Trade Disruptions in the Dairy Sector: Analyzing EU Exports to China under Tariff Pressure

*Abstract* - This study examines the economic impact of tariffs and subsidies on global trade, focusing on the dairy and automotive sectors, using a Computable General Equilibrium (CGE) Model based on the Global Trade Analysis Project (GTAP) framework. The findings reveal that Chinese tariffs on EU dairy imports led to significant export declines and production contractions in major exporting countries, such as France and Germany. At the same time, smaller exporters with niche markets, like Greece, experienced modest gains. The effects on welfare were uneven, with some EU countries achieving slight improvements and others, along with China, facing notable losses. Non-EU producers capitalized on the reduced EU presence in the Chinese market, capturing a larger market share and benefiting economically.

In the automotive sector, EU tariffs on Chinese imports stimulated domestic production and trade surpluses but reduced overall welfare due to higher consumer costs and inefficiencies. China experienced substantial economic losses, reflecting its reliance on the EU as a key market. Meanwhile, other regions adapted by filling global automotive supply chain gaps. These findings illustrate the intricate consequences of protectionist measures, highlighting the need for strategic diversification, multilateral trade reforms, and adaptive policies to address global trade disruptions and mitigate inefficiencies in interconnected industries.

*Keywords* - Agricultural trade, CGE Model, Dairy tariffs, Global Trade Analysis Project (GTAP), Protectionist policies.

Introduction

The dynamics of international trade, especially in the commodities sector, are rapidly influenced by the interdependence of nations. This dependence is particularly evident in agricultural products essential to global commerce, such as milk and its processed derivatives (Marques, 2024). Agricultural products are critical for addressing global food security challenges and supporting the economies of many countries. With countries like the European Union and New Zealand being significant exporters worldwide, the dairy industry is a crucial component of this agricultural trade network (Kryvenko, 2023). The relevance of dairy in global trade has been further cemented by the recent demand for processed milk products brought on by shifting consumer preferences and dietary habits.

In 2023, China imported significant quantities of dairy products, including milk and cream in solid forms, from several European Union (EU) countries. The most substantial imports came from the Netherlands and France, with 5,626,300 kg and 4,400,130 kg, respectively. Netherlands and France hold the largest share of the EU’s milk and cream exports to China and are expected to be most affected by the tariffs imposed by China on EU dairy products. Other exporters like Denmark, Spain, and Germany may face challenges. However, some EU countries, such as Austria, Portugal, and Sweden, reported minimal exports with lower export volumes and could see their market share in China shrink further due to these tariffs.

Figure 1. Milk and Cream Imports to China from EU Countries (2023)

The European Union (EU) is frequently criticized for the distortion of international markets caused by its subsidies. For example, the local markets of producers in developing countries such as Mozambique and Jamaica are undermined by EU-subsidized dairy products. China’s recent anti-subsidy investigation into European dairy imports was initiated on 21 August 2024. This inquiry focuses on large agricultural producers such as Germany and France while also targeting the Netherlands, the largest exporter of dairy products to China. Although China has not yet imposed tariffs on EU dairy imports, there is a possibility that future tariffs could be implemented if the investigation reveals that these subsidies have adversely affected China’s domestic dairy industry (Dowling, 2024). Such actions would significantly impact the global dairy market, particularly given the increasing tension between China and the EU in the context of rising trade disputes.

The European Union has requested the World Trade Organization to discuss measures to combat China’s subsidy programs. This indicates that the EU is committed to safeguarding its dairy sector and the Common Agricultural Policy, which has significantly benefited EU farmers. According to Blenkinsop (2024), the EU intends to impose stringent tariffs on Chinese products, including electric vehicles, due to the deteriorating relations between the two nations. The taxes are expected to range from 17.3% to 36.3%. Alongside the ongoing investigation, this escalating trade conflict may affect additional sectors, including dairy.

Understanding this topic is crucial to comprehend the impact of Chinese tariffs on the competitiveness of European dairy goods in international markets. Moreover, these levies impact sectors beyond dairy. The EU’s tariffs and other punitive measures further complicate commercial relations. The EU’s response illustrates the interconnection of various trade kinds and the multifaceted impacts of protective regulations.

