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Relationalism and Technological Hegemony: A Case Study of Sino-U.S. and U.S.-Japan Semiconductor Industry Competition

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Abstract: Relationalism emphasizes the primacy of maintaining cooperative processes, while technological hegemony seeks to safeguard dominant states' interests by suppressing challengers. This paper conceptualizes suppression as a phenomenon within the process of maintaining relationship, and attempts to explain competitions in the semiconductor industry by relationality or guanxi and case study between Sino-U.S. and U.S.-Japan. The existence of a differential pattern generates importance and intimacy, as well as technical and security relations. Importance and intimacy lead to cooperation, while technology and security relationships influence each other. The changes in security relations will affect technological relations. Faced with the importance oriented Sino-U.S. technological relations and the intimacy oriented U.S.- Japan technological relations, the United States has adopted strategies of limited Mencius Optimality and reversed Confucian Improvement to balance the relationship, with the aim of obtaining maximum benefits in maintaining cooperation. However, the suppression measures of technological hegemony may not necessarily benefit oneself, and may even cause greater losses, resulting in a common failure among relevant parties. Only maintaining the smooth operation of the cooperation process is conducive to forming a harmonious overall relationship, thereby achieving win-win results.

Keywords: Relationality; Technological Hegemony; Semiconductor Industry; Confucian Improvement; Mencius Optimality

1. Introduction

The progress of human civilization has always been accompanied by technological development as well as the rise and decline of hegemonic powers. Following the agricultural civilization that emphasized security and natural forces, and the industrial civilization centered on profit and mechanical forces, human society has entered a post-industrial civilization emphasizing information and knowledge (Wang, C. G.,2023a). In this era, the semiconductor industry, as the foundation of information technology, has become critical.

Since the invention of the transistor at Bell Labs in 1947 (Morris,2008), and the integrated circuit at Texas Instruments in 1958 (Kumar & Krenner,2002; Moore,1996;Shen,2002) , the United States has maintained a dominant position in the global semiconductor industry. Its means of sustaining technological hegemony and capturing significant profits have included overseas investment and technological diffusion through multinational corporations. Yet such practices simultaneously enabled the rise of late-developing countries, creating "Gilpin Dilemma" (Schutte,2021). When facing the rapid development of Japan's and later China's semiconductor industries, the United States resorted to suppression.

Within "a relational theory of world politics," intimacy and importance are two key indicators of cooperation between states (Qin,2021). This raises a puzzle: Why did the semiconductor industries of both Japan and China face U.S. suppression, despite differing levels of intimacy and importance in their relations with the United States? This constitutes the central research question of this study. To address it, this paper examines the cases of Sino-U.S. and U.S.-Japan semiconductor competition through the lens of relational theory, exploring factors that influence cooperation and competition in the technological domain.

2. Technological Hegemony in the Semiconductor Industry

Power is the ability to control the thoughts and actions of others (Morgenthau,2005); when material advantages are converted into will, hegemony emerges. Technological Hegemony refers to the condition in which states possessing overwhelming political, economic, military, and technological capabilities dominate the international technology market, impose their will, principles, and rules upon it, and thereby secure hegemonic rents (Xiao,2008). From the perspective of international relations, technological hegemony is more precisely defined as a state of domination or disequilibrium in which technologically leading countries leverage comparative advantages to occupy a superior position in international relations (Li,2011).Strategies for preserving technological hegemony's interests follow a principle of "internal and external cultivation," namely, restricting others from surpassing while maintaining one's own advantages abroad. This dual-track approach includes both "self-strengthening" and "weakening others" (Huang,2022).

In the context of Sino-U.S. and U.S.-Japan semiconductor competition, existing research is abundant. First, some studies distinguish the nature of these two rivalries. Sino-U.S. competition is often characterized as great-power rivalry rooted in geopolitics, whereas U.S.-Japan competition is seen as strategic rivalry driven by economic development. Realists argue that in the Sino-U.S. case, the U.S. emphasizes balancing to maintain balance of power (Su,1997;Waltz,2003;Bull,2003), leveraging alliances to constrain technological exports to the Soviet Union (Mastanduno,1992; U.S. Congress,1979) and now using similar strategies to restrict China's technological rise (Sun,2020a;Sun,2020b;Tang,2021;Yu&Ji,2021). By contrast, in the U.S.-Japan case, American suppression was primarily economic (Feng,2018; Feng&Guo,2021): Japan's semiconductor growth threatened U.S. market share, prompting Washington to implement trade policies (Borrus,1986; Tyson,1992; Zhao,2002; Zhang,2006) and export controls (Han,2020).

