zero MFN tariffs on EVs | 0.3 | -0.3 | -0.3 | -0.2 | -0.3 | -0.5 | -0.3 |
| S2.b zero MFN tariffs on all cars | 0.3 | -2.1 | -2.9 | -1.6 | -2.3 | -3.3 | -2.2 |
| S3.a zero MFN on EVs but tariffs on Chinese EVs | -0.3 | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.1 |
| S3.b zero MFN on all cars but tariffs on Chinese EVs | -0.3 | -1.8 | -2.4 | -1.3 | -1.8 | -2.8 | -1.8 |
| S4.a Productivity gain in China | 26.1 | -6.9 | -7.2 | -7.8 | -4.9 | -5.5 | -7.1 |
| S4.b Productivity gain with tariffs on Chinese EVs | 24.6 | -6.0 | -6.2 | -7.0 | -3.8 | -4.1 | -6.0 |

scenario is meant to capture the widely-held presumption that Chinese production capacity in the sector is currently expanding very strongly.

### Scenario 4.a: Increased productivity in China without S1 tariffs

In Scenario 4.a, the significant productivity gains in Chinese motor vehicle production lead to a considerable decrease in domestic car prices in China, which drop by 10.25%. This increased efficiency allows Chinese manufacturers to offer more and even more competitively priced vehicles on the global market. However, the US and other major markets are protected by high tariff barriers so that the EU would have to absorb the largest share of increased Chinese exports. This results in a dramatic increase of 159.6% in car imports from China to the EU. The influx of Chinese vehicles leads to a decrease in car imports from the rest of the world by 3.9%. The EU automotive industry's value-added suffers significantly, declining by 6.9% on average. Tariff revenue in the EU also sees a modest decline of 1.85%. Overall, the welfare impact in the EU is negative, with a reduction of 0.031%, while China's welfare increases substantially by 0.804%.

### Scenario 4.b: Increased productivity in China with S1 tariffs on Chinese BEVs

In Scenario 4.b, the productivity gains in China are considered alongside the imposition of a 21% countervailing tariff on Chinese BEVs. The domestic car prices in China again decrease by 10.28%. Despite the tariffs, the increase in car imports from China to the EU remains substantial at 54.2%. However, the decline in imports from the rest of the world is mitigated somewhat, showing a smaller decrease of 2.0%. The EU automotive industry still experiences a decline in value added, but it is less severe at 6.0% on average. Tariff revenue in the EU increases by 7.70% due to the imposed tariffs. The overall welfare impact in the EU remains negative, with a reduction of 0.032%, while

China's welfare continues to benefit significantly, increasing by 0.789%.

Overall, Scenario 4 highlights the significant impact of hypothetical productivity improvements in Chinese motor vehicle production. While these gains benefit China substantially, they pose challenges for the EU automotive industry and overall welfare, particularly in the absence of mitigating tariffs.

## 3.5 Scenario 5: Chinese retaliation, tariffs on European pork meat

Scenario 5 is based on a combination of EU tariffs on Chinese electric cars from S1 and China's (potential) retaliatory tariffs on EU pork imports of 50 percentage points. We report the welfare effects in Table 7 which are, on average, very small and ambiguous in sign. Chinese retaliation would likely hit the affected sector in certain countries by up to an 80% decline in these exports (Figure 8), as China is an important market, as seen in Figure 6. However, the wider repercussion would be minimal.

