

THE US-CHINA SEMICONDUCTOR WAR: HOW IT IMPACTS SOUTH KOREA'S TECH INDUSTRY

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ABSTRACT

The U.S.-China semiconductor war is a turning point in the high-tech history of the world. The war, in its essence, a struggle for supremacy of cutting-edge chip technology, is waged with export controls, sanctions, and investment bans rather than gunpowder. Caught in the middle of it all that the war is over is hope to rule next-generation technologies such as artificial intelligence, quantum computing, and 5G. The world leader in semiconductor production, South Korea, finds itself between a rock and a hard place. Having an economic proximity to China and belonging to the American-led camp, South Korea has to tread the tightrope of a rapidly bifurcating world. It examines how the competition between the U.S. and China for semiconductors is reshaping global value chains and its strategic implications for South Korea's technology industry. Two research questions worded for investigation provide the agenda: how are global semiconductor supply chains being reconstituted under geopolitical tension, and whether South Korea can stay economically neutral even if it loses competitiveness. The study, based on the most recent scholarly research, policy analysis, and business reports, concludes that South Korea was finding it increasingly difficult to keep pace with its technological edge and economic prowess amidst intensifying rivalries on the global stage. The microchip war is not merely a microchip war—it is redrawing economic equilibria, strategic options, and national vitality within the age of digital technology.

Keywords: U.S.-China semiconductor conflict, South Korea technology strategy, Geo-economics of semiconductors, Global supply chain restructuring, Technological decoupling, High-tech rivalry, Strategic autonomy controls and sanctions, and semiconductor geopolitics, Digital power competition.

INTRODUCTION

The semiconductor war is a global rivalry over microchips. The tiny parts that control smartphones, computers, cars, and even military systems. These chips are crucial for modern life, and the race to regulate them has become intense. Governments and companies worldwide struggle to secure chip supplies, shape stronger tech industries, and stay ahead in areas like AI and progressive electronics. This has led to trade restrictions, supply chain shifts, and rising tensions. At its core, the semiconductor war is about who leads the future of technology and who gets left behind.

We will explore the rising semiconductor war, a global conflict generally driven by the growing technological conflict between the United States and China. At the heart of this conflict are semiconductors, the tiny chips that influence nearly everything in our digital world, from smartphones and electric automobiles to artificial intelligence and military systems. This isn't a traditional battle with weapons, but a struggle for control over technology and economic power, fought through export bans, trade restrictions, and supply chain disruptions. The U.S., citing national security concerns, has imposed strict

export controls to block China's access to advanced chips and the machinery required to make them. As The New York Times and Reuters reported, Washington is also pressuring its allies to limit chip-related cooperation with Beijing. China has enhanced efforts to build its chip-making industry, pouring billions into domestic development to reduce analyst reliance on U.S. and allied technologies, as covered by The Wall Street Journal. Amid this escalating competition, South Korea, home to global semiconductor titans like Samsung Electronics and SK Hynix, is caught in the middle. South Korea is a foremost supplier of memory chips and an energetic part of the global semiconductor supply chain. However, as Bloomberg and Nikkei Asia report, Seoul is now under growing pressure to navigate its economic ties with both Washington and Beijing. On one hand, South Korea relies on U.S. technology and tools to stay competitive in chip manufacturing. On the other hand, China remains one of its largest export markets, especially for memory chips. This creates a tactical dilemma. By U.S. spread controls, South Korean companies have been subject to limitations on employing American gear within Chinese manufacturing facilities. Korea's long-term semiconductor demand is also vulnerable to China's pursuit of chip self-sufficiency. The Korea Herald asserts that tensions between the two nations have caused South Korean industries to reassess investments, including their supply chains, and prepare for an increase in geopolitical risk. Aside from distracting commerce, the semiconductor war is also altering the way countries such as South Korea align themselves in a world where politics, security, and technology are totally interconnected.