Other scholars trace the evolution of U.S. strategies toward China through lessons drawn from U.S.-Japan semiconductor rivalry (Chi,2020). Tao and Shi (2023) contend that the Sino-U.S. case lacks the industrial rivalry seen in U.S.-Japan competition; rather, Washington's suppression of China stems from framing the relationship as a great-power rivalry, aiming to prevent Chinese progress in advanced semiconductor technologies.

Second, some studies interpret Sino-U.S. and U.S.-Japan relations through the lens of interdependence. Neither Washington nor Beijing can fully control the global semiconductor supply chain, and the two countries balance one another across design, manufacturing, and market segments. The global industry now operates through fabless-foundry vertical specialization: U.S. firms such as Broadcom, Qualcomm, and NVIDIA design chips, while South Korea and China's Taiwan region specialize in manufacturing, and China mainland and other emerging economies consume them. The U.S. remains the largest exporter, yet its manufacturing lags behind its sales (Ezell,2021); China consumes an enormous share of global semiconductors (Congressional Research Service,2020). Thus, their relationship is one of mutual dependence—each relying on the other's technology or market.

In contrast, U.S.-Japan competition unfolded during a period with limited economic integration. Their rivalry took place under a zero-sum division of labor. Japan, dependent on U.S. security guarantees and the American market, lacked structural market power over semiconductors (Irwin,1996; Nishimura,2016).

From cultural and normative perspectives, Sino-U.S. relations resemble Hobbesian or Lockean cultures, making confrontation more likely (Yi&Cai,2019); U.S.-Japan relations, by contrast, exhibit a Kantian culture, characterized by negotiation rather than suppression.

In sum, existing analyses of technological hegemony largely focus on power, institutions, and culture, often adopting the logic of consequences (March&Olsen,1998) centered on individual rationality. They argue that cooperation or confrontation is driven by self-interest but give little attention to the relational dynamics shaping interaction (Nordin,2019). The logic of relationality instead emphasize processes of interaction (Huang,2017): actors are constituted by their relations, and behavior follows relational rationality. Hence, studying technological hegemony through a relational lens is necessary.

3. Relationalism and Technological Hegemony: The Logics of Cooperation and Competition

In the "relational turn," relations are understood as ongoing processes of social interaction, and relational constellations are recurring patterns of such interactions. Relationalism therefore regards relational combinations as fundamental analytical units (Wei,2017). Mustafa Emirbayer (1997) elevated "relation" as a core concept in sociology. Patrick Jackson and Daniel Nexon (1999) introduced it into international relations through "process relationalism," emphasizing that relations precede entities and that "processes constitute actors." In the East, relation also means "guanxi", though they may be different. Zhao (2003;2009) advanced the concept of a "tianxia system" without externalities, stressing that "co-being precedes being" and that "I act, therefore I am." Qin (2021) developed "a relational theory of world politics," emphasizing "relational co-existence." Shih Chih-yu (2019) proposed "relational balancing theory," examining bilateral contexts with Huang Chiung-chiu (Huang&Shih,2014), while Wei Ling (2022) applied it to ASEAN's multilateral practices.

Relations (or guanxi) can be measured along two axes: intimacy and importance. Measuring relationships by intimacy means dividing the guanxi circle centered on the actor according to the degree of closeness, thus forming a "ripple-like" differential mode of association (Fei,2006); the "kin selection" mechanism holds that the higher the intimacy of relationship between actors, the more likely cooperation will be achieved (Qin,2021); The rule of Hamilton (1964) also holds that natural selection will enable actors with kinship to cooperate. In traditional Chinese society, intimacy was gauged through kinship, extended clans, and familiarity. In international society, indicators include alliances, partnerships, or shared membership in organizations. For example, distinctions between "strategic partners" "comprehensive strategic partners" and "comprehensive strategic cooperative partners" reflect varying levels of intimacy (Qin,2021). Shared culture, history, or ideology also enhances intimacy.

