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Geoeconomic Shifts, Trade Wars, and Global Sustainability: A Dynamic CGE Analysis of US-China-EU Impacts

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Abstract

Everyone eagerly awaits November 4, 2024, when the European Commission is expected to definitively increase tariffs on Chinese electric vehicles if negotiations with China yield no results. This decision is more closely related to the U.S. elections than any other reason. Indeed, the rise of Kamala Harris and the continuation of Biden's anti-China policies may push the European Union to take this measure, which could trigger a trade war between the Western bloc, led by the United States, and the Eastern bloc, led by China. On the other hand, if Trump returns to the White House, his protectionist policies, which do not distinguish between enemies and allies, could drive the European Union closer to China (Belt and Road Initiative), leaving the United States almost alone against the Eastern bloc

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strengthened by the European Union's adhesion. This article aims to analyse these two scenarios to understand their respective impacts on the economies in conflict by using a dynamic multi-regional computable general equilibrium model based on the PEP w-t celebrated with the GTAP 11 database and the updated CEPII 2022 scenario.

The simulation results of the first scenario reveal an almost absolute superiority of the Eastern bloc, particularly in the automotive sector (the declared cause of the conflict). Indeed, this sector in China experienced a growth of +19.99% compared to the baseline scenario. At the same time, the West, particularly the European Union, saw a contraction in this industry of -15.56% compared to the base scenario. Regarding the implicit objective of this conflict, namely 'slowing down China's economic rise', the results indicate that it fails, as the Chinese economy is expected to surpass that of the United States by 2030.

Keywords: trade wars, computable general equilibrium model, global trade, geoeconomic shifts, global sustainability.

JEL Classification: C68, F17, F13, F15, F11, F47.

Introduction

The economic rivalry between the United States (U.S.) and China has emerged as one of the most consequential geopolitical developments of the 21st century, reshaping global trade dynamics and challenging the post-World War II liberal economic order. As the world's two largest economies - contributing 23.3% and 16.1% of global GDP, respectively (Statistics Times, 2018) - their bilateral relationship carries profound implications for international markets, supply chains, and multilateral institutions. The escalation of trade tensions since 2018, marked by reciprocal tariffs, investment restrictions, and technological decoupling, has disrupted the interdependent economic frameworks binding the two nations and triggered ripple effects across global production networks and growth forecasts (Freund et al., 2018). This confrontation, often termed the "trade war," transcends mere economic competition; it reflects a strategic struggle for technological supremacy, military dominance, and the future trajectory of globalization (Suisheng & Guo, 2019).

The roots of this conflict lie in long-standing structural imbalances, including the US's chronic trade deficit with China, which peaked at $376 billion in 2017 (US Census Bureau, 2019). However, the dispute is equally driven by anxieties over China's rapid technological advancement, exemplified by initiatives like "Made in China 2025" and fears that Beijing's state-led economic model undermines fair competition (Liu, 2018). Concurrently, the US has framed its protectionist measures - such as tariffs and export controls - as necessary to reclaim industrial jobs, safeguard national security, and counter alleged intellectual property theft (Vinogradov et al., 2019). Yet, scholars argue that such policies risk accelerating deglobalization, fragmenting markets into competing blocs, and eroding the rules-based trading system (Bergsten, 2018; Legrain, 2018).

Globally, the conflict exacted a heavy toll. The International Monetary Fund (IMF, 2020) reported a decline in global growth from 3.6% in 2018 to 2.9% in 2019, while the World Trade Organization (WTO, 2020) noted a 0.4% contraction in trade volumes. Financial markets experienced heightened volatility, and foreign direct investment flows stagnated as uncertainty deterred cross-border capital (Chong & Li, 2019). The trade war's spill over effects disrupted supply chains, particularly in technology and agriculture, forcing firms to relocate production and adopt costly mitigation strategies (Bergsten, 2018).

This trade war concluded on January 15, 2020, with an agreement between the two parties. However, one year later, it became evident that the declared objective of this war, namely reducing the trade deficit with China, was not achieved. In reality, the trade deficit had significantly increased.

Four years later, especially in 2024, tensions are reigniting. The US unveiled tariffs targeting China's electric vehicle (EV) sector - a global leader bolstered by state subsidies - while pressuring allies like the EU and Canada to join its efforts. The European Union's June 2024 announcement of 38% tariffs on Chinese EVs, followed by Canada's alignment, signals a shift toward multilateral confrontation (European Commission, 2024). China has threatened proportional retaliation, risking a broader conflict that could fracture global supply chains. Critical sectors - such as Russia's neon gas exports, Brazil's agricultural commodities, and Algeria's hydrocarbons - face disruption, while China's dominance in 37 of 44 strategic technologies (Australian Strategic Policy Institute, 2023) amplifies the stakes. Simultaneously, emerging economies like Turkey, South Africa, and Latin American nations may retaliate by restricting access to their markets for Western goods, further fragmenting global trade.

This evolving conflict raises urgent questions: What are the possible scenarios for this conflict in the current geopolitical context? What will be the consequences for the Chinese and American economies, as well as for all stakeholders? What will the repercussions be on the global economy and international trade? This paper employs a dynamic multiregional computable general equilibrium (CGE) model based on the GTAP database and the CEPII scenario to address these questions.

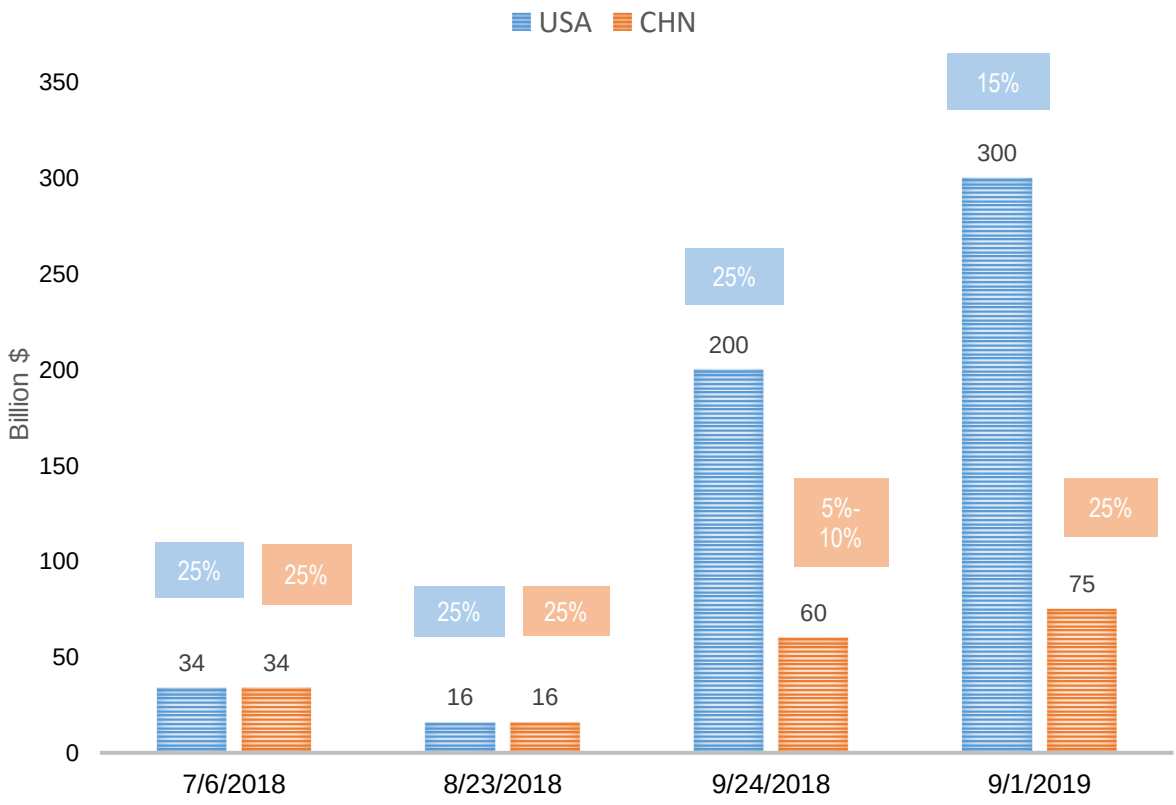
The remainder of this article is structured as follows: Section 2 presents some stylized facts; Section 3 reviews the literature on trade wars and their systemic implications; Section 4 outlines the methodology and data sources; Section 5 presents the CGE model results and scenario analysis; and Section 6 concludes with policy recommendations and strategic insights.