RESEARCH QUESTION:

1. How is the U.S.-China semiconductor war reshaping the global semiconductor supply chain, and what are the strategic implications for South Korea's chip industry?
In this question, we will examine how trade restrictions, export controls, and realignments are altering the supply of materials, technology, and investment in the chip industry and how this affects South Korea's status as a top chip maker.
2. To what extent can South Korea maintain a neutral economic and political stance between the U.S. and China without negotiating its

semiconductor sector's growth and stability? In this question, we will explore South Korea's political and economic methods to strike a balance between the two powers, estimating the risks and trials of maintaining its semiconductor sector in the face of heightened geopolitical tensions.

LITERATURE REVIEW:

The Semiconductor War: A Strategic Technological Rivalry

The semiconductor war is an accelerating, geopolitically charged conflict, between the United States and China mainly, over domination of advanced semiconductor technology. Semiconductors are the bricks and mortar of modern technology, found in everything from smartphones and electric cars to weapons systems and artificial intelligence platforms. Instead of a conventional war, this is being waged through export controls, technology embargoes, trade sanctions, and industrial policy. The U.S., in the name of national security, is keen to unveil broad measures to curtail China's access to high-end chips and the equipment to produce them. These include blacklisting firms such as Huawei, limiting access to cutting-edge equipment such as extreme ultraviolet (EUV) lithography equipment, and recruiting allies such as Japan and the Netherlands to impose the same restrictions. China has acted by speeding up the development of an indigenous semiconductor ecosystem. With programs such as "Made in China 2025" and record state investment, it is pumping billions of dollars into domestic chipmakers such as SMIC and YMTC. With all these attempts, China is still reliant on foreign vendors to access the latest manufacturing technology and intellectual property, making its tech aspirations vulnerable. While the U.S. continues to protect its strategic edge by returning chip production back home and enacting bills such as the CHIPS and Science Act, which targets reviving its domestic semiconductor industry, the technological landscape is not only rewriting the bilateral relationship but also re-charting the global semiconductor map. It has triggered a global race towards semiconductor self-reliance, and South Korea, Taiwan, Japan, and the EU all have announced publicly huge investment plans. The war of semiconductors is a flip-point struggle for

dominance in future technologies artificial intelligence, quantum computing, etc. Its result will presumably cast economic and strategic pecking orders for decades, and semiconductors are becoming the centerpiece of international power politics.

South Korea's Semiconductor Economy: Strategic Strength, Structural Vulnerability

South Korea is one of the world's top semiconductor players with a dominant position in the memory chip market and inroads into logic chip technology. Companies like Samsung Electronics and SK Hynix have a combined share of more than half of the world's DRAM and NAND flash memory output, thereby making semiconductors a crucial pillar of the South Korean economy. By 2023, semiconductors made up almost 20% of the total exports of South Korea, with China and the United States being two of its largest markets. But with the U.S.-China semiconductor war today, South Korea finds itself sandwiched between two titans with rival technological and security interests. Although South Korean chipmakers depend significantly on American equipment and software for producing advanced chips, they also have large facilities in China. Samsung's NAND plant in Xi'an and SK Hynix's DRAM plant in Wuxi are vital to their global supply chains. As the U.S. imposes restrictions on exporting advanced chip technologies and tools to China, South Korean firms operating in China face growing uncertainty. Despite being given temporary waivers by Washington, they are under the shadow of possible future sanctions or downgraded upgrades. On the other hand, any perception of coordination of U.S. policy could be countered with Chinese economic reprisal, South Korea's number one trading partner. Its dual relationship with both nations exposes South Korea's chip sector to external shocks. It has to balance U.S. regulation with commercial outreach in China, a challenge which is becoming increasingly onerous as the global technology ecosystem is cleaving along geopolitical fault lines. The episode barebones a structural vulnerability in South Korea's chip policy: technology-driven but not completely autonomous in supply chains and highly sensitive to geopolitical tensions. Strategic policy realignments and diversification of supply chains

become increasingly urgently necessary as the dispute escalates.