We must employ the CGE (Computable General Equilibrium) and GTAP (Global Trade Analysis Project) models to analyze these trade patterns. Hertel (1997) asserts that these models facilitate examining the impact of trade policy on various industries in China, the EU, and other interacting nations. This work addresses a significant gap in the research by examining the application of CGE and GTAP models in investigating anti-subsidy instances in agricultural trade. It will inform future discussions on trade policy and assist Chinese and EU leaders in comprehending the impact of these issues on their economies. It is crucial to attain a comprehensive grasp of the implications of these trade policies, particularly since they may influence sectors beyond the dairy industry in the current volatile geopolitical and international trade landscape.

Literature Review

Agriculture has a significant impact on interdependence in global commodity trade. Ramesh (2021) emphasizes that agricultural commerce maximizes resources and promotes economic development by capitalizing on comparative advantages. CGE (Computable General Equilibrium) models are critical for evaluating the impact of global market dynamics and agricultural policies. Dupas et al. (2022) investigate the interconnectivity of international agricultural markets. The research highlights how agrarian output, especially dairy products, is becoming increasingly consolidated in a few countries, creating threats to global food security. This centralization increases reliance on limited essential producers, potentially leading to weaknesses in the supply chain. *Dupas et al*. (2022) argue that this concentration, particularly in dairy and other essential commodities, requires careful analysis to mitigate potential global food-system disruptions.

*Dong et al.* (2022) examine the evolving trade patterns in agricultural products, noting that from 2000 to 2016, distinct trade communities formed around core countries like the United States, Germany, and Brazil. China’s disappearance from these trade communities in 2007 highlights the dynamic nature of global agricultural trade networks.

Agricultural subsidies significantly influence international trade dynamics. Mishra et al. (2024) and Heyl et al. (2022) examine the distorting effects of subsidies on the worldwide market. Mishra et al. (2024) contend that whereas subsidies may enhance short-term agricultural profitability, they often induce market distortions that jeopardize sustainability. This disparity is particularly evident in the dairy sector, where overput and ecological degradation frequently occur. *Heyl et al. (2022)* call for a reassessment of subsidy frameworks to better align with sustainability goals, particularly within the European Union.

In the dairy sector, subsidies have a measurable, though temporary, impact on trade. Kondaridze (2023) finds that a one percent increase in subsidies leads to a 0.02 percent rise in dairy product trade, with these effects diminishing after two years. This suggests subsidies can temporarily boost trade, but their long-term impact on market dynamics is limited. Similarly, Cima and Chepeliev (2024) argue that WTO frameworks on subsidies need reform to prioritize sustainability over trade distortion, particularly in the dairy industry, where such reforms could mitigate environmental impacts.

China’s role in the global dairy market is critical, particularly in light of its increasing demand for dairy imports*. Wang et al.* (2023) highlight the volatility in China’s raw milk markets due to the interconnectedness with international dairy powder markets. This volatility can be exacerbated by tariffs on European dairy products, which could disrupt global trade patterns and pricing strategies. *Bai et al*. (2022) further emphasize the impact of imported dairy products on China’s domestic production, suggesting that tariffs could stabilize or increase local production while also affecting global dairy prices.

The consumer perspective on dairy products in China is also crucial. *Shao et al.* (2020) examine the implications of a domestic dairy scandal, which led to a significant shift in consumer trust and demand for imported products. Tariffs on European dairy products may further complicate the Chinese market, increasing domestic prices and exacerbating consumer distrust, potentially leading to broader global trade shifts.

The use of CGE and GTAP models provides a comprehensive framework for assessing the impacts of these trade policies. *Chepeliev et al.* (2018) and *Sue Wing et al.* (2018) highlight how these models can simulate the effects of anti-subsidy measures, offering insights into production, consumption, and welfare changes. These models are instrumental in analyzing specific contexts, such as the dairy sector, where trade policies significantly influence market dynamics and international relations.

Lastly, trade policy uncertainty plays a significant role in shaping global markets, as highlighted by *Zhu et al. (*2024) and *Wang et al.* (2023). *Zhu et al.* (2024) note that increased trade policy uncertainty reduces the volume of imported intermediates, affecting production and innovation within Chinese companies. Similarly, *Wang et al.* (2023) explore how this uncertainty impacts China’s energy sector and economy, influencing investment decisions and hindering economic cooperation between China and the EU.

Methodology

This study employs a Computable General Equilibrium (CGE) Model based on the Global Trade Analysis Project (GTAP) framework (van der Mensbrugghe, 2018). This research analyzes the impacts of trade policies, subsidies, and market dynamics on agricultural and automotive trade, particularly on dairy products and motor vehicles. The CGE Model is designed to simulate the economy-wide responses of various sectors to policy changes or external shifts, providing a quantitative foundation for evaluating trade and welfare impacts. The Model effectively captures the complex interactions between economic sectors by incorporating intersectoral linkages, ensuring a comprehensive analysis.