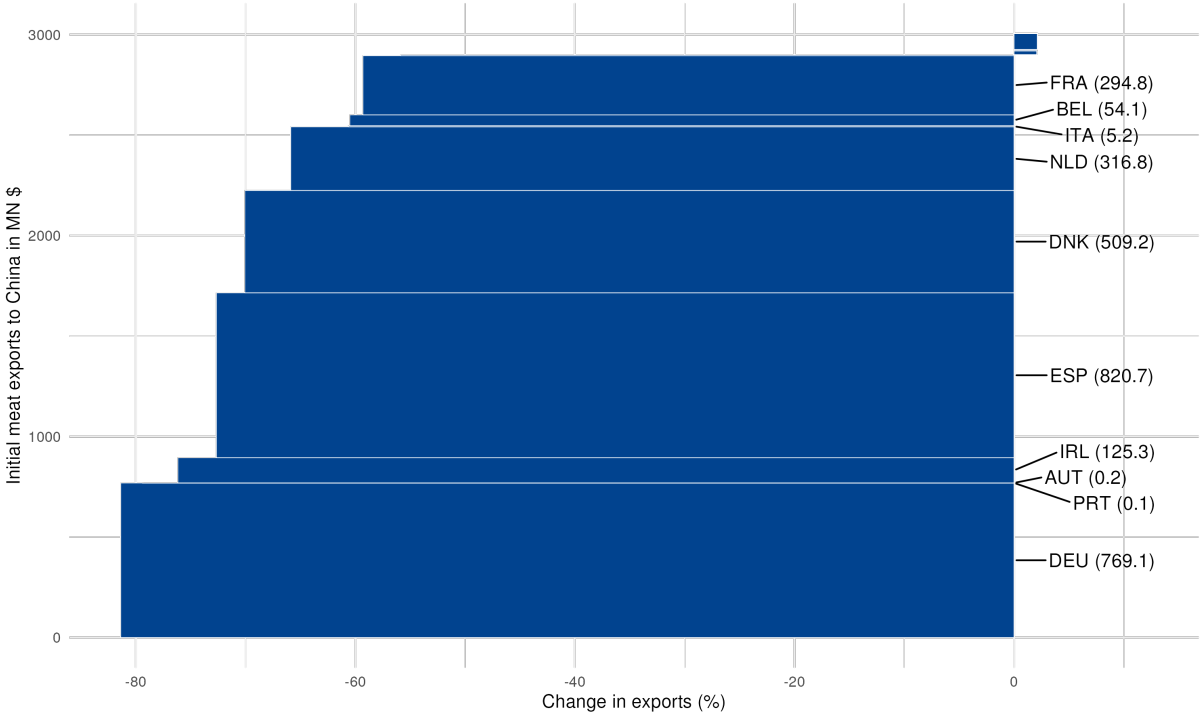
**Table 6:** Change in tariff revenue of automotive imports (in %).

| Scenario | EU | AUT | DEU | ESP | FRA | ITA |
|---|---|---|---|---|---|---|
| S1. tariffs on Chinese EVs | 2.18 | 0.43 | 0.81 | 2.40 | 1.98 | 2.48 |
| S2.a zero MFN tariffs on EVs | -2.61 | -0.35 | -1.79 | -5.07 | -1.80 | -0.82 |
| S2.b zero MFN tariffs on all cars | -45.51 | -9.86 | -78.35 | -20.70 | -4.66 | -10.28 |
| S3.a zero MFN on EVs but tariffs on Chinese EVs | 0.10 | 0.10 | -0.76 | -4.46 | 1.44 | 2.05 |
| S3.b zero MFN on all cars but tariffs on Chinese EVs | -42.68 | -9.42 | -77.82 | -20.55 | -1.22 | -5.30 |
| S4.a Productivity gain in China | 1.85 | -0.58 | -1.55 | 4.94 | 1.48 | 3.54 |
| S4.b Productivity gain with tariffs on Chinese EVs | 7.70 | 0.58 | 0.61 | 11.57 | 6.87 | 10.34 |

**Table 7:** Change in welfare (in %).

| Scenario | CHN | EU | AUT | DEU | ESP | FRA | ITA |
|---|---|---|---|---|---|---|---|
| S1. tariffs on Chinese EVs | -0.006 | 0.008 | 0.001 | 0.003 | 0.002 | -0.000 | 0.000 |
| S2.a zero MFN tariffs on EVs | 0.003 | 0.006 | -0.000 | -0.002 | -0.002 | -0.000 | -0.001 |
| S2.b zero MFN tariffs on all cars | 0.004 | -0.004 | -0.002 | -0.023 | -0.010 | -0.002 | -0.004 |
| S3.a zero MFN on EVs but tariffs | -0.003 | 0.008 | 0.000 | 0.001 | 0.001 | -0.001 | -0.000 |
| S3.b zero MFN but tariffs | -0.002 | -0.002 | -0.002 | -0.019 | -0.008 | -0.002 | -0.003 |
| S4.a Productivity gain in China | 0.804 | -0.031 | -0.021 | -0.080 | -0.025 | 0.003 | -0.019 |
| S4.b Productivity gain with tariffs | 0.789 | -0.032 | -0.019 | -0.077 | -0.023 | -0.001 | -0.021 |
| S5. Chinese retaliation on EU pork | 0.014 | 0.005 | -0.001 | -0.002 | -0.006 | -0.002 | -0.001 |

**Figure 8:** Change in bovine meat exports from EU to China, Scenario S5.




*Note:* Initial exports to China on the y-axis and in brackets after the country name, in million USD. Change in exports to China due to Chinese retaliation tariffs in Scenario S5 on the x-axis.