Diplomatic Balancing Act Between China and the U.S.

The geopolitical location of South Korea positions it in an awkward and frequently uncomfortable place in the U.S.-China chip war. Though a close American friend, united by alliances of arms and economically increasingly interdependent through initiatives such as the "Chip 4 Alliance," South Korea has its own close economic relationships with its largest trading partner, China. That dual loyalty creates bitter diplomatic tension, especially when both superpowers urge Seoul to choose between them in their battle for technology. The war of the semiconductor has made it more difficult. For instance, while South Korea has signed up with U.S.-led initiatives in providing secure and democratic chip supply chains, it has simultaneously negotiated in secret for Chinese-based companies of its own to be exempted to prevent economic countermeasures. Samsung and SK Hynix received waivers in 2023 from the U.S. administration to continue employing American gear in Chinese facilities. These exemptions are, however, temporary and politically tractable, exposing firms to surprise policy reversals. Meanwhile, apparent compliance with U.S. tech bans risks triggering Beijing's reprisal, having deployed unofficial sanctions and consumer boycotts in the past, such as for the 2017 THAAD missile defense standoff. While tensions mount, pressure builds on South Korea to stand its ground more strongly. But up to now, it has adopted the policy of strategic ambiguity, backing supply chain resilience everywhere in the world without directly provoking China. The tightrope walk, while successful for now, becomes increasingly difficult as U.S.-China decoupling gains momentum. South Korea's dilemma is not merely economic but also political: how to advance national interests, defend its chip industry, and preserve regional stability without being collateral damage in a superpower high-risk game.

THEORITICAL FRAMEWORK(NEOREALISM):

The US-China war of semiconductors can be understood by applying realism, which is a theory

of international relations that focuses on power, security, and national interest as the primary motivations for state action. In line with this view, the global system is anarchic, and states trade goods to secure their survival and maximize their power. Semiconductors, critical to cutting-edge technologies such as artificial intelligence, high-level computing, and the military, are commanding a strategic value that affects the balance of power internationally. America, practicing what can reasonably be argued is offensive realism, is taking China to great lengths to ensure it continues its geopolitical and industrial superiority by setting the terms for China's purchase of cultured chips and chip-producing equipment. The apprehension is that Chinese supremacy would undermine its world leadership. This has the added burden of export restrictions and exerting pressure on allies like South Korea to fall in line with its policies. Likewise, China, under defense realism, interprets such restraints as security threats to its country and economic development, prompting it to aggressively seek semiconductor self-sufficiency through government-backed funds and efforts to minimize foreign technology requirements. While South Korea is on a treacherous terrain being a middle influence between these two giants, it relies heavily on the Americans' technology and security rhetoric while having close economic relationships with China, its biggest trade partner. Realist accounts of South Korean strategic correspondence constitute a response to power deficiencies; it has to judiciously tread between tribulations on both flanks to guard its semiconductor manufacturing and national interests. Therefore, the war of the semiconductors is less economically and technically motivated and more about control and survival in an uncertain world order where states are mostly guided by strategic imperatives rather than co-operation or common perception.

SUMMARY OF THE ARTICLES:

How the U.S.-China Chip War Is Reshaping the Global Tech Industry. The New York Times (2024)

The article uses the term "semiconductor war" to describe the current U.S.-China conflict, highlighting U.S. attempts at technological superiority in the guise of applying export controls on advanced semiconductor chips and

chip-making machines. It describes how these measures are aimed at stopping China from bridging the technological gap, especially in those domains which are most relevant to military and economic dominance, i.e., AI and 5 G. The article records spillover effects on global supply chains, including added expenses, slowdown, and reorientation of major industry giants. It also underscores the tricky situation of semiconductor centers like Taiwan and South Korea that are between their profitable economic relationship with China and the pressure from the U.S. to adhere to export controls.