The research utilizes the GTAP 8 database, which offers detailed data on countries’ bilateral trade, production, consumption, and trade policies. GTAP 8 is particularly suitable for this study due to its extensive coverage of the agricultural and dairy sectors, central to the analysis. The database enables precise modeling of tariff and subsidy policies and their effects on global trade flows and production patterns. The GTAP 8 data also ensures accuracy in capturing regional and sectoral interdependencies within the global economy.

The mechanics of the CGE Model include critical features such as intersectoral linkages, bilateral trade flows, and welfare computations. These elements are integrated to assess the comprehensive economic impacts of policy changes. The intersectoral linkages ensure that sector-specific shocks, such as tariffs, are propagated throughout the economy, affecting production, consumption, and trade patterns. Bilateral trade flows allow for analyzing regional dependencies, while welfare computations quantify the economic gains and losses experienced by different countries and regions.

The implementation of the Model involves several key steps. First, the GTAP 8 data is input into the CGE modeling software. A baseline scenario reflecting the status quo is established to serve as a reference point. Policy scenarios, such as the tariff implementations described above, are then introduced. The Model is calibrated to simulate economic responses, capturing interregional effects and sectoral adjustments. The outputs of these simulations include changes in trade volumes, sectoral outputs, and welfare measures, which are then analyzed to draw insights into the broader implications of the trade policies under study.

The General Equilibrium Framework forms the foundation of the Model, representing sectoral outputs as a function of inputs such as labor, capital, land, and intermediate goods (Baqaee and Farhi, 2018). The production function follows a Constant Elasticity of Substitution (CES) structure, allowing for flexibility in substituting inputs:

$$Q\_{s} = A\_{s} . \left[α\_{s }L\_{s}^{ρ}+β\_{s}K\_{s}^{ρ}+γ\_{s}T\_{s}^{ρ}\right]^{\frac{1}{ρ}}$$

Here, $Q\_{s} $notes output in the sector $s , A\_{s} $represents total factor productivity and $ρ=1- \frac{1}{σ}$ , where σ is the elasticity of substitution. This specification captures the varying degrees of substitutability among inputs, essential for assessing sectoral adjustments to policy changes.

The Model incorporates trade relationships using the Armington assumption, which differentiates between domestically produced and imported goods. (Ahmad, Montgomery, & Schreiber, 2020). The composite demand for goods is specified as:

$Q\_{d}$=$\left(δ\_{m}M^{\frac{σ\_{t}^{-1}}{σ\_{t}}}+δ\_{d}D^{\frac{σ\_{t}^{-1}}{σ\_{t}}}\right)^{\frac{σ\_{t}}{σ\_{t}^{-1}}}$

where $Q\_{d}$ represents composite demand, $M$ denotes imports and $D$Indicates domestic goods. Bilateral trade flows are modeled as a function of relative prices and trade costs, capturing regional dependencies and the impact of tariff barriers:

$$T\_{ij}=X\_{ij}.\frac{P\_{ij}^{-ϵ}}{Σ\_{j}P\_{ij}^{-ϵ}}$$

Here, $T\_{ij}$​ Represents trade flows from a region $i$ to $j$, Moreover, *ϵ* epsilonϵ is the price elasticity of trade. Economic welfare is evaluated using a utility function modeled as CES, where consumer preferences dictate the allocation of expenditures across goods. Welfare changes are measured using the Equivalent Variation (EV) formula:

$$EV= \sum\_{h}^{}\left[U\_{h}^{1}-U\_{0}^{h}\right]. P\_{h}^{0}$$

Where *EV* captures welfare gains or losses by comparing utility in baseline $U^{0}$and policy $U^{1}$scenarios. The Model also analyzes sectoral output changes and global trade impacts. Output in a sector adjusts based on changes in domestic demand (​$∆Q\_{s}$), imports (​$∆Q\_{m}$), and prices (​$∆P\_{s}$), :

$$△Q\_{s}=ϵ\_{s} . (△D\_{s}+△M\_{s}-△P\_{s})$$

The trade balance for a region *r* is calculated as the net difference between exports and imports for that region across all trading partners. Mathematically, it is expressed as:

$$TB\_{r }=\sum\_{j}^{}\left(T\_{rj}-T\_{jr}\right)$$

where $TB\_{r }$represents the trade balance of region *r*,$T\_{rj}$​ denotes exports from region *r* to region *j*, and $T\_{jr }$indicates imports to region *r* from region *j*. This formulation allows the Model to capture the direction and magnitude of trade flows and assess how policy changes, such as tariffs or subsidies, alter the trade balance. A positive $TB\_{r }$​ Indicates a trade surplus, while a negative value signifies a trade deficit, providing key insights into regional economic performance.