Measuring relationships by importance means using power or interdependence as the basis to influence and intervene in intimacy when actors act. Traditionally linked to the cosmological idea of "correspondence between heaven and humanity," importance placed filial piety and parental ties above all (Zhai,2019). In international relations, importance is gauged by geopolitical weight, economic influence, or cultural significance. U.S.-China relations, for instance, are important in geopolitical and economic terms; Vatican ties are important for cultural reasons.

Actors follow relational rationality: the pursuit of relational balance under differential order. Relational rationality defines rationality through relations, prioritizing co-being with others. National behaviors are shaped by how states perceive and choose their relations, which in turn shift with context (Qin,2012).

Differential interaction occurs both horizontally and vertically. Horizontally, asymmetries in power generate unequal exchanges, producing "gift-giving of interests." Different issue-areas intersect, creating linkages. Vertically, states assign different priorities to issues, reflecting hierarchical orderings.

Relational balance refers to states' active management of relations to achieve equilibrium in intimacy and importance. Bilateral balance involves restraint to maintain reciprocity (Shih,2013), as seen in Southeast Asian states' strategies toward China (Huang,2015). Multilateral balance entails embedding major powers in relational networks, such as ASEAN's institutionalization of "ASEAN centrality" (Wei,2019).

Relational balancing operates through two mechanisms. Confucian Improvement is based on the maxim "What you do not wish for yourself, do not impose on others," this principle holds that "enhancing others' interests also enhances one's own."(Qin,2021) Zhao Tingyang(2016) defines it as a perfect cooperative strategy in which all parties improve their benefits reciprocally, such that gains by one necessitate gains by the other. Mencius Optimality emphasizes that harmonious relations foster conditions most conducive to maximizing self-interest. Cooperative reciprocity sustains harmony, which in turn allows actors to achieve optimal outcomes (Qin,2021).

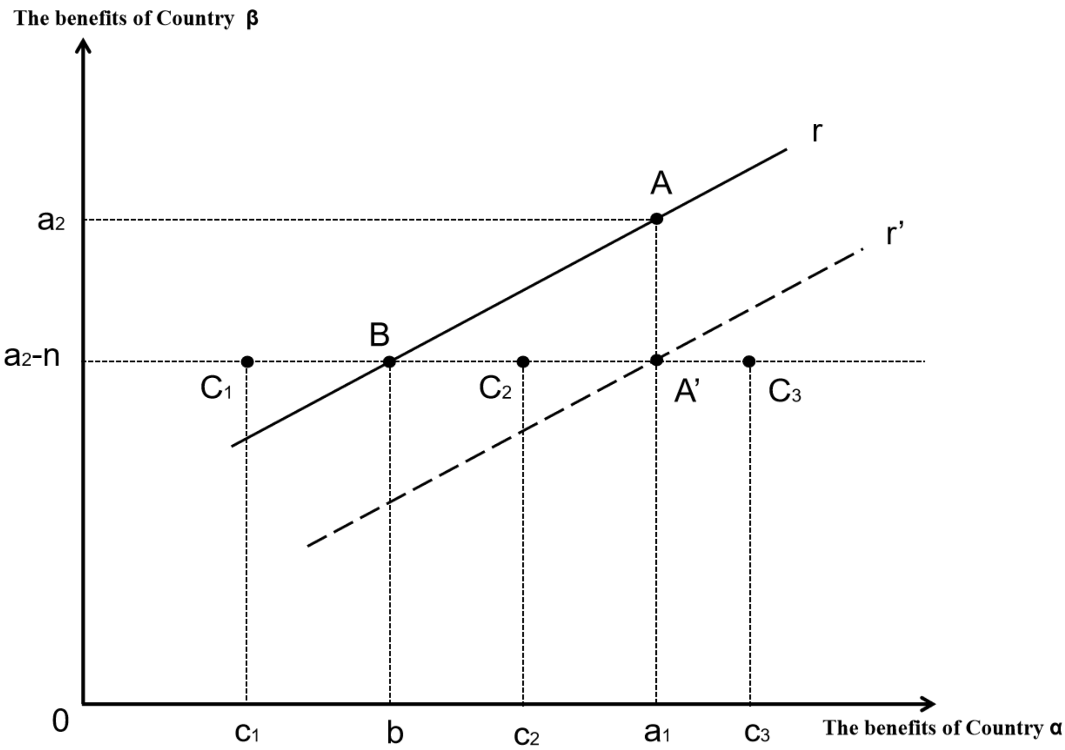
However, if cooperation is prioritized, how can competition be explained? This paper argues that suppression by a technological hegemony is not aimed at ending cooperation, but at addressing relational imbalance. Such imbalance arises when shifts in perception alter identity-based relations, with disequilibrium in one issue-area spilling over into others. Technological hegemony attempt to re-balance relations by managing networks. Yet mechanisms differ across importance-oriented and intimacy-oriented relations.