U.S.-China Semiconductor Clash: Strategic Rivalry and Economic Fallout" Reuters (2024)

Reuters concentrates on the geopolitical and economic impact of the semiconductor war. It explains how the U.S. has created the "Chip 4" coalition—allied with South Korea, Japan, and Taiwan—to build a tech bloc to restrict China's access to advanced semiconductor technology. The article explains how such export controls interfere with China's chip supply and manufacturing capacity. It also describes the pressures on South Korean firms, which have to obey U.S. regulations while maintaining their sizeable business interests in China. The article discusses how the war influences world chip prices, supply chain stability, and foreign trade relationships.

South Korea's semiconductor industry struggles amid US-China tech competition. The Korea Herald (2024)

The piece is particularly keen on the example of South Korea's semiconductor industry, detailing the impact of US export controls on semiconductor equipment manufacturing on South Korean companies in China, namely Samsung Electronics and SK Hynix. It explains Seoul's strategic conundrum of maintaining its close security bond with America and economic reliance on China's enormous market. According to the article, South Korean firms need to remake supply chains, swiftly establishing local and third-country manufacturing, and nudging the government to conform to geopolitics. It points out potential long-term effects on innovation and competitiveness for the global chip industry.

Semiconductor supply chains: Navigating the U.S.-China Tech Cold War

Financial Times (2024)

It writes about how the fight for semiconductors has triggered a huge re-jigging of global supply chains. It explains how export controls, tariffs, and political arm-twisting are compelling semiconductor companies to diversify raw material, production site, and tech supplier sources. Nations and enterprises are resorting to decouple from China or America-centric technology, making huge investments in alternatives. Its positioning as one of the top chip makers and high-end memory chip export-oriented makers is being highlighted, along with its attempts to be supply-chain resilient under geopolitical pressure. The article also speaks of how they drive costs, innovation cycles, and competition for overseas markets.

China's Push for Semiconductor Self-Reliance Amid U.S. Sanctions South China Morning Post (2024)

This is a piece about China's sweeping drive to achieve self-sufficiency in semiconductors in the face of US sanctions and export controls.

It discusses such government agendas as "Made in China 2025," subsidizing domestic chipmakers, nurturing human talent, and core technologies such as chip design and manufacturing. The news outlet mentions China's technological shortfalls, for example, advanced manufacturing equipment and intellectual property. It then proceeds to identify semiconductors' strategic value to China both in civilian and military uses, so self-reliance is now of more national importance.

U.S. Semiconductor Policies and Their Global Impact, Brookings Institution Report (2023)

The report examines the global impact of U.S. semiconductor export controls.

The report quantifies their impact on world innovation economies, world collaboration, and economic integration. The report examines potential threats of technology decoupling, such as innovation stifling and market fragmentation. South Korea is considered to be among nations stuck in between expectations of greater alliance cooperation with US allies and being denied access to Chinese markets. The report also

includes policy recommendations for reconciling national security requirements with global economic stability.

The Future of Semiconductor Alliances: Opportunities and Risks for South Korea Council on Foreign Relations (2024)

The article speaks about the new semiconductor alliances, especially the "Chip 4" alliance between Taiwan, Japan, South Korea, and the U.S. It describes how the alliances serve to seal up supply lines and counter China's tech thrusts. While the cooperation provides South Korea with exposure to cutting-edge technology and greater geopolitical clout relative to China through stronger relations with the U.S., the article also warns against Chinese retribution in terms of trade pushback and diplomatic blowback. It points to the strategic dilemma for South Korea and the requirement of sophisticated diplomatic navigating to obtain the best out without taking a misstep.