1. Stylized Facts

Since its onset in July 2018, the conflict has significantly intensified. It began with the United States imposing a 25% tariff on $34 billion worth of Chinese goods, to which China responded with equivalent retaliatory measures. In August 2018, the United States extended these measures by imposing a 25% tariff on an additional $16 billion worth of Chinese goods. China responded by applying a 25% tariff on the same import amount. In September 2018, the United States further escalated the tariffs, imposing 10% and 25% tariffs on $200 billion worth of Chinese imports, leading China to retaliate with tariffs on $60 billion worth of American imports (see Figure 1).

This tense atmosphere led both parties to the negotiating table. However, it did not last long before the United States declared its failure in August 2019 by implementing a 10% surtax on an additional $300 billion worth of Chinese imports. In response, China intended to impose new tariffs on $75 billions of American imports.

Figure 1: The escalation of the Sino – US trading



Sources: Authors, AFP offices

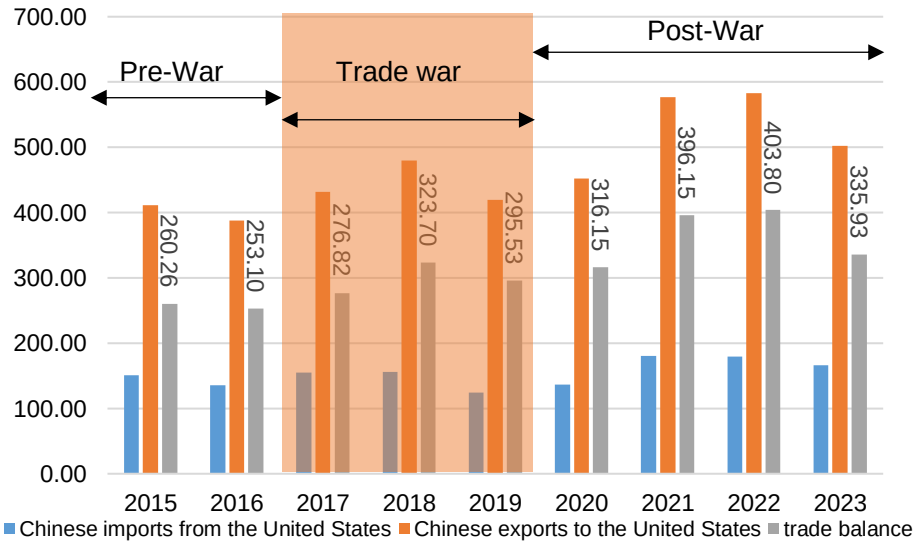
This trade war concluded on January 15, 2020, with an agreement between the two parties. However, one year later, it became evident that the declared objective of this war, namely the reduction of the trade deficit with China, was not achieved (Figure 2). In reality, the trade deficit had significantly increased. On the microeconomic level, the losses were even more severe: the well-being of American consumers decreased due to the substantial rise in prices. Farmers experienced a contraction in their production capacity due to the closure of Chinese markets, leading to the exit of many producers from the market. Heavy industries were also severely affected.

On the other hand, China demonstrated notable resilience. The Chinese economy maintained stable growth, reaching 6.1% in 2019, thanks to robust domestic demand and supportive government policies. Moreover, despite the trade tensions, Chinese exports to the United States continued to grow, illustrating the resilience and flexibility of the Chinese economy. At the same time, the country continued to attract significant foreign direct investment, strengthening its economic position. Furthermore, Chinese exports continued to grow even during the crisis, highlighting China's ability to adapt and mitigate the negative impacts of trade tensions.

The rest of the world did not escape the consequences of this trade war. Given that the two conflicting economies represent 40% of the global economy, how could it? According to the International Monetary Fund (IMF), global economic growth slowed to approximately 2.9% in 2019, down from 3.6% in 2018. Similarly, global trade volume decreased by 0.4% in 2019, according to the World Trade Organization (WTO).

The uncertainties associated with the trade war led to increased volatility in financial markets. Global stock indices experienced significant fluctuations, influenced by news regarding trade negotiations and tariff measures. The uncertainty affected investment decisions, with investors often adopting a more cautious approach, leading to a reduction in foreign direct investment (FDI) in certain regions.

Figure 1: China-United States trade



Sources: Authors, using World Bank database (2023)

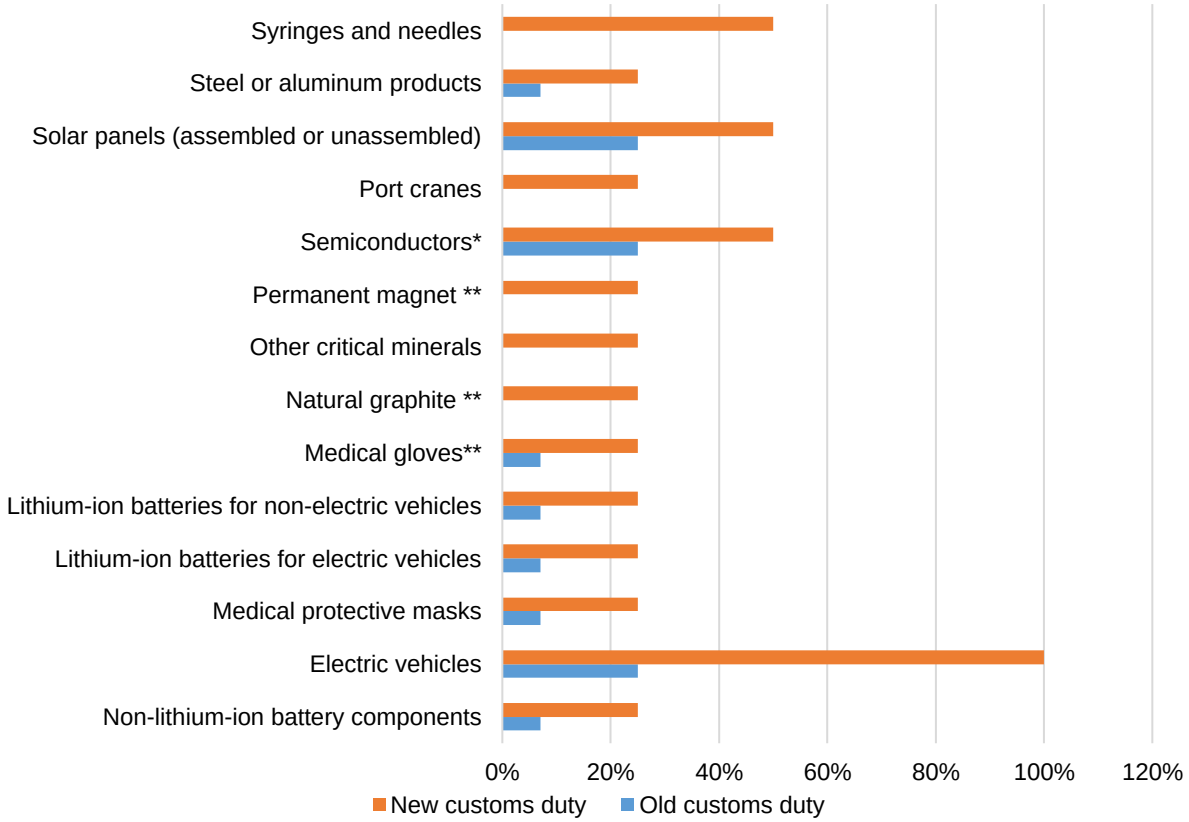
Today, four years after the end of this trade war, the United States is again wielding a list of tariffs against China, primarily targeting the electric vehicle industry, a sector in which China holds a global leadership position, supported by significant government subsidies (see Figure 3). This move aims to curb China's progress, potentially signalling a resumption of trade hostilities after four years of calm. However, this time, the conflict is taking on a multilateral dimension, as the United States is not hesitant to ally with its Western partners, particularly the European Union. This shift became evident when the European Union announced on June 12, 2024, its intention to increase tariffs on Chinese electric vehicle imports to 38%, following pressure from the Biden administration. Before the end of June, Canada announced its intention to join this initiative. In response, China threatened to retaliate if this measure is implemented, which could lead the world into an unprecedented global trade war. China, for its part, would not delay in mobilizing its allies, including industrial giants, to engage in this trade conflict, which could entirely disrupt most global supply chains:

- Russia: Neon gas, natural gas, natural resources, chemical industry, metallurgical and mining industry, defence and aerospace industry, etc.
- Brazil: Livestock, wood and forest products industry, bauxite and aluminium, etc.
- Algeria: Oil and natural gas, liquefied natural gas (LNG), phosphates, agricultural products, petrochemical products, etc.
- Iran: Hydrocarbons (oil and natural gas), iron ore metals (uranium, zinc, and lead);
- Africa and Latin America: Natural resources (oil and natural gas, minerals and metals), agricultural and food products (cocoa, coffee and tea, fruits and vegetables).