The study incorporates two distinct policy scenarios into the Model to evaluate the effects of specific trade policies. Scenario 1 focuses on the imposition of a 25% tariff by China on dairy imports from the European Union (EU). The Model examines trade flows, export trends, and welfare changes, particularly within the dairy sector. By simulating this tariff increase $T\_{ij}^{new}= 0,25 $, The Model assesses how the protectionist measure impacts China’s dairy market, EU exporters, and global trade dynamics.

In Scenario 2, the study explores a potential retaliatory policy by the EU involving a 35% tariff on Chinese motor vehicles and parts. This scenario investigates the repercussions of such a tariff. $T\_{ij}^{new}= 0,35 $on trade flows, sectoral outputs, and welfare within the automotive and technology sectors. Analyzing this policy shift, the Model captures the cascading effects on global automotive supply chains, EU production, and China’s export competitiveness.

Results and Discussion

**Impact of Tariffs on Dairy Product Exports and Trade Balances Between the EU and China**

This study implements a tariff scenario of up to 25 percent on cheese and milk imported from EU countries to China. It impacts trade policies on export performance, trade balances, and overall economic welfare to analyze implications on EU and global dairy markets. Figure 2 illustrates the substantial decline in export sales across EU nations, with the majority exhibiting a negative percentage change. Bulgaria, Croatia, Estonia, and Hungry experienced significant decreases, with dairy exports plummeting by 78.72 percent. The considerable declines illustrate the harsh effects of the tariffs on smaller EU dairy producers, which depend substantially on shipments to China as a component of their overall market strategy. Due to tariffs increasing the cost of EU dairy products and diminishing their competitiveness in the Chinese market, demand has significantly declined, particularly for non-essential dairy items like specialty cheeses.

Other prominent EU dairy exporters, like Austria (-72.9%), Poland (-72.15%), and Finland (-74.24%), also face substantial declines. The losses indicate that these tariffs have significantly impeded the EU’s access to the Chinese market, a major consumer of imported dairy products. France and Germany decreased by 64.69 percent and 63.03 percent respectively.

Nonetheless, there are significant exceptions. Greece and the global market exhibit modest growth in export sales, with gains of 7.26 percent and 7.24 percent, respectively. The favorable result for Greece indicates that some specialty dairy goods, such as distinctive cheeses like Feta, have sustained demand despite taxes, likely owing to their substantial cultural or gastronomic importance in China (Papoutsi, Noulas, & Tsatoura, 2022). Likewise, the Rest of the World may have profited from China’s transition in sourcing away from the EU, as other non-EU dairy producers exploit the gap created by diminished EU imports. The report also underscores diverse outcomes across EU nations. Although most EU member states saw adverse effects, specific countries, such as Denmark (-59.3%) and Italy (-54.54%), exhibited comparatively superior performance.

Figure 2. Export Sales of Dairy Products from EU Countries

The simulation results show a significant change in the trade balance of dairy products between China and the EU, as shown in Table 1. In the context of China’s dairy trade balance, there is a significant decrease of -111.67 million USD. This indicates that the tariff has reduced the competitiveness of EU dairy products, especially cheese and milk, in the Chinese market. Although the tariff was imposed to protect China’s domestic dairy industry, the significant decrease in the trade balance indicates that China still relies on imports to meet its milk needs, possibly due to the shortage of raw materials.

Among the EU countries, France stands out with the most significant positive change in the dairy trade balance, recording a surplus of 377.58 million USD. France is known for its strong dairy industry, particularly in cheese production, and the positive balance suggests that French dairy exports remain competitive in the global market despite the tariffs imposed by China. It is possible that France has shifted its focus toward other markets or has maintained a niche demand in China for premium products less affected by the tariff. Germany also shows a significant trade surplus of 206.95 million USD, likely reflecting the strength of its dairy sector, which benefits from efficient production and strong global demand.