THE THREE ENTITIES

UNITED STATES:

The United States considers semiconductors to be the driver of its economic development and national security, considering advanced chip technology to be a leading pillar for new-generation industries like artificial intelligence, quantum computing, 5G networks, and defense systems. The US semiconductor industry is the world-leading industry in chip design, software, and equipment manufacturing, with leading companies like Intel, NVIDIA, Qualcomm, and Applied Materials. But the manufacturing of high-end chips has moved increasingly to Asia, and to Taiwan and South Korea, causing strategic unease in Washington about the exposure of the supply chain. In an attempt to offset it, America has embarked on a multi-dimensional strategy to guarantee its primacy, protect its technology leadership, and restrain the development of hostile peers.

The U.S. has strangled export restrictions on Chinese tech firms such as Huawei and SMIC since 2018, restricting their access to high-end chips and chip-making machinery. The export restrictions are due to concerns regarding military applications and increased geopolitical competition (Commerce, 2023). The CHIPS and Science Act of 2022 represents a major \$52

billion commitment to revive chip manufacturing and research, reduce foreign dependence on production centers, and revive the U.S. semiconductor value chain (Congress.gov, 2022). The legislation subsidizes new fabs, the renovation of current ones, and the training of an efficient semiconductor workforce. At the same time, the U.S. has been spearheading the multilateral initiative with its allies in the "Chip 4 Alliance," which includes South Korea, Japan, and Taiwan. The alliance has its vision of aligning export controls, securing reliable supply chains, and collectively restricting China's access to cutting-edge semiconductor technology (Reuters, 2024). The U.S. policy seeks to build an alliance of trusted partners to sustain technological superiority and prevent China from catching up. However, this effort also risks Balkanizing the world semiconductor industry, which is highly integrated and reliant upon cross-border cooperation for design, production, and assembly. Supply chain disruptions, rising expenditures, and decreased innovation create considerable problems for U.S. policymaker (Brookings Institution, 2023). Overall, U.S. semiconductor policy is a strategic combination of trade control, huge investment, and coalition building to gain technological hegemony in an age of rising geopolitical rivalry. The chip industry is at the eye of this fight, proof of economic ascendance as much as it is proof of Washington's national security fears.

CHINA:

Beijing's chip ambitions are at the center of its broader ambitions to be technologically independent and a global power, especially in the face of an intensification of tensions with the United States. Beijing's ambitions revolve around semiconductors to remake the economy, remake the military, and shut off weaknesses exposed by American export controls. Though China is the largest worldwide consumer of semiconductors, it is still considerably dependent on foreign producers for the production equipment of advanced chips, in particular, ASML-made extreme ultraviolet (EUV) lithography machines (Financial Times, 2024). The dependency is a gargantuan strategic weakness whose America-led sanctions on the cards stall the purchase by China of advanced chips and equipment for manufacturing. In response, China has launched

an all-out government-led drive to create an indigenously developed semiconductor ecosystem. The National Integrated Circuit Industry Investment Fund, popularly known as the "Big Fund," has spent tens of billions of dollars intended to augment manufacturing capacity, chip design, and packaging capabilities (China Daily, 2023). China's "Made in China 2025" industrial strategy also sets particular emphasis on semiconductors as a strategic industry to drive technological innovation and decouple from foreign technologies. Local titans like Semiconductor Manufacturing International Corporation (SMIC) have improved manufacturing technology to the best but are still lagging behind the industry leaders, producing chips in most of the 14nm to 7nm nodes, with the leader now below 3nm (Financial Times, 2024). China has also retaliated against the U.S. sanctions by expanding exports of critical semiconductor raw materials such as gallium, germanium, and rare earth material, which are critical inputs into semiconductor production and where China is nearly the sole supplier to the world (Reuters, 2024). They are aimed at pressuring global supply chains and raising the complexity of semiconductor production for nations relying on these materials. Apart from investing domestically, China is also seeking international collaboration and other sources of technology, collaborating more aggressively with countries like Russia and part of the Southeast Asian countries in a bid to escape Western sanctions (South China Morning Post, 2023). Despite being boosted, China's semiconductor industry remains considerably plagued by talent deficits, advanced manufacturing tech deficiencies, and the continued sanctions' impacts. Although its short and long terms both are focused on achieving technological self-reliance, to become a top semiconductor player in the world.