3.1 Limited Mencius Optimality

In importance-oriented relations, cooperation is undermined when intimacy declines. As shown in Figure 1, assuming that country α is a technological hegemonic country α and Country β is a technological catch-up country, the curve r represents the cooperation process of a certain issue, and point A represents the interests that country α and country β can obtain by maintaining cooperation at any node; when the intimacy of the relationship between the two sides decreases, country α will adopt a "weakening others" strategy against country β, and rebalance the relationship by suppressing the technological development of country β. Point A' is the state that country α hopes to achieve, i.e., the interests of country α remain unchanged or even increase, while the interests of country β decrease. However, if country α only suppresses country β without taking other measures, decoupling from country β will inevitably harm itself, and eventually the two sides will reach a new equilibrium of cooperation at point B. Therefore, country α needs to introduce a third party to replace cooperation with country β, such as forming a technological alliance, aiming to exclude cooperation with country β to form a new balance. This paper refers to this behavior as the strategy of limited "Mencius Optimum", that is, restricting the participants in the "Mencius Optimum" model and selecting collaborators according to their own preferences, similar to "minilateralism" (Shen&Hu,2022). At this time, point C represents the new equilibrium point, which is a moving point and moves along the line BA'. Its position can be divided into three cases. When point C is on the left side of point B, such as at position C_1, country α's decoupling from country β and formation of a technological alliance will not be worth the cost, resulting in greater losses than doing nothing except decoupling; when point C is between points B and A', such as at position C_2, country α can obtain certain benefits by forming a technological alliance, but the benefits are less than those from cooperating with country β; when point C is on the right side of point A', such as C_3, country α will obtain greater benefits by forming a technological alliance than from cooperating with country β. Furthermore, converting the content to be expressed in Figure 1 into a matrix form, we can obtain Table 1. Table 1 lists the cooperation situations of country α and country β respectively. It can be seen that when the intimacy between country α and country β decreases, unless both countries choose to cooperate, they will move towards mutual losses.

In general, country α cannot guarantee absolute benefits through the relationship balance of limited "Mencius Optimum"; instead, there is a possibility of causing greater losses. Maintaining a relatively stable technological cooperation process with country β can ensure predictable benefits, thereby achieving a win-win situation for both sides.

Figure 1: Limited Mencius Optimum



Note: The vertical axis represents country β 's benefits, and the horizontal axis represents country α 's benefits. Point A, Point B, Point A', Point C_1, Point C_2, and Point C_3 are points under different scenarios; Curve r represents the cooperation process.

Table 1: Equilibrium Under Limited Mencius Optimality

		Country β	
		cooperate	not cooperate
Country α	cooperate	（a_1，a_2）	（b，a_2-n）
	not cooperate	（a_1，a_2-n）	（c，c-n）