## 4 Policy Considerations

If the assumption is correct that Chinese subsidies to BEV manufacturers violate WTO law and distort the market against the EU, then imposing trade remedies is a dominant EU strategy. In a repeated game, countermeasures in response to rule-breaking are a necessary element of a rational strategy. This does not necessarily mean that the anti-subsidy measures will be imposed in the end, but the EU must be able to credibly threaten their imposition. This mechanism is at the heart of the multilateral trading system's capacity to protect its integrity; see Bagwell and Staiger (2004). Ideally, a credible threat of countermeasures is sufficient to lead to negotiated outcomes that avoid both the initial violation of rules and the imposition of remedies. In other words, countermeasures remain out of equilibrium in a game tree. Given the relevance of non-economic interests in recent trade conflicts, and in particular China's industrial policy of seeking technological dominance in key sectors such as electric vehicles, credible responses to illegal behavior by trading partners are crucial; see G. Felbermayr (2018). If EU member states publicly question the EU Commission's recommendation,

they weaken the EU's bargaining power in the current context and in future cases. If the EU wants to defend the rules-based global trading system, it cannot simply ignore evidence of rule-breaking behavior.

Certainly, negotiations with China can fail, which could lead to a costly tariff war. In principle, neither the EU nor China should be interested in such an outcome, as both economies currently face insufficient aggregate demand. Economic decoupling would be costly for both sides, see G. Felbermayr, Mahlkow, and Sandkamp (2023) and Baqaee et al., 2024. However, the possibility of an escalation does not mean that the EU should not impose trade remedies as mandated by its investigation; otherwise, it would lose its trade policy credibility. If negotiations fail, the EU and China should treat their differences in the appropriate dispute settlement fora provided by the WTO. This is a promising avenue because both are parties to the Multiparty-Interim Appeal Arbitration Agreement (MPIA) which substitutes for the dysfunctional Appellate Body.

Nevertheless, there are several lessons to be learned from this episode. First, when the EU Commission initiates an *ex officio* safeguard investigation against an important trading partner, it is crucial to ensure *ex ante* the support of the Member States most affected by the possible imposition of tariffs. In the current case, the Commission appears not to have involved critical industry associations like the German Association of the Automotive Industry (VDA). This is tactically problematic. It leaves the Commission vulnerable to criticism from parts of the industry that the Commission is trying to protect, even though European industry associations have taken different positions across EU Member States. More generally, it is of paramount importance that anti-subsidies or anti-dumping investigations should be conducted in an objective and open-ended manner to avoid any suspicion that the investigation is designed to ensure a certain outcome. Until the imposition of definitive duties, the Commission should check on its methodology, make amendments if needed, including in the height of tariffs for specific brands, and make every effort to explain its findings.

Second, the procedural rules should be reconsidered. Under the current rule book, provisional countervailing duties may be applied by the Commission within 9 months after initiation of the investigation (i.e., by 4 July at the latest) in the present case. Definitive measures are to be imposed within 4 months after the imposition of the provisional duties, that is, by 2 November, and might apply for five years. It could be sensible to allow for more time between the publication of the investigation results and the applications of provisional tariffs to facilitate a negotiated solution.

The EU faces difficult trade-offs. On the one hand, it is committed to the multilateral trading system and a level playing field. On the other hand, it has ambitious plans to reduce $CO_2$ emissions,

including from individual mobility, at reasonable prices. Countervailing duties help achieve the first goal, but are counterproductive for the second. However, there is a solution to this trade-off: the EU can unilaterally reduce its MFN import tariffs on BEVs from the level of 10% which it currently applies on all trading partners with which there is no free trade agreement. By lowering its MFN tariffs, the EU could signal that it resorts to tariff measures not for protectionist reasons but to defend the rules. A combination of MFN tariff cuts and countervailing duties on Chinese cars would be a perfect implementation of the EU's new "*open, sustainable and assertive*" trade policy doctrine.[12]

[12] See https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_645.

## References


Aguiar, Angel et al. (2023). "The GTAP Data Base: Version 11". In: *Journal of Global Economic Analysis* 7.2, pp. 1–37.