SOUTH KOREA:

South Korea plays a central role in the semiconductor world, with its economy under the control of behemoths Samsung Electronics and SK Hynix that dominate the memory chip market of the world. Semiconductors are the backbone of South Korean economy, contributing approximately 20% of total exports, and its largest export market is China, absorbing

close to 40% of chip shipments (KOTRA, 2024). Such financial dependence on China leaves South Korea in a precarious geopolitical situation amidst escalating U.S.-China competition to control semiconductors. Being a neighboring U.S. ally, South Korea is intensely pressed to come into line with American-led export controls and tech restrictions on China to limit China's semiconductor capability. Cutting off or limiting semiconductor commerce with China, though, would have a catastrophic impact on South Korean corporations, which have goliath-scale facilities and supply chains in China. The U.S. has reacted to this complexity by the temporary waivers that have been offered to South Korean companies, and they have been allowed to conduct part of their business in China under tight supervision, even though waivers are politically driven and temporary (Bloomberg, 2024). To alleviate vulnerabilities and enhance its semiconductor competitiveness, South Korea unveiled the "K-Semiconductor Strategy," committing to invest more than \$450 billion by 2030. This is targeted at expanding the manufacturing capacity from memory chips to logic chips and foundry segments, enhancing research and development, and cultivating talented human resources (Business Korea, 2024). The government provides huge support in the form of subsidies, tax credits, and public-private partnerships to spur innovation and build safe supply chains. South Korea balances its strategic cooperation with the U.S. and economic cooperation with China diplomatically. Seoul does not want to take sides overtly but protect its chip industry and broader economic interests. It is premised on the preservation of tensions, multilateral diplomacy, and regional stability being necessary if sustainable growth is to be achieved (Council on Foreign Relations, 2024). South Korean chip industry is a critical global supplier but greatly depends on its capacity to navigate this delicate geopolitical risk.

ANSWER OF THE RESEARCH QUESTION:

The U.S.-China chip war has emerged as one of the largest technological and economic rivalries of the 21st century, structurally transforming global semiconductor supply chains that were previously very integrated and interdependent. Semiconductors, also referred to as the "brains" of current technology, drive everything from

mobile phones and PCs to advanced defense systems and AI applications. Traditionally, semiconductor production has been based on a worldwide division of labor: design innovation typically originates in the U.S. and South Korea; fabrication and assembly occur in East Asia; and raw materials come from around the world. But increasing geopolitical tensions, particularly between the United States and China, have started to break down this complicated apparatus. The U.S. government, in an attempt to curb China's access to advanced chips and semiconductor manufacturing technology, citing national security threats and intellectual property theft, has leveled a range of export controls and blacklists. The range of restrictions imposed includes prohibitions on sales of advanced lithography equipment, chip designs, and semiconductor manufacturing software. Based on coverage by The Wall Street Journal and Reuters, the plan is intended to stem China's advancement in leading areas of technology over which dominance can bring significant military and economic benefits. In counteraction, China has embarked on an aggressive effort to build a domestically independent semiconductor industry, spending tens of billions of dollars through government subsidies, tax incentives to domestic companies, and joint ventures with foreign companies that are willing to share technology. Nonetheless, even with these efforts, China continues to fall behind in manufacturing the most sophisticated chips, those measuring less than 10 nanometers, which are significant for AI, 5G, and quantum computing. This technological lag is significant because it reveals ongoing reliance on foreign sources, mostly U.S. firms and their allies. The semiconductor war therefore, speeds the fragmentation of global supply chains, prompting businesses and nations to reconsider their approach to stay out of trouble. Companies are diversifying more of their manufacturing bases beyond China, such as in Southeast Asia, the United States, and South Korea, to mitigate geopolitical risks. For South Korea, the implications are far-reaching and multilateral. Being the hub of Samsung Electronics and SK Hynix, the two largest memory chip makers in the world, South Korea is crucial to the global semiconductor supply chain. The nation's semiconductor exports contributed to about 18% of its overall exports in