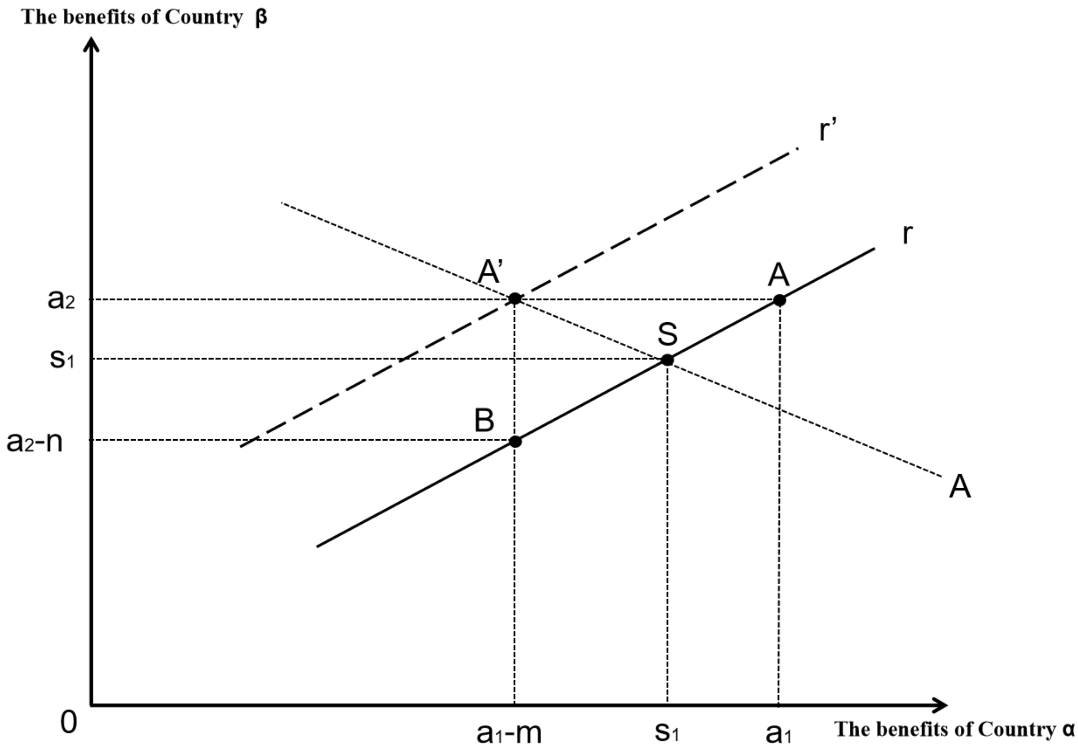
3.2 Reversed Confucian Improvement

In relationships oriented by intimacy, cooperation is often affected by changes in importance—declines in the importance of bilateral relations will lead to a decrease in the degree of cooperation. As shown in Figure 2, assuming that country α is a technological hegemony and country β is a technological catch-up country, Curve r represents the cooperation process of a certain issue, and Point A represents the interests that country α and country β can obtain by maintaining cooperation at any node; when the importance of bilateral relations declines, country α will reduce "interest giving" to country β to rebalance the relationship. This is the strategy of reversed "Confucian Improvement". The so-called reversed "Confucian Improvement" is the opposite of the Confucian Improvement model, with its core being "Do to others what you do not want others to do to you", i.e., when one's own interests decrease, others' interests should also be reduced. Based on Professor Zhao Tingyang's definition of "Confucian Improvement", we can define "reversed Confucian Improvement" as follows: "(1) For any two players X and Y, there exists a loss equilibrium S such that when X loses interest x, Y also loses interest y, resulting in a new reciprocal equilibrium of S-s; (2) X suffers an interest loss x- if and only if Y suffers an interest loss y-, and vice versa; therefore, promoting the emergence of y- becomes X's preferred strategy, because Y has to recognize and promote y- to maintain cooperation, and vice versa; (3) The interest losses of all parties caused in the loss equilibrium are less than the interest losses each party would suffer independently".

In Figure 2, when the importance of bilateral relations declines, the "interest giving" required for country α to maintain the cooperation process decreases. If country α does not adjust the "interest giving", it will suffer interest losses, and the cooperative equilibrium between the two sides will shift from Point A to Point A', indicating that country α's interests decrease while country β's interests remain unchanged. When country α balances the relationship, Point B represents the state after country α reduces interest giving, i.e., country β's interests decrease while country α's interests remain unchanged. Since the two sides are in cooperation, the losses caused by maintaining the cooperation process are less than the losses each side would suffer independently, so the cooperation between the two sides will reach an equilibrium at Point S. Although Point S indicates that the losses of both sides are less than the losses each would suffer independently, reversed "Confucian Improvement" itself is a lose-lose model in which all relevant parties suffer interest losses. Being trapped in the thinking of "reversed Confucian Improvement" will inevitably lead to neither party being able to obtain benefits.

Furthermore, converting the content represented in Figure 2 into a matrix form, we can obtain Table 2. Table 2 lists the cooperation situations of country α and country β respectively, showing that when the importance of country α and country β declines, if the two sides are trapped in the thinking of reversed Confucian Improvement, both sides will suffer losses regardless of whether they cooperate or not.