Alternatively, close these markets to Western products:

- Turkey: Machinery and equipment, automobiles, chemicals, food products, textiles.
- Algeria: Machinery and equipment, automobiles, chemicals, food products, textiles.
- South Africa: Pharmaceuticals, capital goods and technology.
- Africa and Latin America: Machinery and equipment, and pharmaceuticals.

Figure 2: Tariffs on 14 Chinese imports set to increase significantly in the US in the incoming months



Note: * Tariff implementation starting in 2025, ** Tariff implementation starting in 2026
Source: Authors, CEPII

This is beginning to manifest clearly with Algeria's recent threats to cancel its strategic commercial cooperation with the European Union. It is worth noting that trade transactions between China and the West alone reached $1.84 trillion last year. Moreover, China is the global leader in most sensitive technologies (According to the Australian Strategic Policy Institute, China dominates 37 out of 44 sensitive technologies). This foreshadows an unprecedented war in modern history.

This study aims to answer the following questions: What are the possible scenarios for this conflict in the current geopolitical context? What will be the consequences for the Chinese and American economies, as well as for all stakeholders? What will be the repercussions on the global economy and international trade?

2. Literature Review

Although opinions differ on the benefits of protectionist policies and their role in protecting local industries, there is undeniable consensus that trade wars resulting from these policies lead to losses for all parties involved. Freund & Ornelas (2010), in their article 'Regional Trade Agreements', demonstrate using a Computable General Equilibrium Model (CGE) that trade wars can slow global economic growth, reduce international trade, and lead to global welfare losses. Another study using the CGE model by Bown & Irwin (2019) focuses more on developing countries, showing that global trade wars can devastate developing economies, reducing economic growth and increasing poverty. Developing countries relying heavily on exports to major economies will likely be the most affected.

Ossa (2011) estimates widespread trade wars could significantly reduce global trade and result in substantial welfare losses for most countries. Their simulations also show that bilateral trade agreements can mitigate some of the adverse effects of trade wars.

More specifically, Ortiz Valverde & Latorre (2020) used a CGE model to simulate the impact of Brexit on the economies of the EU and the UK. The results indicate that Brexit would lead to a reduction in trade between the UK and the European Union, a decrease in GDP in the UK, and a redistribution of income with varying impacts on different regions and sectors. Robinson & Thierfelder (2018) used a CGE model to show that increased tariffs between the United States and Mexico would result in significant declines in GDP in both countries, with particularly severe impacts on the agricultural and manufacturing sectors. American and Mexican consumers would also experience an increase in the prices of consumer goods.

Research and analyses vary from author to author, but they all share a common point: In a trade war, all parties suffer losses. This brings us back to what Peter Navarro (1984) stated in his book The Policy Game: 'As history has painfully taught us, once protectionist wars begin, the most likely outcome is a downward spiral that is fatal for the entire global economy'.

Despite all this, the recent trade war between China and the United States has challenged this reality. Prior to ex-post studies, ex-ante studies have shown superiority in favour of China, attributable to its vast domestic consumption and strategic planning. Li, C. et al. (2018) used a CGE model to assess the impacts of a potential trade war between China and the United States. The results show that, despite initial losses, China manages to offset these losses by reorientating its exports and increasing domestic demand, thereby limiting long-term adverse effects. In their study, Li, Y. et al. (2020) show that the Sino-American trade war led to a global reduction in trade and a decline in global GDP. However, China compensated for some of its losses by redirecting its exports to other markets and increasing domestic production. The adverse effects were particularly pronounced in sectors dependent on global value chains. Similarly, Li, M. et al. (2020) used a CGE model to analyse China's response to tariffs imposed by the United States. The results indicate that China could mitigate the negative impacts on its economy by diversifying its exports and stimulating domestic consumption, thus limiting economic damage. Likewise, Bekkers & Schroeter (2020) show in their article that, although affected by American tariffs, China diversified its trade relationships and minimized losses with relative gains in certain sectors.

Tsutsumi (2019) estimates the impact of the US - China trade war with a dynamic CGE model exploring the linkage between trade openness and productivity. As the trade war reduces trade openness, productivity declines, resulting in a fall in GDP of 0.24% in the USA and 0.88% in China.

The next trade war is expected to be unprecedented in scale, mainly due to the near-universal involvement of global economic actors. As a result, relying solely on previous studies to predict its outcomes appears insufficient. This underscores the urgent need to conduct a comprehensive ex-ante analysis to assess the potential impacts of this conflict on all stakeholders. The article adheres to the methodology commonly employed in such studies to achieve this objective: a dynamic multiregional computable general equilibrium (CGE) model based on the GTAP database and the CEPII scenario. Before presenting the possible scenarios of this conflict, we focus on describing the methodology and the model used in the next section.

3. Computable General Equilibrium Model and Database

Our analysis employs a dynamic multiregional Computable General Equilibrium (CGE) model based on the Partnership for Economic Policy's PEP-W-t (Robichaud et al., 2014), calibrated using the GTAP Database version 11 (Aguiar et al., 2022). The model assumes competitive markets where agents optimize their objective functions under specific constraints, with equilibrium adjustments driven by relative price changes.

Key structural features include the production structure, where input-value added complementarity is governed by a Leontief production function that dictates the relationship between intermediate inputs and value-added, implying zero elasticity of technical substitution between these components. Value-added in each sector is composed of composite labour and capital combined through a constant elasticity of substitution (CES) function, with composite labour aggregated from two distinct labour categories (e.g., skilled/unskilled) using a CES specification and composite capital combining three capital types (e.g., capital, land, and natural resource) via CES.

In domestic and international markets, locally produced goods and imports exhibit imperfect substitutability, modelled using a CES aggregation for domestic composite goods, while a constant elasticity of transformation (CET) function governs the allocation of production between domestic sales and exports; labour and capital are perfectly mobile across domestic sectors but remain internationally immobile.

The demand structure is characterized by household behaviour that maximizes utility following a linear expenditure system (LES) under budget constraints, and government and investment expenditures are determined via Cobb-Douglas functions that reflect constant budget shares.

Finally, the simulation design features a baseline scenario for the period 1980–2100, calibrated using CEPII projections[2] (May 2022 revision) that integrate data from United Nations (UN) demographic and economic forecasts, International Labour Organization (ILO) labour trends, and International Energy Agency (IEA) energy pathways, along with supplementary econometric estimates for long-term dynamics. Appendix 1 provides a schematic representation of the PEP-W-t model structure, while Appendix 4 details the aggregation levels for the production sector, factor production, and region (see Supplementary file).

[2] (i) capital accumulation, (ii) savings rates, (iii) the relationship between capital and investment, (iv) education, (v) women's labour market participation, and (vi) technological progress (total factor productivity and energy-specific productivity)

4. Simulation and Interpretation of Results

Politics and economics are two sides of the same coin - an undeniable reality in the modern world. While economics provides frameworks for growth and stability, change is the only constant in politics. This inherent unpredictability shapes global dynamics, including the trajectory of conflict. As seasoned observers recognize, the outbreak of war, its triggers, and its potential pathways remain uncertain. However, amid this ambiguity, diplomatic and economic analysts increasingly converge on two plausible scenarios:

- *Scenario KH:* A Continuity-Driven Trade Confrontation: Kamala Harris assumes the presidency, doubling down on Biden's legacy of reinforcing Western alliances. This cohesion revitalizes transatlantic partnerships but hardens divisions with China, likely triggering a multipolar trade war. The US - led Western bloc - leveraging coordinated sanctions, tech embargoes, and reshoring initiatives - clashes with an increasingly assertive Eastern bloc anchored by China's industrial and geopolitical ambitions.
- *Scenario DT:* A Tariff-Fuelled Global Realignment: Donald Trump's return to power culminates in his proposed 10% universal tariff, a unilateral move decried as economic brinkmanship. The EU - facing punitive US trade measures - abandons its hedging strategy, forging unprecedented supply chain and infrastructure partnerships with China under the Belt and Road Initiative. This fractures the post-war economic order, triggering a global trade confrontation pitting the US and a diminished coalition of allies against a Sino-centric coalition of developing economies.