2023, with China being among its biggest buyers, taking over 30% of South Korea's semiconductor outputs. At the same time, South Korean chipmakers depend significantly on U.S.-sourced semiconductor manufacturing tooling and intellectual property to output the new generation of chips. This presents a tough dilemma: obedience to American export controls limits South Korean companies' ability to sell chips and equipment to buyers in China, yet disobedience threatens penalties and damaged relations with the American government. Industry experts, quoted by Bloomberg and Nikkei Asia, indicate that the restrictions have compelled South Korean firms to postpone or cancel plans for investment in China, reorganize supply chains, and invest more in R&D at home and in allied nations. Further, the semiconductor war has induced South Korea to step up government-initiated efforts aimed at enhancing chip-manufacturing capabilities and lessening outside dependencies through greater funding of next-generation semiconductor technologies and infrastructure.

The stakes are high for strategy because South Korea's economic well-being and technological primacy are intensely connected with how effectively it plays this balancing game. The semiconductor sector is a cornerstone of the South Korean economy, propping up millions of jobs and fueling export income. Any threat to its supply chain or access to markets threatens serious economic consequences. But Seoul's geopolitical context is limited by its security relationship with the United States that exercises pressure to fall in line with American policies, such as becoming a member of semiconductor supply chain partnerships like the "Chip 4" aimed at countering China's technological ascension. Meanwhile, China is also South Korea's biggest trading partner, with almost a quarter of its overall trade volume, making it almost impossible for Seoul to cut off contacts entirely without incurring economic losses. Keeping itself evenhanded among these two superpowers is thus one of South Korea's most difficult diplomatic and economic endeavors. Though officially it follows a policy of "strategic ambiguity" of economic engagement with both nations, South Korea is increasingly under pressure from the U.S. to limit exports of technology to China and to stand firmer on

technological cooperation. Conformity with American policies, reported by The Korea Herald and Yunshan News, has already resulted in strained ties with Beijing, with Beijing officials cautioning against what they consider South Korea's alignment with the U.S. In addition, China's attempts to establish indigenous semiconductor capability and possible retaliatory steps introduce still more uncertainty for South Korean companies doing business there. This context has led Seoul to seek a hedging approach, bolstering its homegrown chip-making capabilities and investing in research and development to boost independence, while keeping diplomatic relations with both the U.S. and China intact to not antagonize either. Finally, whether South Korea can succeed in keeping neutrality while not sacrificing its growth of the semiconductor industry relies on its ability to balance these geopolitical forces tactfully, strategically invest in technology and infrastructure, and diversify partnerships beyond the U.S.-China dichotomy, including with the European Union, Japan, and Taiwan. The semiconductor conflict highlights how deeply technology, economics, and geopolitics are presently intertwined and points to South Korea's pivotal position as a leader in technology and a geopolitical fulcrum in this international struggle.

CONCLUSION:

The U.S.-China chip war is a turning point in the worldwide technological and geopolitical path, with long-lasting impacts on the countries and sectors linked by the intricate network of semiconductor supply chains. For South Korea, the economic ascension and technological dominance of which cannot be separated from the semiconductor industry, the war offers historic opportunities, as well as challenges. As the world's premier memory chip producers, South Korea is treading on thin ice between two superpowers whose competition strategy is re-defining the very nature of the global tech industry. Essentially, the chip war is a battle for the future—a battle for the technologies that will underpin artificial intelligence, 5G communications, quantum computing, and next-generation military technologies. The United States, motivated by concerns of national security and technological development, has instituted