Aichele, Rahel, Gabriel J Felbermayr, and Inga Heiland (2014). "Going deep: The trade and welfare effects of TTIP". In: *Available at SSRN 2550180*.

Bagwell, Kyle and Robert Staiger (2004). *The Economics of the World Trading System*. MIT Press.

Baqaee, David et al. (2024). "What if? The effects of a hard decoupling from China on the German economy". In: *Paris Report 2: Europe's Economic Security*. Ed. by Jean Pisani-Ferry, Beatrice Weder di Mauro, and Jeromin Zettelmeyer. Paris & London: CEPR Press. URL: https://cepr.org/publications/books-and-reports/paris-report-2-europes-economic-security.

Bickenbach, Frank et al. (2024). "Foul Play? On the Scale and Scope of Industrial Subsidies in China". In: *Kiel Policy Brief* 127.

Caliendo, Lorenzo and Fernando Parro (2015). "Estimates of the Trade and Welfare Effects of NAFTA". In: *Review of Economic Studies* 82.1, pp. 1–44.

Chowdhry, Sonali et al. (Mar. 2024). "Brothers in arms: the value of coalitions in sanctions regimes". In: *Economic Policy* 39.118, pp. 471–512. ISSN: 0266-4658. DOI: 10.1093/epolic/eiae019. eprint: https://academic.oup.com/economicpolicy/article-pdf/39/118/471/58341919/eiae019.pdf. URL: https://doi.org/10.1093/epolic/eiae019.

Dekle, Robert, Jonathan Eaton, and Samuel Kortum (2008). "Global Rebalancing with Gravity: Measuring the Burden of Adjustment". In: *IMF Economic Review* 55.3, pp. 511–540.

Eaton, Jonathan and Samuel Kortum (2002). "Technology, Geography, and Trade". In: *Econometrica* 70.5, pp. 1741–1779.

European Commission (2023). *41th Annual Report from the Commission to the European Parliament and the Council on the EU's Anti-Dumping, Anti-Subsidy and Safeguard activities and the Use of Trade Defence Instruments by Third Countries targeting the EU in 2022*. Tech. rep.

Felbermayr, Gabriel (2018). "Zur Rückkehr der Machtpolitik in Handelsfragen: Theoretische Überlegungen und politische Empfehlungen". In: *Perspektiven der Wirtschaftspolitik* 19 (3), pp. 232–244.

Felbermayr, Gabriel, Hendrik Mahlkow, and Alexander Sandkamp (2023). "Cutting through the value chain: the long-run effects of decoupling the East from the West". In: *Empirica* 50, pp. 75–108.

Felbermayr, Gabriel and Alexander Sandkamp (2020). "The Trade Effects of Anti-Dumping Duties: Firm-level Evidence from China". In: *European Economic Review* 103367.

Francis, Robert (Sept. 2023). "EU China EV subsidies probe: What's at stake". In: *Borderlex*.

Friesenbichler, Klaus et al. (2024). "Technical background report: A component-based analysis of the automotive sector with a special focus on Austria and ton the EU". In: *ASCII Technical Report*. URL: forthcoming.

Gaulier, Guillaume and Soledad Zignago (2010). "BACI: International Trade Database at the Product-Level. The 1994-2007 Version." In: *CEPII Working Paper* 23.

Hinz, Julian and Evgenii Monastyrenko (2022). "Bearing the cost of politics: consumer prices and welfare in Russia". In: *Journal of International Economics*, p. 103581. ISSN: 0022-1996. DOI: https://doi.org/10.1016/j.jinteco.2022.103581. URL: https://www.sciencedirect.com/science/article/pii/S0022199622000137.

Klimek, Peter et al. (2024). "Will the EU Tariffs on Chinese Electric Vehicles also Hit EU Firms?" In: *ASCII Policy Brief*, 5 pages. URL: https://ascii.ac.at/wp-content/uploads/EU-CN-Tariffs.pdf.

# A Technical description of the KITE Model

The KITE model builds on Caliendo and Parro (2015) and its implementation is similar to that of Aichele, G. J. Felbermayr, and Heiland, 2014, Hinz and Monastyrenko (2022), and Chowdhry et al., 2024. There are $N$ countries, indexed $o$ and $d$, and $J$ sectors, indexed $j$ and $k$. Production uses labor as the sole factor, which is mobile across sectors but not across countries. All markets are perfectly competitive. Sectors are either wholly tradable or non-tradable.