Results of simulations:

All indications suggest that Kamala Harris will follow the path of the previous administration, which was characterized by a hostile approach towards China and Russia and focused on Western alliances. Her arrival in the White House will increase pressure on the European Union, pushing it to raise tariffs on Chinese cars and prompting China to respond to this decision. This could significantly lead the world into an unprecedented trade war as China and the United States mobilize their respective allies. Depending on current geopolitical events, the two blocs might be divided as follows:

- The Western bloc includes the United States of America, the United Kingdom, the European Union, Canada, Australia, Japan, South Korea, and Argentina.
- The Eastern bloc includes China, Russia, Brazil, Iran, South Africa, Turkey, Algeria, Venezuela, Belarus, Central Asia, Southeast Asia, Iraq, Lebanon, Syria, Yemen, Sub-Saharan Africa, and Bolivia.

To give an overview of the effects of this war[3], we assume a gradual escalation of tensions over five years, represented by an annual increase of 20% in tariffs between the two blocs (the Eastern bloc and the Western bloc). At the same time, an annual reduction of 20% in tariffs will be applied within each bloc, reflecting the consolidation of alliances and the ability of members to mitigate the negative impacts of trade barriers.

[3] It is nearly impossible to provide a detailed and accurate scenario due to the difficulty of predicting geopolitical events.

In the Eastern bloc, the focus is primarily on the impacts on China and Russia, while in the Western bloc, the main focus is on the United States, the European Union (28), and the United Kingdom[4].

Table 1: The impact of the “KH” scenario on production at the sectoral level in %

		AGR	AUT	MET	ENG	ELV	CRP	MEI	EEI	TXT	MLR
CHN	N32	52,28	56,37	52,88	58,05	50,62	57,12	56,34	58,89	51,82	53,80
	KH32	54,81	76,35	54,43	66,19	51,65	68,35	55,99	51,10	39,59	43,72
	ΔKH	2,53	19,99	1,56	8,14	1,04	11,22	-0,35	-7,78	-12,2	-10,0
RUS	N32	29,73	36,61	36,65	35,14	33,71	39,88	27,22	34,48	41,65	41,40
	KH32	35,45	116,89	42,71	33,79	36,89	83,76	53,88	41,71	34,32	52,87
	ΔKH	5,72	80,29	6,05	-1,35	3,18	43,88	26,66	7,23	-7,32	11,47
USA	N32	23,92	20,50	16,43	19,06	21,61	21,12	16,22	20,43	22,09	20,93
	KH32	21,15	9,99	19,56	18,75	19,86	18,19	19,30	21,75	50,86	30,16
	ΔKH	-2,78	-10,51	3,12	-0,30	-1,75	-2,93	3,08	1,33	28,77	9,23
UE	N32	18,22	21,41	15,51	13,68	18,27	18,11	15,95	15,92	20,76	20,45
	KH32	19,08	5,85	18,06	14,76	16,30	17,86	13,59	24,46	41,98	28,83
	ΔKH	0,85	-15,56	2,55	1,07	-1,97	-0,25	-2,36	8,54	21,22	8,38
GBR	N32	20,46	22,31	19,40	24,96	20,50	18,78	21,59	22,23	21,11	23,62
	KH32	21,30	3,21	23,93	26,54	20,05	19,16	21,49	31,30	44,71	33,60
	ΔKH	0,84	-19,10	4,53	1,58	-0,45	0,39	-0,10	9,07	23,59	9,98

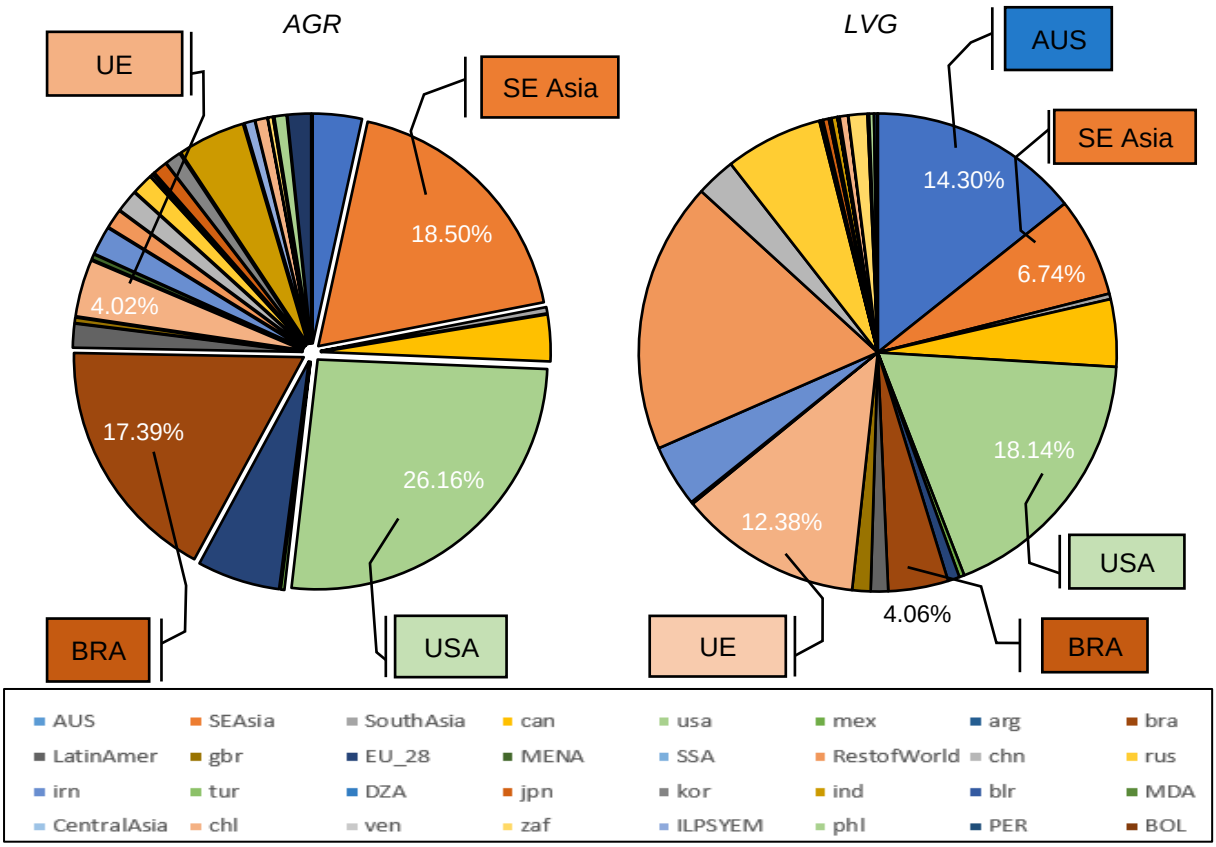
Note: N32: Variations (2024-2032) in indicators (here, production) under the normal scenario (baseline scenario). KH32: Variations (2024-2032) in indicators (here, production) under the scenario of Kamala Harris becoming President (KH scenario). ΔKH: difference between the two scenarios.
Source: Prepared by the authors using GAMS.

Based on the results (Table 1 and Table 2), the Eastern bloc has managed to avoid the negative consequences of the trade war at the sectoral level. Unlike the Western bloc, it has benefited some sectors (12 green cases versus 6 for the West), see Table 4.

Regarding the "food security" sectors (agriculture and livestock), the Eastern bloc has achieved positive results from the trade war, while the Western bloc has suffered significant losses. This is explained by China's strong domestic consumption, which was largely met by Western suppliers, particularly American and European ones (Figure 4). The shift in the global dynamics due to this war led China to rely more on itself (reflected in a 2.53% increase in domestic production for agriculture and a 1.04% increase for livestock compared to the baseline scenario) and to turn to suppliers from the Eastern bloc, such as Russia, Brazil, and Southeast Asian countries (SEAsia), to the detriment of the United States and the European Union see Table 9 in Appendix 2 from supplementary file. This explains the significant increase in Russian domestic production compared to the baseline scenario (5.72% for agriculture and 3.18% for livestock) and the notable decline in American (AGR: -2.78%, LIV: -1.75%) and European (LIV: -1.97%) production compared to the baseline scenario, see Table 4.