strict export controls aimed at restricting China's access to leading-edge semiconductor technology and production equipment. The bans on leading-edge chip designs and key manufacturing equipment, among others, have dislocated the traditionally integrated global supply chain of semiconductors. In response, China has launched a wide-ranging bid to build a domestic semiconductor industry, spending billions on locally producing and researching chips. China's efforts are impressive but still dependent on foreign technology for the cutting-edge processes of chip manufacturing, a testament to the profound interdependence that still exists with rising tensions. For South Korea, the new struggle is a multifaceted puzzle. Its semiconductor sector, led by the multinational titans Samsung Electronics and SK Hynix, is one of the pillars of the home economy, earning a significant portion of exports and technological development. However, South Korea's semiconductor sector has double dependence: it depends on US equipment and technology to manufacture high-level chips, and China is the key market for its exports. The US export controls compel South Korean companies to restrain sales and collaboration with Chinese partners at economic cost and operational expense. However, the economic value of Beijing as a trade partner and geopolitical neighbor implies that total disengagement is impossible without severe consequence. This places South Korea in a strategic balancing act. The nation employs a policy of "strategic ambiguity" and is trying to sustain economic ties with China and fulfill security obligations and technological cooperation with the United States. But as tensions between the U.S. and China escalate, it is increasingly hard to try to do this balancing act. Washington urging Seoul to come on board more resolutely with its policies, such as joining up for those alliances that are formed in a bid to block China's ambitions in semiconductors, such as the "Chip 4" alliance. On the other hand, China calls for allegiance and cautions against actions seen as aligning with the U.S., which can jeopardize South Korean firms' access to markets. All this on the back of increased chances of economic reprisal, supply chain disruption, and diplomatic tension.

In turn, South Korea is aggressively pursuing multiple avenues for risk management and

semiconductor destiny. The government is investing significantly in indigenous capability for research, development, and manufacturing in an effort to accelerate technological autonomy and innovation. These initiatives strive to minimize vulnerabilities and move the country forward in the global semiconductor pecking order. At the same time, South Korean firms are diversifying their supply chains by expanding production capacity outside of China to other nations such as Vietnam, the United States, and South Korea itself in an attempt to reduce geopolitical risk exposure. Diversification further entails securing more robust collaborations with overseas allies and cracking into emerging markets. All these positive initiatives notwithstanding, challenges still exist. It is a process that entails prolonged investment, innovative excellence, and consistent international cooperation to be completely free of semiconductor technology dependence. The high-capital and complexity of the semiconductor industry ensure that sudden interruptions or disturbances carry serious ripple effects. Furthermore, ongoing geopolitical tensions contribute additional uncertainty, ensuring that supply chains are vulnerable and market access tenuous. South Korea thus needs to keep dealing with a very fluid situation with both responsiveness and vision. The wider dimensions of the semiconductor war far exceed economics and technology; it illustrates the extent to which international trade and geopolitics are now inseparable. Semiconductors have moved from being simple parts to strategic assets that decide national power relations and international alignments. South Korea's case is a model of how highly technologically developed nations are caught in the middle between competing world powers. Its capacity to remain neutral, or at least not be driven to an absolute alignment, will hinge on a heightened reconciliation of economic interest, diplomatic relations, and homegrown technological advancement. Ultimately, South Korea's chip industry has reached a crossroads. Its survival in the years to come will depend on ongoing investment in innovation, supply chain strategic diversification, and cautious diplomatic footwork. Strengthening alliances outside of the U.S.-China rivalry, i.e., with the European Union, Japan, and Taiwan, may open other options for joint technological development and risk management. South Korea's pragmatic and

flexible approach underlies its consolidation as a world technology leader against increasing geopolitical uncertainty. The U.S.-China semiconductor war is redrawing global technology geography and international geopolitics, compelling nations like South Korea to face difficult decisions. The war demonstrates the central role of semiconductors not only as economic commodities but also as tools of power and influence. Its survival success in this new era will be of tremendous significance not just for the future of its own technology and economy but also for the stability and prosperity of the world semiconductor community as a whole.

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