There are $L_d$ representative households in each country that maximize their utility by consuming final goods $C_d^j$ in the familiar Cobb-Douglas form

$$u(C_d) = \prod_{j=1}^{J} C_d^{\alpha_d^j} \quad \text{with} \quad \sum_{j=1}^{J} \alpha_d^j = 1.$$

where $\alpha_d^j$ is the constant consumption share on industries $j$'s goods. Household income $I_d$ is derived from the supply of labor $L_d$ at wage $w_d$ and a lump-sum transfers of tariff revenues. Intermediate goods $\omega^j \in [0,1]$ are produced in each sector $j$ using labor and *composite* intermediate goods from all sectors. Let $\beta_d^j \in [0,1]$ denote the cost share of labor and $\gamma_d^{k,j} \in [0,1]$ with $\sum_k \gamma_d^{k,j} = 1$ the share of sector $k$ in sector $j$'s intermediate, such that

$$q_d^j(\omega^j) = z_d^j(\omega^j) \left[l_d^j(\omega^j)\right]^{\beta_d^j} \left[\prod_{k=1}^{J} m_d^{k,j}(\omega^j)^{\gamma_d^{k,j}}\right]^{1-\beta_d^j}$$

where $z_d^j(\omega^j)$ is the overall efficiency of a producer, $l_d^j(\omega^j)$ is labor input, and $m_d^{k,j}(\omega^j)$ represent the composite intermediate goods from sector $k$ used to produce $\omega^j$. With constant returns to scale and perfectly competitive markets, unit cost are

$$c_d^j = \frac{\Upsilon_d^j w_d^{\beta_d^j}}{z_d^j(\omega^j)} \left[\prod_{k=1}^{J} (P_d^k)^{\gamma_d^{k,j}}\right]^{1-\beta_d^j}$$

where $P_d^k$ is the price of a composite intermediate good from sector $k$, and the constant $\Upsilon_d^j = \prod_{k=1}^{J} (\gamma_d^{k,j} - \beta_d^j \gamma_d^{k,j})^{-\gamma_d^{k,j} + \beta_d^j \gamma_d^{k,j}} (\beta_d^j \gamma_d^j)^{-\beta_d^j \cdot \gamma_d^j}$. Hence, the cost of the input bundle depends on wages and the prices of *all* composite intermediate goods in the economy. Producers of composite intermediate goods supply $Q_d^j$ at minimum costs by purchasing intermediate goods $\omega^j$ from the lowest

cost supplier across countries, so that

$$Q_d^j = \left[\int r_d^j(\omega^j)^{1-1/\sigma^j} d\omega^j\right]^{\sigma^j/(\sigma^j-1)}.$$

$\sigma^j > 0$ is the elasticity of substitution across intermediate goods within sector $j$, and $r_d^j(\omega^j)$ the demand for intermediate goods $\omega^j$ from the lowest cost supplier such that

$$r_d^j(\omega^j) = \left(\frac{p_d^j(\omega^j)}{P_d^j}\right)^{-\sigma^j} Q_d^j$$

where $P_d^j$ is the unit price of the composite intermediate good

$$P_d^j = \left[\int p_d^j(\omega^j)^{1-\sigma^j} d\omega^j\right]^{1/(1-\sigma^j)}$$

and $p_d^j(\omega^j)$ denotes the lowest price of intermediate good $\omega^j$ in $d$ across all possible origin locations, i.e.

$$p_d^j = \min_o \left\{p_{od}^j\right\}. \tag{1}$$

Composite intermediate goods are used in the production of intermediate goods $\omega^j$ and as the final good in consumption as $C_d^j$, so that the market clearing condition is written as

$$Q_d^j = C_d^j + \sum_{k=1}^{J} \int m_d^{j,k}(\omega^j) d\omega^j \tag{2}$$

Trade in goods is costly, such that the offered price of $\omega^j$ from $o$ in $d$ is given by

$$p_{od}^j = \phi_{od}^j \cdot \frac{c_o^j}{z_o^j(\omega^j)} \tag{3}$$

where $\phi_{od}^j$ denote generic bilateral sector-specific trade frictions. These can take a variety of forms — e.g. tariffs, non-tariff barriers, but also sanctions. In that case we can specify

$$\phi_{od}^j = \tau_{od}^j \cdot \kappa_{od}^j,$$

where $\tau_{od}^j \geq 1$ represent sector-specific ad-valorem tariffs and $\kappa_{od}^j \geq 1$ other iceberg trade costs. Tariff

revenue $(\tau_{od}^j - 1)$ is collected by the importing country and transferred lump-sum to its households.