[4] The reason behind this choice is purely geopolitical.

Figure 4: The main suppliers to China in the AGR and LVG sectors (2023)



Source: World Bank, OECD, IT, Comtrade (Base de données sur le commerce international des Nations Unies), USDA (United States Department of Agriculture), FAO (Organisation des Nations Unies pour l'alimentation et l'agriculture), International Fertilizer Association (IFA), Global Fertilizer Trade, 2023, NBS (National Bureau of Statistics of China), China Agricultural Outlook, IBGE (Instituto Brasileiro de Geografia e Estatística), Embrapa (Empresa Brasileira de Pesquisa Agropecuária), Russian Ministry of Agriculture, Rosstat.

Regarding the "natural resources" sector (minerals and energy), particularly the mining sector, both blocs experienced an increase in production compared to the baseline scenario. Russia saw the most significant rise (+6.05% compared to the baseline scenario (Table 4) due to its vast mineral reserves. It took advantage of new markets opened during the trade war to increase its exports and mitigate Western sanctions. This notable increase in production (+6.05%) reflects this strategy. The main markets targeted by Russian exports included Turkey (+182.71% compared to the baseline scenario), Algeria (+76.7%), Vietnam (+73.15%), South Africa (+57.95%), China (+51.20%), and Southeast Asian markets (+53.27%), see Table 9 in Appendix 2 from supplementary file.

As for China, the world's leading producer of many strategic minerals (Table 5), production growth was limited, with only a 1.05% increase compared to the baseline scenario. This modest performance is due to its dominant position in global markets, which restricts its ability to increase production further. China partially succeeded in redirecting its exports to offset the decline in trade flows to Western markets (GBR: -132.53%, EU_28: -134.38%, USA: -131.81%, etc.), by focusing more on emerging markets such as Algeria (+182.91% compared to the baseline scenario), Belarus (+155.33%), Iran (+103.21%), and Southeast Asian markets (+79.81%), see Table 9 in Appendix 2 from supplementary file.

Regarding Western countries "USA," "EU_28," and "GBR," they have recorded notable increases in their production, respectively 3.12%, 2.55%, and 4.53% (Table 4) compared to the baseline scenario. This growth is attributed to their need to compensate for domestic demand, previously met by imports from China, as well as external demand (exports) from other Western countries that also suffered from reduced supplies due to the halt of Chinese and Russian exports, particularly for strategic minerals such as aluminium, copper, zinc, and rare earth (Table 2).

Table 2: The importance of China and Russia in the natural resources sector

	Natural resource	Share of world production (%)	World production ranking	Share of world exports (%)	World export ranking	Share of dependency on Western countries (%)
Chine	Rare earths	92	1	80	1	92
	Antimony	87	1	85	1	90
	Tungsten	84	1	80	1	85
	Gallium	83	1	75	1	80
	Germanium	79	1	70	1	75
	Indium	60	1	55	1	*60*
	Aluminium	60	1	15	5	*50*
	Copper	50	1	40	1	8
	Fer	17	3	35	4	-
	Zinc	35	1	20	3	25
	Coal	50	1	20	2	30
Russia	Oil	12	2	13	1	12
	Natural gas	17	1	20	1	15
	Palladium	40	1	40	1	50
	Nickel	20	2	15	2	25
	Platine	10	3	8	3	10
	Aluminium	6	5	5	5	10
	Uranium	5	6	4	6	15

Sources: US Geological Survey (USGS), World Bank, International Energy Agency (IEA), UNCTAD, WTO, GlobalData, Bureau of Economic Analysis (BEA), International Aluminium Institute (IAI), International Copper Study Group (ICSG), International Nickel Study Group (INSG), International Tungsten Industry Association (ITIA), OPEC, International Nickel Study Group (INSG), World Bureau of Metal Statistics (WBMS), World Platinum Investment Council (WPIC), London Metal Exchange (LME), World Aluminium, World Platinum Investment Council (WPIC), London Metal Exchange (LME), De Beers Group, Kimberley Process Certification Scheme (KPCS), Diamond section, World Steel Association, International Aluminium Institute, International Copper Study Group, International Zinc Association, International Lead & Zinc Study Group, US Geological Survey, UN Comtrade Database, ITC.

Regarding the energy sector, both Russia and the United States experienced a decrease in their production. For Russia, the decline was -1.35% compared to the baseline scenario, mainly due to the loss of its market shares in Western markets (USA: -63.86%, KOR: -

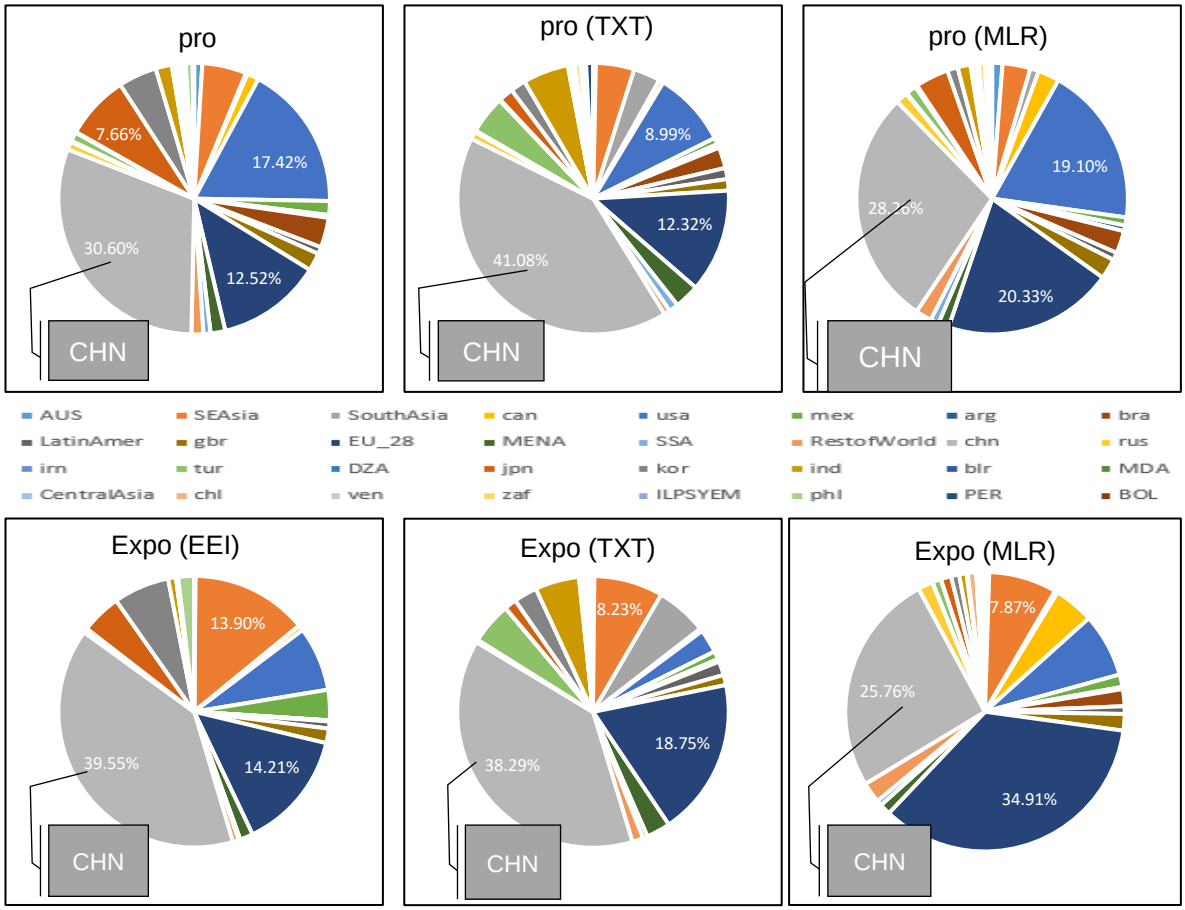
122.98%, ARG: -84.18%, JPN: -32.37%, etc.) see Table 4 and Table 9 in Appendix 2 from supplementary file, particularly in the export of gas and enriched uranium. As for the United States, production decreased by -0.3% compared to the baseline scenario due to the reduction of their crude oil supplies from Eastern bloc countries, especially from Algeria (-51.58%), Russia (-63.86%), Brazil (-52.67%), Belarus (-87.12%), Venezuela (-33.68%), and Central Asia (38.8%), see Table 4 and Table 10 in Appendix 2 from supplementary file. On the other hand, China recorded the highest increase in energy production, with an 8.14% rise compared to the baseline scenario. This increase is explained by a significant influx of crude oil from other Eastern bloc countries, which redirected their exports to Chinese markets at the expense of American markets, notably Venezuela, Iran, and countries like Yemen-Syria-Iraq (ILPSYEM), which saw their energy exports to China increase by 16.83%, 4.95%, and 6.39% respectively, compared to the baseline scenario, see Table 4 and Table 10 in Appendix 2 - from supplementary file.