On the other hand, several EU countries experience negative impacts. Italy, for instance, faces a dramatic negative change in its dairy trade balance, with a deficit of -236.56 million USD. This suggests that tariffs have disproportionately affected Italian dairy exports, particularly those of high-quality cheeses like Parmigiano-Reggiano. The negative trade balance for Italy may indicate a reliance on the Chinese market for premium dairy exports, and the tariffs have likely led to a sharp drop in demand for Italian products. Similarly, Spain shows a significant negative trade balance of -146.76 million USD, reflecting the broader challenges southern European dairy producers face in adapting to the new trade environment.

Smaller EU countries also display varying outcomes. Denmark emerges with a notable trade surplus of 171.42 million USD, potentially due to the country’s focus on niche dairy products such as butter and specialty cheeses, which may be less affected by tariffs or have successfully found alternative markets. Ireland also benefits from a positive balance of 171.59 million USD, as its dairy industry is globally competitive, with a strong focus on milk and cheese exports. In contrast, countries like Greece (-52.91 million USD), Portugal (-31.44 million USD), and Finland (-9.26 million USD) experience negative trade balances, indicating that their dairy sectors have been adversely affected by the reduced demand in China.

Outside of the EU, the Rest of the World (RoW) experiences the most significant adverse change in the dairy trade balance, with a deficit of -1,035.14 million USD. This considerable reduction suggests that the tariffs affect EU countries and other dairy-exporting nations, which may have previously benefited from access to the Chinese market. The negative trade balance for the RoW indicates that China’s protectionist measures have had a global ripple effect, reducing dairy imports from non-EU countries, possibly due to weakened demand for foreign dairy products in China.

Table 1. Dairy Product Trade Balance by Country (in Million USD)

|  |  |
| --- | --- |
| Country | Dairy Product Trade Balance |
| China | -111,67 |
| Austria | 33,8 |
| Belgium | -25,68 |
| Bulgaria | -8,54 |
| Cyprus | -2,08 |
| Croatia | 2,27 |
| CzechRep | 11,95 |
| Denmark | 171,42 |
| Estonia | 17,51 |
| Finland | -9,26 |
| France | 377,58 |
| Germany | 206,95 |
| Greece | -52,91 |
| Hungary | -6,57 |
| Ireland | 171,59 |
| Italy | -236,56 |
| Latvia | 8,98 |
| Lithuania | 35,43 |
| Luxembourg | -6,73 |
| Malta | -6,1 |
| Netherlands | 277,27 |
| Poland | 115,41 |
| Portugal | -31,44 |
| Romania | -28,61 |
| Slovakia | -12,03 |
| Slovenia | -1,37 |
| Spain | -146,76 |
| Sweden | -61,44 |
| RestofWorld | -1035,14 |

Table 2 shows how tariffs have affected economic welfare in China and EU member states, focusing on gains and losses across countries. The highest welfare loss is $49.45 million in China. As milk and cheese prices rise due to higher import costs, tariffs may hurt the Chinese economy. Reduced imports reduce customers’ access to high-quality dairy products and hurt local firms that import. Trade protectionism’s welfare losses show how tariffs meant to defend domestic sectors can harm customers and the economy.

Despite tariffs, certain EU countries’ welfare levels have increased. Finland posted the most significant welfare rise, with $2.85 million. This could be due to a shift in demand for domestic dairy products or increased exports to non-tariffed regions. Furthermore, Germany ($1.54 million) and Italy ($1.45 million) had positive welfare adjustments, indicating that their dairy businesses have reduced their dependency on the Chinese market or shifted their trading focus to other regions. The smaller welfare increases in countries such as Austria ($0.61 million) and Sweden ($1.41 million) suggest that these nations have responded to changing trade dynamics, resulting in a change in trade focus to other markets.

However, welfare rates fell in many other EU countries. The welfare of France, the world’s largest dairy exporter, suffered a significant drop of -11.60 million USD. The cause for this loss was a drop in demand for French dairy goods in China, a traditionally important market for premium French cheese. In the same line, welfare decreased in Poland (-2.25 million USD) and the Netherlands (-2.47 million USD). This may be because both countries rely on dairy exports to China. These countries may have difficulty establishing new markets or reducing the effects of tariffs on their domestic economies. Notably, other countries globally significantly increased welfare, totaling USD 23.67 million. This growth indicates that restructuring the global dairy trade has benefited countries other than the EU and China. After China reduced imports from the EU, other dairy exporting countries may have interfered in meeting the increased demand. This indicates that trade policies have a worldwide impact, as disagreements between key trading partners might open up new opportunities for others.