Figure 2: Reversed Confucian Improvement



Note: The vertical axis represents Country β's benefits, and the horizontal axis represents Country α's benefits. Point A, Point B, Point S, and Point A' are equilibrium points under different scenarios; Curve r represents the cooperation process.

Table 2: Equilibrium under Reversed Confucian Improvement

		Country β	
		cooperate	not cooperate
Country α	cooperate	(a_1-m, a_2)	(s_1, s_2)
	not cooperate	(s_1, s_2)	(a_1-m, a_2-n)

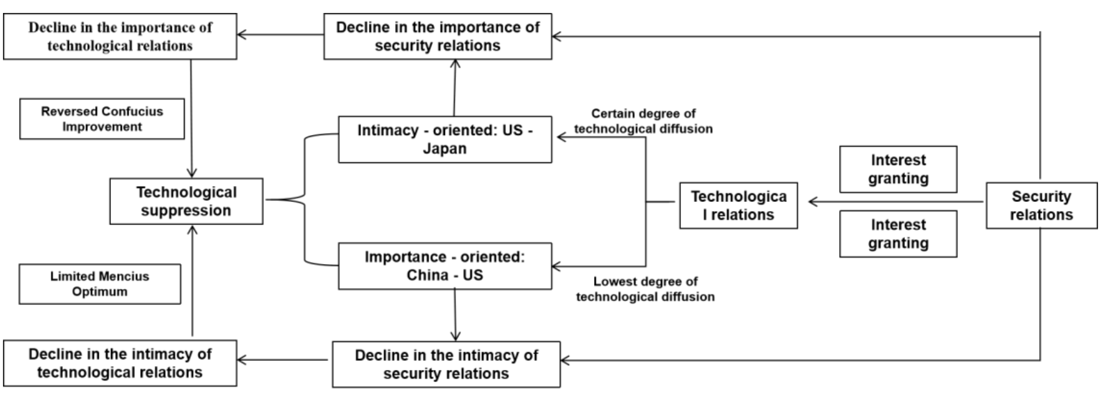
It can be concluded that in relationships oriented by importance, technological hegemony can suppress catch-up countries to create new cooperation processes (i.e., form technological alliances) on the one hand, and force catch-up countries to accept new cooperation norms through extreme pressure to maintain the cooperation process on the other hand. In relationships oriented by intimacy, technological hegemony take advantage of catch-up countries' desire to maintain the cooperation process, forcing them to bear losses together with the technological hegemony. However, both scenarios reflect that suppressing catch-up countries may not increase the interests of technological hegemony; instead, it is more likely to lead to a "lose-lose" situation.

This paper has two basic assumptions: first, Sino-U.S. relations are oriented by importance, while US-Japan relations are oriented by intimacy. This can be understood as Sino-U.S. cooperation is driven by the importance of issues, while US-Japan cooperation is driven by the intimacy of their relationship.

Second, for the convenience of operation, this paper assumes the existence of two issues: security and technology, and technology is connected to security (Yang&Cheng,2023). The premise of US-Japan cooperation is the existence of the Soviet Union and the communist camp; thus, US-Japan security relations are important. To maintain US-Japan security relations, the U.S. cooperated with Japan in issues such as technology through interest giving, thereby promoting the development of US-Japan technological relations oriented by intimacy. When US-Soviet relations eased, the importance of US-Japan security relations also declined, leading to adjustments in US-Japan technological relations—i.e., the U.S. could maintain its relationship with Japan with less interest giving. Similarly, the development of Sino U.S. technological relations also originated from the existence of the Soviet Union. However, unlike the US-Japan case, the U.S. used Japan to directly confront the Soviet Union, while the U.S. maintained cooperation with China to prevent China from aligning with the Soviet Union again—resulting in differences in the degree of technological diffusion between the two cases. After the U.S. identified China as a "strategic competitor", Sino U.S. relations were elevated to a level similar to US-Soviet relations, and the U.S. increasingly viewed bilateral security relations as a zero-sum game, with intimacy continuing to decline, which in turn affected the decline in the intimacy of bilateral technological relations. On the other hand, the U.S. enhanced intimacy with its allies and formed technological alliances to impose technological blockades on China. This behavior has two intentions: first, if China is forced to make concessions, subsequent cooperation between the two sides will increase the US's relative gains; second, if China does not make concessions, the minilateral alliance it forms can also replace China.