Regarding the "industrial sectors" (textiles (TXT), electronics (EEI), other light industries (MLR), machinery and industrial equipment (MEI), and automobiles (AUT)), the results vary between the Eastern and Western economic poles. First, in the textile (TXT), electronics (EEI), and other light industries (MLR) sectors, China recorded the worst performances, with production declines of -12.2%, -7.78%, and -10.03%, respectively, compared to the baseline scenario - a result that was anticipated. Indeed, China holds the most significant global production shares in these sectors, with rates of 41.08% (TXT), 30.6% (EEI), and 28.26% (MLR), and also dominates global exports with market shares of 38.29% (TXT), 39.55% (EEI), and 25.26% (MLR), see Figure 5.

Consequently, the closure of Western markets to Chinese products led to a significant loss of global market share for China, explaining the decline in its production in these sectors. On the other hand, Western economies responded by increasing their domestic production to fill the gap left by China, resulting in production increases in these countries: In the United States, domestic production in the textile and apparel sector (TXT) increased by 28.77% compared to the baseline scenario, by 1.33% in the electronics and IT equipment sector (EEI), and by 9.23% in other light industries (MLR). Similarly, the European Union recorded production increases of 21.22% in the textile and apparel sector (TXT), 8.54% in electronics and IT equipment (EEI), and 8.38% in other light industries (MLR), compared to the baseline scenario. The situation is similar in the United Kingdom, where a recovery in these three sectors was observed, with respective increases of 23.59%, 9.07%, and 9.98% compared to the baseline scenario (Table 4).

China and Russia recorded the highest production increases in the chemical and pharmaceutical industries, with +11.22% and +43.88%, respectively, compared to the baseline scenario. At the same time, the West experienced a significant decline, with a decrease of -2.93% in the United States and -0.25% in the European Union compared to the baseline scenario. In reality, China's absolute dominance over rare earth supply chains is the sole explanation for these results. In other words, rare earth elements are the essential drivers of all pharmaceutical and chemical industries; without them, these industries cannot operate. By banning the export of these materials to the West, China has effectively strangled Western pharmaceutical and chemical industries.

Figure 5: Global production and export market shares dominated by China (2023)



Sources: Global Construction Equipment Market 2022-2027 (Mordor Intelligence), China Construction Machinery Industry Association (CCMA), World Bank, ITC, 2022, China Iron and Steel Association (CISA), World Steel Association, 2023, World Steel Association, 2023, International Organization of Motor Vehicle Manufacturers (OICA), 2023, World Steel Association, 2023, China Association of Automobile Manufacturers (CAAM), 2023, International Energy Agency (IEA), 2023, Market Research Reports, 2023, UNCTAD, World Investment Report, 2023.

Regarding the automotive sector, which is at the heart of the conflict, it seems that Western barriers have not achieved their objectives. Not only have they failed to curb China's rise, which saw a 19.99% increase in production in this sector compared to the baseline scenario, but they also have not improved Western automotive industries. On the contrary, these industries experienced a significant decline, with drops of -10.5%, -15.56%, and -19.10% compared to the baseline scenario for the United States, the European Union, and the United Kingdom, respectively (Table 4). These results can be explained as follows: first, the significant increase in Chinese production (compared to the baseline scenario) despite the closure of Western, particularly European, markets is due to China's shift toward emerging markets such as Belarus (+318.75%), South Africa (+403.91%), Iran (+146.66%), Brazil (+224.27%), Russia (+296.14%), as well as Southeast Asian (+189.21%) and African markets (+189.21%), see Table 9 in Appendix 2 from supplementary file. Secondly, the decline of the automotive industry in Western countries, despite the closure of their markets to Chinese products, which they accuse of dumping and massive subsidies, is due to the loss of the Chinese market, which

represented a significant share of Western, particularly European, car exports. The closure of this market has put the Western automotive industry in a critical situation.

Regarding machinery and industrial equipment (MEI), European economies appear to be the main losers in this sector due to their strong dependence on the Chinese market for the export of their products. The closure of the Chinese market to Western suppliers led to a contraction in European production by 2.36% compared to the baseline scenario.

In summary, the Eastern bloc appears to have shown greater resilience in this conflict compared to its Western counterpart. Russia, in particular, achieved remarkable performances across all sectors, turning this conflict into an opportunity to mitigate the impact of the economic sanctions imposed by the West. As for China, despite facing challenges in certain light industrial sectors such as textiles (TXT) and electronics (EEI), it also exceeded baseline scenario expectations in six strategic sectors, notably in the automotive and chemical and pharmaceutical industries.

This observation contrasts with the situation in the West, where, despite relatively positive results in some sectors such as textiles and electronics, significant declines were observed in the majority of sectors, particularly in the automotive industry (which is said to be the cause of the conflict), raising many questions and concerns.

At a global level, it appears that all actors have suffered losses across all indicators without exception (Table 6). However, the most significant point to highlight here is that the underlying strategic objective of the West in this conflict - namely, "slowing down China's economic progress" - although not explicitly stated, has not been achieved, as clearly demonstrated by Figures 9 and 10 in Appendix 3 from supplementary file.

Table 3: The impact of the “KH” scenario on GDP, total export and import as well as on total trade

		GDP (Real)	Total export	Total import	Total trade
CHN	N32	53,09	47,74	43,25	45,85
	KH32	48,05	18,38	-7,23	7,61
	ΔKH	-5,04	-29,37	-50,48	-38,24
RUS	N33	35,62	33,50	34,52	33,97
	KH33	27,62	27,71	0,77	15,39
	ΔKH	-8,01	-5,78	-33,75	-18,58
USA	N35	21,69	25,01	28,74	27,22
	KH35	20,58	3,48	7,59	5,91
	ΔKH	-1,11	-21,54	-21,15	-21,31
UE	N36	20,51	21,14	22,46	21,81
	KH36	17,80	15,41	11,13	13,23
	ΔKH	-2,71	-5,73	-11,32	-8,58
GBR	N37	23,95	23,97	25,23	24,68
	KH37	21,41	17,57	13,07	15,04
	ΔKH	-2,54	-6,40	-12,16	-9,64

Source: authors using GAMS.

4.1. DT Scenario: USA vs the World

Trump stated that if he returns to the White House, he would increase taxes by 10% on all countries, including the European Union. He also confirmed his intention to withdraw from NATO. If Trump were to implement either or both of these measures, it could push European Union countries to turn towards China within the framework of the "Belt and Road Initiative." This hypothesis is reinforced by the recent visit of Italian Prime Minister Giorgia Meloni to China, following Trump's speech on tariffs and NATO. In summary, if Trump were to adopt these two measures, he would plunge the United States into a major trade war, where they would find themselves almost alone against the Eastern bloc, which could gain new allies, including the European Union.

- The Western Bloc: United States of America, United Kingdom, Canada, Australia, Japan, Republic of Korea, Argentina.
- The Eastern Bloc: China, Russia, European Union 28, Brazil, Iran, South Africa, Turkey, Algeria, Venezuela, Belarus, Central Asia, Southeast Asia, Iraq, Lebanon, Syria, Yemen, Sub-Saharan Africa, Bolivia.

Regarding the shock, we will maintain the same approach as that adopted in the Kamala Harris (KH) scenario. In this second scenario, we will focus solely on comparing the situation of the European Union between the 'Kamala Harris scenario' and the 'Trump scenario,' with some references to China and the United States.