Table 2. Welfare Impact by Country (In Percentage)

|  |  |
| --- | --- |
| Country | Welfare |
| China | -49,45 |
| Austria | 0,61 |
| Belgium | 0,03 |
| Bulgaria | -0,05 |
| Cyprus | -0,02 |
| Croatia | 0,02 |
| CzechRep | -0,08 |
| Denmark | -0,33 |
| Estonia | 0,02 |
| Finland | 2,85 |
| France | -11,60 |
| Germany | 1,54 |
| Greece | -0,10 |
| Hungary | 0,21 |
| Ireland | -1,07 |
| Italy | 1,45 |
| Latvia | 0,01 |
| Lithuania | -0,05 |
| Luxembourg | 0,06 |
| Malta | 0,00 |
| Netherlands | -2,47 |
| Poland | -2,25 |
| Portugal | 0,21 |
| Romania | 0,19 |
| Slovakia | 0,15 |
| Slovenia | 0,04 |
| Spain | 0,13 |
| Sweden | 1,41 |
| RestofWorld | 23,67 |

Figure 3 explores the percentage change in output before and after the tariff implementation, highlighting both increases and declines in production. The results indicate widespread declines in dairy product output across most EU countries, with some countries experiencing more considerable reductions than others. France sees the most substantial decline, with a -173.92 percent change, reflecting the severe impact of reduced access to the Chinese market. France, known for its strong dairy industry, particularly in premium products like cheese, has faced a significant reduction in demand due to the tariffs. Similarly, Germany experiences a -99.17 percent drop in output, further emphasizing the challenges faced by large dairy exporters in the EU, who rely on China as a key market.

Other countries, including Ireland (-54.8 %), Netherlands (-47.03 %), and Finland (-45.26 %), also suffer notable declines in output. These countries are major dairy producers and exporters, and the tariffs have likely caused a substantial contraction in production as exports to China become less competitive due to increased costs.

In contrast, smaller percentage declines are observed in countries like Austria (-2.9 %) and Belgium (-12.52 %), indicating that their dairy industries may be less dependent on exports to China or have diversified their markets. Countries like Bulgaria and Slovenia see minimal changes, each recording less than negative one percent output reductions. These minor shifts could suggest that these nations are not as exposed to the Chinese market or that their dairy industries focus more on domestic or regional markets.

The Rest of the World stands out with a significant increase of 208.13 percent in dairy product output. This rise indicates that as EU dairy products become more expensive and less competitive in the Chinese market, other countries have stepped in to fill the demand. The Rest of the World, likely including major dairy producers outside the EU, has benefited from the disruption in EU-China trade, capturing a larger share of the Chinese dairy market.

Figure 3. Dairy Product Output Change Percentage by Country

**Impact of EU Retaliatory Tariffs on Chinese Motor Vehicle and Parts Exports: A Trade Balance and Welfare Analysis**

Figure 4 demonstrates the simulation of potential retaliatory by the European Union (EU) involving tariffs of up to 35 percent on motor vehicles and parts imported from China, revealing substantial shifts in trade dynamics across the EU, China, and the rest of the world (RoW). China exhibits a considerable trade deficit of -6,555.59 million USD, signifying a significant decline in motor vehicle and parts exports to the EU. Elevated tariffs may diminish the competitiveness of Chinese vehicles in the EU market, leading to a decrease in demand. This result aligns with the anticipated effect of the tariffs, which deter imports from China by increasing costs while safeguarding domestic producers in the EU.

Moreover, the rest of the world (RoW) had a significant negative trade balance of -15,679.54 million USD, signifying that tariffs have disrupted the global automotive supply chain, adversely affecting countries beyond the EU and China. These nations may see spillover effects from the EU-China trade dispute as they cannot compensate for the decline in EU demand for Chinese autos and components.

Figure 4. Motor Vehicles and Parts Trade Balance (Million USD)

The impact of these trade restrictions on the welfare of the EU, China, and the rest of the world (RoW) is illustrated in Figure 5. The EU’s welfare loss of -114.04 million USD, despite the impact of protectionist measures on the domestic automotive sector, has reduced the overall economic welfare of the EU. The welfare loss results from the increased pricing of imported items from China, which may increase consumer prices and decrease demand in particular businesses that rely on imported Chinese motor components. The economic cost may also be exacerbated by the EU’s potential difficulties in reallocating resources to local industries.