Ricardian comparative advantage is induced à la Eaton and Kortum (2002) through a country-specific idiosyncratic productivity draw $z^j$ from a Fréchet distribution.[13]

The price of the composite good is then given as

$$P_d^j = A^j \left[ \sum_{o=1}^{N} \lambda_o^j (c_o^j \phi_{od}^j)^{-\theta^j} \right]^{-1/\theta^j} \tag{4}$$

which, for the non-tradable sector towards *all* non-domestic sources collapses to

$$P_d^j = A^j (\lambda_d^j)^{-1/\theta^j} c_d^j \tag{5}$$

where $A^j = \Gamma(\xi^j)^{1/(1-\sigma^j)}$ with $\Gamma(\xi^j)$ being a Gamma function evaluated at $\xi^j = 1 + (1-\sigma^j)/\theta^j$. Total expenditures on goods from sector $j$ in country $d$ are given by $X_d^j = P_d^j Q_d^j$. The expenditure on those goods originating from country $o$ is called $X_{od}^j$, such that the share of $j$ from $o$ in $d$ is $\pi_{od}^j = X_{od}^j / X_d^j$. This share can also be expressed as

$$\pi_{od}^j = \frac{\lambda_o^j (c_o^j \phi_{od}^j)^{-\theta^j}}{\sum_{h=1}^{N} \lambda_h^j (c_h^j \phi_{hd}^j)^{-\theta^j}} \tag{6}$$

Total expenditures on goods from sector $j$ are the sum of the firms' and households' expenditures on the composite intermediate good, either as input to production or for final consumption

$$X_d^j = \sum_{k=1}^{J} (1 - \beta_d^k) \gamma_d^{j,k} \sum_{o=1}^{N} X_o^k \frac{\pi_{od}^k}{\tau_{od}^k \zeta_{od}^k} + \alpha_d^j I_d \tag{7}$$

with $I_d = w_d L_d + R_d + B_d$, i.e., labor income, tariff revenue and the aggregate trade balance. Sectoral trade balance is simply the difference between imports and exports

$$B_d^j = \sum_{o=1}^{N} X_{od}^j - X_{do}^j \tag{8}$$

and the aggregate trade balance $B_d = \sum_{j=1}^{J} B_d^j$, and $\sum_{d=1}^{N} B_d = 0$, with $B_d$ being exogenously

[13] The productivity distribution is characterized by a location parameter $\lambda_o^j$ that varies by country and sector inducing *absolute* advantage, and a shape parameter $\theta^j$ that varies by sector determining *comparative* advantage.

determined. The total trade balance can then be expressed as

$$\sum_{j=1}^{J}\sum_{o=1}^{N} X_d^j \frac{\pi_{od}^j}{\tau_{od}^j \zeta_{od}^j} - B_d = \sum_{j=1}^{J}\sum_{o=1}^{N} X_o^j \frac{\pi_{do}^j}{\tau_{do}^j \zeta_{do}^j}. \tag{9}$$

A counterfactual general equilibrium for alternative trade costs in the form of $\hat{\phi}_{od}^j = \phi_{od}^{j\prime}/\phi_{od}^j$[14] can be solved for in changes following Dekle, Eaton, and Kortum, 2008.

[14] I.e. where any variable $\hat{x}$ denotes the relative change from a previous value $x$ to a new one $x'$.

# IMPRESSUM

**Publisher:**
Kiel Institute for the World Economy –
Leibniz Center for Research on Global Economic Challenges
Kiellinie 66, 24105 Kiel, Germany
Phone +49 (431) 8814-1
Email info@ifw-kiel.de

The Kiel Institute for the World Economy – Leibniz Center for Research on Global Economic Challenges is an independent foundation under the public law of the German federal state of Schleswig-Holstein

**Value Added Tax Id.-Number:**
DE 251899169

**Board of Directors:**
Prof. Dr. Moritz Schularick, President, Executive Scientific Director
Birgit Austen, Executive Administrative Director

**Photo:**
Cover: © Unsplash

**Responsible Supervisory Authority:**
Ministry of General Education and Vocational Training, Science, Research and Culture



**https://www.ifw-kiel.de/de/publikationen/kiel-policy-brief/**