Table 4: The impact of the "DT" scenario on production at the sectoral level, in %

		AGR	AUT	MET	ENG	ELV	CRP	MEI	EEI	TXT	MLR
CHN	N32	52,28	56,37	52,88	58,05	50,62	57,12	56,34	58,89	51,82	53,80
	DT32	54,66	62,36	53,63	63,29	51,18	65,69	55,48	58,66	47,19	45,53
	ΔDT	2,38	5,99	0,75	5,24	0,57	8,57	-0,87	-0,23	-4,63	-8,27
	ΔKH	2,53	19,99	1,56	8,14	1,04	11,22	-0,35	-7,78	-12,23	-10,08
RUS	N32	29,73	36,61	36,65	35,14	33,71	39,88	27,22	34,48	41,65	41,40
	DT32	33,36	51,51	41,01	36,66	32,65	64,61	31,73	36,12	31,06	40,18
	ΔDT	3,62	14,91	4,36	1,52	-1,06	24,73	4,51	1,64	-10,58	-1,21
	ΔKH	5,72	80,29	6,05	-1,35	3,18	43,88	26,66	7,23	-7,32	11,47
UE	N32	18,22	21,41	15,51	13,68	18,27	18,11	15,95	15,92	20,76	20,45
	DT32	19,48	32,00	17,61	13,49	19,96	20,74	18,51	17,85	17,18	20,30
	ΔDT	1,26	10,59	2,10	-0,20	1,69	2,63	2,56	1,93	-3,58	-0,15
	ΔKH	0,85	-15,56	2,55	1,07	-1,97	-0,25	-2,36	8,54	21,22	8,38
USA	N32	23,92	20,50	16,43	19,06	21,61	21,12	16,22	20,43	22,09	20,93
	DT32	21,20	7,56	19,81	15,52	21,21	16,83	18,87	20,38	52,65	32,07
	ΔDT	-2,72	-12,94	3,38	-3,53	-0,40	-4,29	2,65	-0,05	30,56	11,14
	ΔKH	-2,78	-10,51	3,12	-0,30	-1,75	-2,93	3,08	1,33	28,77	9,23
GBR	N32	20,46	22,31	19,40	24,96	20,50	18,78	21,59	22,23	21,11	23,62
	DT32	20,92	6,16	22,55	25,77	20,40	26,09	19,66	27,84	37,61	33,36
	ΔDT	0,46	-16,15	3,15	0,81	-0,11	7,32	-1,93	5,61	16,50	9,74
	ΔKH	0,84	-19,10	4,53	1,58	-0,45	0,39	-0,10	9,07	23,59	9,98

Source: authors using GAMS

In short, regarding "food security" ("AGR" and "ELV"), the European Union recorded production increases of +1.26% and +1.69%, respectively, compared to the baseline scenario. These results are significantly better than those obtained in the "KH" scenario (AGR: +0.85%; ELV: -1.97%), see Table 7. This improvement is explained by the closure of European markets to American food products that previously flooded European markets (decrease in EU imports from the United States of -121.08% for the AGR sector and -125.61% for the ELV sector), see Table 12 in Appendix 5 from supplementary file.

Regarding the "natural resources" sectors (metals (MET) and energy (ENG)), the European Union recorded a production increase of +2.1% in the metals sector compared to the baseline scenario. This result is slightly lower than that observed in the "KH" scenario (+2.55%), due to a resurgence in dependence on metal imports from China (+19.41 % RBS[5]). For the energy sector, European production experienced a decrease of -0.20% compared to the baseline scenario, in contrast to the +1.07% increase observed in the "KH" scenario. This decrease is primarily explained by a return to dependence on Russian energy production, particularly for low-cost gas and oil (+7.73% RBS), see Table 7 and Table 12 in Appendix 5 from supplementary file.

The difference between the "DT" and "KH" scenarios for the European Union is more pronounced in the "industrial sectors." For example, the chemical and pharmaceutical industries (CRP) recorded a production increase of +2.63% compared to the baseline scenario, a result significantly better than that observed in the "KH" scenario (-0.25%). This increase is attributed to the continued flow of rare earths from China to the European Union, unlike what occurred in the "KH" scenario, where the export of these materials from China to the European Union was completely halted, leading to the collapse of European pharmaceutical and chemical industries.

Regarding the automotive sector (AUT), considered the cause of the conflict (so it is said), the European Union recorded exceptional growth of 10.59% compared to the baseline scenario, contrasting with the "KH" scenario, where the automotive industry was the most affected, with a decrease of -15.56%. The 10.59% growth is mainly attributed to a substantial increase in European automotive exports to the Chinese market (+66.9% RBS), which represents the largest consumer market for European vehicles. The same reasoning applies to the machinery and equipment manufacturing industries (MEI), where this sector experienced an expansion of 2.56% compared to the baseline scenario. This contrasts sharply with the "KH" scenario, where the sector recorded a contraction of -2.36%, see Table 7 and Table 11 in Appendix 5 from supplementary file.

Regarding the light industries (sectors TXT, EEI, and MLR), the European Union recorded weak results (-3.58%, +1.93%, -0.15%) compared to the baseline scenario. These performances are significantly lower than those observed in the "KH" scenario (8.38%, 21.22%, 8.54%). This situation can be attributed to the massive influx of Chinese products flooding European markets in these sectors, particularly in textiles (TXT) and electronics (EEI), (+29.24%, +12.55% RBS), see Table 7 and Table 11 in Appendix 5 from supplementary file.

In summary, compared to the "KH" scenario, the European Union's alignment with the Eastern bloc under the "Belt and Road Initiative" represents a significant gain for European economies over any other party. The results achieved by the European Union in this scenario

[5] Relative to the baseline scenario.

are far superior to those recorded in the case of a continued confrontation with China and the maintenance of the American approach (the "KH" scenario), particularly in crucial and sensitive sectors such as automotive, machinery, pharmaceutical and chemical industries, as well as food security. Additionally, the return to dependence on Russian energy exports (notably gas), which plays a crucial role in reducing costs and revitalizing other industries, further supports this. It is undeniable that light industries have faced difficulties, but this is negligible compared to the successes recorded in other sectors.

Table 5: The impact of the "DT" scenario on GDP, total exports, total imports, and total trade

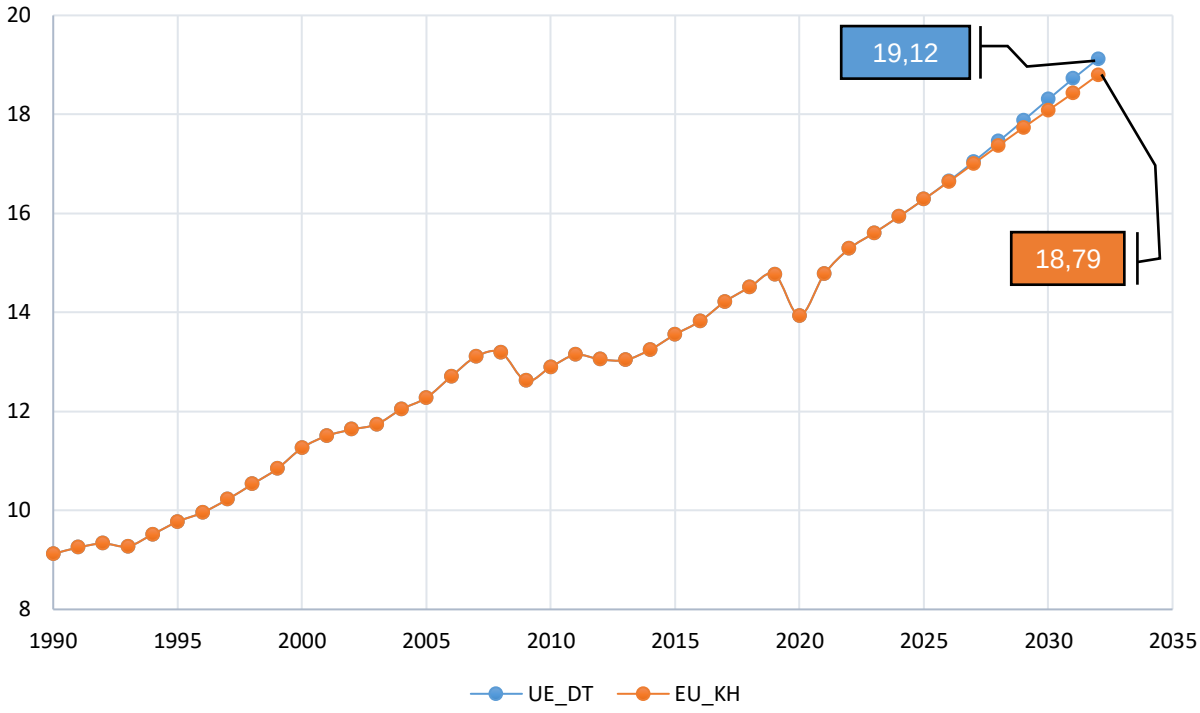
		GDP (Real)	Total export	Total import	Total trade
CHN	N32	53,09%	47,74%	43,25%	45,85%
	DT32	49,38%	31,14%	8,63%	21,68%
	ΔDT	-3,71%	-16,60%	-34,61%	-24,18%
	ΔKH	-5,04	-29,37	-50,48	-38,24
RUS	N32	35,62%	33,50%	34,52%	33,97%
	DT32	33,81%	41,68%	30,68%	36,65%
	ΔDT	-1,82%	8,18%	-3,84%	2,68%
	ΔKH	-8,01	-5,78	-33,75	-18,58
UE	N32	20,51%	21,14%	22,46%	21,81%
	DT32	19,81%	22,29%	20,46%	21,36%
	ΔDT	-0,70%	1,15%	-2,00%	-0,46%
	ΔKH	-2,71	-5,73	-11,32	-8,58
USA	N32	21,69%	25,01%	28,74%	27,22%
	DT32	20,40%	-8,98%	-0,28%	-3,84%
	ΔDT	-1,29%	-33,99%	-29,02%	-31,06%
	ΔKH	-1,11	-21,54	-21,15	-21,31
GBR	N32	23,95%	23,97%	25,23%	24,68%
	DT32	21,52%	17,94%	13,63%	15,52%
	ΔDT	-2,42%	-6,04%	-11,59%	-9,16%
	ΔKH	-2,54	-6,40	-12,16	-9,64