The adverse effects of tariffs on Chinese exports, particularly within the automotive sector, are reflected in the considerable decrease of -606.73 million USD in China’s GDP. The implementation of tariffs led to an increase in the price of Chinese motor vehicles and components in the EU, thereby decreasing demand and diminishing competitiveness. Chinese manufacturers experienced diminished export volumes, which resulted in a decline in production, revenue, and overall economic welfare. The significant disruption that tariffs can cause to exporting economies and the dependence of the Chinese automobile sector on the EU market is exemplified by the deterioration of welfare in China.

 In contrast, the welfare of the remainder of the world (RoW) was improved by USD 172.05 million. This favorable outcome suggests that nations beyond the EU and China benefit from the trade disruption between these two significant economies. Other countries may intervene to fill the void left by China as the EU seeks alternative suppliers for automotive components and vehicles. This could lead to an increase in the automotive industry’s output and exports. Moreover, nations not directly involved in tariffs may experience improved market prospects or more favorable trade conditions, enhancing their well-being. The world benefits from the complex dynamics of global trade, as protectionist policies between two nations can significantly impact third parties who are not directly involved in the trade dispute.

Figure 5. Welfare Impact (in Million USD)

The percentage change in domestic and international motor vehicle and part exports by region is depicted in Table. There is a 0.66 percent increase in EU exports. Improving intra-EU commerce and restricting Chinese imports increased the demand for EU-made vehicles and parts. The EU’s exports to China were reduced by -0.46% due to trade disruptions or retaliation between China and the EU. The EU’s foreign trade was also influenced by global supply networks and demand preferences, as evidenced by a 0.14% decrease in exports to the rest of the world. Exports from the European Union experienced a 75.9% decline. The reduction in EU exports significantly affected the Chinese automotive sector, which has historically depended on the EU as its primary export destination. This was because 35 percent tariffs reduced the competitiveness of Chinese motor cars and parts. China’s automobile industry is experiencing difficulties due to tariff spillovers and global demand disruptions, which resulted in a -0.14% decrease in internal exports and a -0.28% decrease in worldwide exports. Nevertheless, China’s global exports experienced a 0.17 percent increase, indicating that it is actively pursuing new automobile markets to compensate for its losses in the European Union. Nevertheless, this increase is insufficient to pay for the substantial trade losses experienced by the EU.

The Rest of the World (RoW) emerges as a region with relatively balanced outcomes. The quantity of exports within its region grows by 0.85 percent, and there is a small positive change of 0.17 percent in exports to China, likely benefiting from the void left by Chinese exports to the EU. However, the RoW’s exports to the EU experienced a slight decline of -0.28 percent. This suggests that while some RoW countries benefit from increased demand for motor parts in China, the overall disruption in global trade, particularly in the EU, has affected their ability to sustain or grow exports to the European market. The minor change in intra-regional exports (0.05 %) reflects the relatively stable position of the RoW’s automotive sector, indicating that the overall impact of the tariffs on the rest of the world is moderate compared to the dramatic shifts seen in China and the EU.

Table 3. Quantity of Exports (Percentage Change)



Figure 6 below highlights the changes in industry output for motor vehicles and parts before and after the tariff imposition. For the EU, the quantity of motor vehicles and parts production shows a notable increase of 3,082.5. This increase in production can be attributed to the protective nature of the tariff, which discourages imports from China and encourages domestic production. By imposing the tariff, the EU has effectively supported its local automotive industry, allowing it to expand production and capture a larger market share. This increase also reflects the EU’s ability to meet domestic demand through local production rather than imports, strengthening the region’s industrial base and positively contributing to employment and economic growth in the automotive sector.

In contrast, China experienced a significant decline in the output of motor vehicles and parts, with a decrease of -4,375.63. This sharp decline is a direct consequence of the reduced demand for Chinese motor vehicles and parts in the EU market, a significant export destination for China. The tariff makes Chinese products less competitive, leading to a substantial contraction in production.

For the rest of the world, the output quantity increases by 1,277. This increase suggests that countries outside the EU and China benefit from the trade disruptions caused by the tariffs. As the EU reduces its reliance on Chinese imports, it turns to alternative suppliers, boosting production in the rest of the world. While the percentage increase is minor compared to the EU, it still reflects an opportunity for the rest of the world to expand their production and potentially strengthen their foothold in the global automotive supply chain. The relatively stable growth in output in these regions indicates that they can absorb some of the market share lost by China, albeit on a smaller scale.

Figure 6. Quantity of Output (Million)

Policy Implications and Strategic Recommendations

Diversifying trade partnerships is essential to mitigate the adverse effects of protectionism and enhance global trade resilience. For instance, EU dairy exporters facing significant reductions due to Chinese tariffs must actively seek new markets in regions with growing dairy consumption, such as Southeast Asia and the Middle East. This can be facilitated through bilateral trade agreements that reduce barriers and foster mutual benefits. Similarly, China, experiencing reduced automotive exports to the EU, should focus on strengthening its domestic production capabilities. Investments in automation and innovation, coupled with subsidies for critical sectors, can boost competitiveness and reduce dependency on external supply chains.

Policymakers must prioritize multilateral trade reforms, such as revisiting World Trade Organization (WTO) frameworks, to lower tariff barriers and create stable trade environments. Highly sensitive sectors, such as agriculture and technology, require targeted policies to ensure fair competition and global collaboration. In the EU, the dairy sector’s small and medium enterprises (SMEs), disproportionately affected by tariffs, need immediate support. Programs offering financial assistance, market access facilitation, and training on export strategies are vital. For example, SMEs could benefit from government-backed initiatives like trade missions or subsidies for exploring non-EU markets.

Conclusion

The imposition of tariffs on EU dairy imports by China and on Chinese automotive exports by the EU has yielded significant economic consequences across global markets. This study’s major findings highlight four essential insights. First, tariffs on EU dairy products lead to steep export reductions and severe output contractions among prominent EU dairy exporters, notably France (with a -64.69% drop in dairy exports and -173.92% in output) and Germany (-63.03% drop in exports and -99.17% of the production), smaller producers such as Bulgaria (-78.72%) also heavily impacted. Conversely, niche-oriented or smaller EU exporters (e.g., Greece with +7.26% growth in dairy exports) experience modest gains, suggesting heterogeneous outcomes based on product specializations and export strategies.

The tariffs led to varied welfare effects across regions. Finland (+2.85 million USD) and Germany (+1.54 million USD) reported modest gains. Conversely, France, for instance, endured a welfare drop (-11.60 million USD), and the Netherlands (-2.47 million USD) experienced significant losses. China’s dairy-related welfare declines by -49.45 million USD, and the Rest of the World (RoW) registers a modest welfare gain of +23.67 million USD alongside a substantial output increase of +208.13%, reflecting its ability to capture portions of the EU’s lost market share.

Despite the tariffs, France and Germany achieved significant trade surpluses of +377.58 million USD and +206.95 million USD, respectively. This success likely stems from their ability to pivot from the Chinese market and focus on alternative trade opportunities. In contrast, Italy (-236.56 million USD) and Spain (-146.76 million USD) experienced substantial trade deficits, reflecting their heavy dependence on Chinese demand for premium dairy products. Meanwhile, China’s trade balance declined by -111.67 million USD, indicating its reliance on dairy imports to meet domestic consumption despite efforts to protect local industries through tariffs.

Moreover, although the EU benefits from higher automotive production and a notable trade surplus in motor vehicles and parts (+18.397,93 million USD), its overall welfare in the automotive sector still diminishes by -114.04 million USD due to increased consumer costs and internal resource reallocation. China, meanwhile, undergoes a steep -606.73 million USD welfare loss in its automotive sector, with exports to the EU plummeting by -75.9% and output contracting by -4,375.63.

At last, these protectionist measures generate worldwide ripple effects that alter trade balances and production patterns. The automobile sector of the RoW experiences a welfare gain of +172.05 million USD as it substitutes China’s exports to the EU. While tariffs provide temporary protection for domestic businesses, inefficiencies and extensive welfare losses underscore policymakers’ need to consider intersectoral connections and global interdependencies.

These findings underscore the complex interplay between trade protectionism and global supply chains. While tariffs can protect local industries by reducing foreign competition, they also lead to inefficiencies and welfare losses in importing and exporting countries. The research illustrates that while the EU benefits from tariff barriers in the automotive sector, its dairy industry suffers from similar trade restrictions imposed by China. The results of this study emphasize the need for careful consideration of the broader economic impacts of trade policies, especially in sectors with strong global interdependencies, such as dairy and automotive production.

Future studies could investigate the long-term effects of trade protectionism on innovation and competitiveness within the affected industries, especially in the automotive and dairy sectors. Another critical area for future research is the role of global supply chain diversification, particularly for countries heavily dependent on a limited number of export markets.

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