Source: authors using GAMS

At the macroeconomic level, the results indicate that the European Union performs more robustly in the "DT" scenario compared to the "KH" scenario, particularly in terms of exports, which show an increase of +1.15% compared to the baseline scenario. This progress contrasts sharply with the situation in the "KH" scenario, where European exports experienced a decrease of -5.73% compared to the same baseline scenario. Furthermore, the real Gross Domestic Product (GDP) in the "DT" scenario reaches $19.12 trillion, surpassing that of the "KH" scenario, which stands at $18.79 trillion (Figure 6). In summary, all results confirm that for the European Union, restoring relations with China and ceasing to follow American policies is a beneficial move for European economies over any other actor.

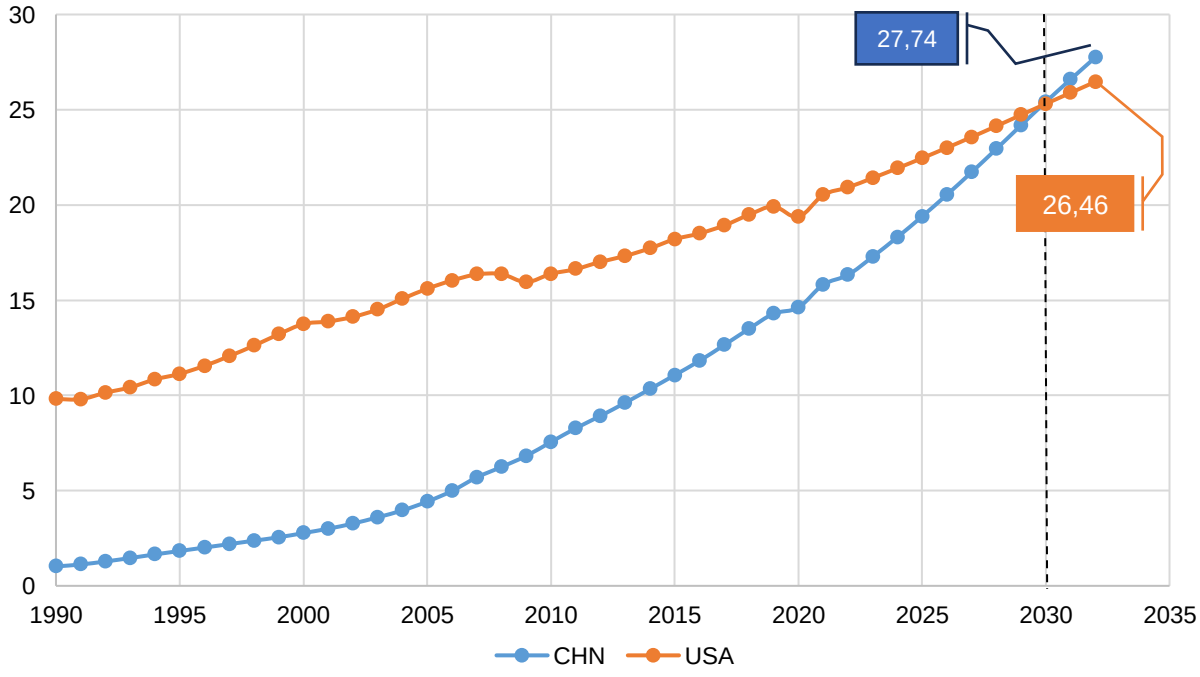
Regarding the United States and China, the central actors in this trade war, it appears that Trump's return to the White House did not allow the United States to escape the nightmare of 2030 (Figure 7).

Figure 6: Comparison of European GDP between the two scenarios "KH" and "DT", in trillions of constant 2010 US dollars



Sources: authors using GAMS

Figure 7: Comparison of real GDP between China and the United States in the baseline scenario (DT32), in trillions of constant 2010 US dollars



Sources: authors using GAMS

Conclusion

Everyone eagerly anticipates November 4, 2024, when the European Commission is expected to definitively increase tariffs on Chinese electric vehicles if negotiations with China do not yield positive results. This decision seems more influenced by the upcoming American elections than other factors. The rise of Kamala Harris and the continuation of Biden's anti-China policies may prompt the European Union to take this measure, potentially triggering a trade war between the Western bloc, led by the United States, and the Eastern bloc, led by China. Conversely, if Trump returns to the White House, his protectionist policies, which do not distinguish between enemies and allies, could draw the European Union closer to China through initiatives like the Belt and Road Initiative. This shift could leave the United States isolated against an Eastern bloc strengthened by the European Union's cooperation.

Under the first scenario, this study revealed significant advantages for Eastern economies over their Western counterparts, particularly in the automotive industry. The findings indicated a robust recovery of the Chinese automotive sector, starkly contrasting to a contraction in its Western counterpart, especially within the European Union. Moreover, this scenario suggests that the Chinese economy is expected to surpass that of the United States by 2030.

In the second scenario, the model results showed that if the European Union distances itself from American influence and improves relations with China, it would primarily benefit European economies. This is particularly evident in a substantial recovery of the European automotive industry and other significant gains, including better performance of European GDP compared to the first scenario. Notably, this inclination towards China would be illustrated by reducing or eliminating tariffs between the two parties. In practice, this could manifest as European participation in the Belt and Road Initiative, which includes tariff reductions and significant infrastructure projects. This could double the benefits for the European Union.

In summary, this study highlights the failure of the West's strategic goals in this trade war, whether explicit (such as protecting electric vehicle industries in the West) or implicit (like curbing China's economic rise). It positions the European Union at a strategic crossroads, where it must choose between enhancing relations with China - which could stimulate economic growth in many European countries that have experienced nearly two decades of stagnation despite having significant resources and potential - or continuing to align with American policies, which could marginalize the European Union on the global economic stage and ultimately lead it towards historical decline.

Finally, it is important to note that while the model used in this analysis is dynamically temporal, it remains static from a geopolitical perspective. It does not account for several crucial factors, such as mergers and acquisitions, which have historically provided China with a strategic advantage, nor the substantial financial support from the Chinese government. Additionally, the model overlooks observable tendencies among European companies, particularly German ones, to relocate their production chains to China. It also fails to consider China's adeptness in managing trade conflicts. For instance, China has successfully supported the Russian economy under twelve waves of Western sanctions. It has positioned it favourably, achieving a growth rate in 2023 that surpasses that of most Western economies, including the United States.

Credit Authorship Contribution Statement

All authors contributed to the design and conception of the study (conceptualization, methodology, software, validation, formal analysis, investigation, resources, data curation, writing-original draft preparation, writing-review and editing).

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