In summary, this paper proposes the core hypotheses and constructs an analytical framework accordingly (as shown in Figure 3).

Figure 3: Analytical Framework for Explaining Technological Hegemony Suppression



Hypothesis 1: The Sino U.S. relationship, oriented by importance, involves a minimum degree of technological diffusion; when the intimacy of Sino U.S. security relations declines, the intimacy of technological relations also declines, and the U.S. adopts the strategy of limited "Mencius Optimum" to balance the relationship.

Hypothesis 2: The US-Japan relationship, oriented by intimacy, involves a certain degree of technological diffusion; however, when the importance of US-Japan security relations declines, the importance of technological relations also declines, and the U.S. adopts the strategy of reversed "Confucian Improvement" to balance the relationship.

4. Case Studies: Sino-U.S. and U.S.-Japan Semiconductor Industry Competition

In the semiconductor industry, the U.S. is often regarded as a technological hegemony. After World War II, it launched two "wars" in the semiconductor industry to suppress catch-up countries (Liu,2019). The suppressed countries were Japan and China, which have different levels of intimacy and importance in their relations with the US. Some scholars argue that hegemony adopt different suppression methods against competitors in different historical eras (Bown,2020), and hegemony maintain their hegemony through technological restrictions (Ferry&Layton,2021), but suppressing catch-up countries will not bring success to hegemony (Semiconductor Industry Association,2018; Varas,2021). The core question of this paper is: in the face of China and Japan, which have different levels of intimacy and importance in their relations with the US, why has the U.S. suppressed the semiconductor industries of both countries? Furthermore, since the suppression of catch-up countries by hegemony has become an objective fact, how should the relationship theory, which emphasizes the maintenance of the cooperation process, explain this phenomenon?

4.1 Sino-U.S. Semiconductor Competition

4.1.1 Background

Since the invention of the transistor at Bell Labs in 1947, the United States has dominated the global semiconductor industry. China's semiconductor development began in the 1950s. In 1956, the State Council adopted "the 1956-1967 Science and Technology Development Plan Outline", which listed semiconductors as a priority. That same year, China's National Laboratory produced its first domestically made transistor, and in 1957, Beijing Electron Tube Plant manufactured the first batch of semiconductor products. By 1965, China developed its first integrated circuits. In 1980, Wuxi No. 742 Factory imported wafer fabrication technology from Japan, marking China's first large-scale semiconductor wafer plant. Later, China pursued a strategy of "market for technology," encouraging domestic firms to "go global," combining indigenous innovation with international integration (VerWey,2019). Policies such as the National Science and Technology Conference (2006), the Outline for Promoting the Development of the National Integrated Circuit Industry (2014), Made in China 2025 (2015), and the Guiding Opinions on Strengthening International Cooperation and Improving China's Position in the Global Value Chain (2016) demonstrated the government's determination to promote innovation and industrial upgrading.

U.S. policy shifted dramatically under President Trump, who labeled China a "competitor." Engagement gave way to containment, with "decoupling" as a central strategy (Zhang&Feng,2018),

and technology was at the core of this confrontation. In August 2017, Washington launched a Section 301 investigation targeting China's practices in technology transfer and intellectual property. Simultaneously, the U.S. adopted a "dual tightening" strategy of restricting both imports and exports. In July 2018, tariffs were imposed on a wide range of Chinese goods, including high-tech products. That same year, Congress passed the Export Control Reform Act (ECRA), tightening restrictions on exports of semiconductors and related technologies, targeting Chinese firms such as Hygon and Huawei HiSilicon. In May 2019, the U.S.-China Economic and Security Review Commission (2021) accused Chinese companies of illegally acquiring U.S. technology with state support, further tightening export controls. By the end of 2020, numerous Chinese firms and individuals were placed on the Entity List.

During the Biden administration, the comprehensive containment strategy was "small yard, high fence" but largely continued Trump-era measures. For example, on April 8, 2021, the U.S. Department of Commerce included seven Chinese supercomputing enterprises in the "Entity List"; in June of the same year, 59 Chinese enterprises were added to the investment "blacklist" and prohibited from engaging in investment transactions with U.S. persons (The White House,2021). In August 2022, the Chips and Science Act of 2022 was signed into law by Biden. Since 2024, U.S. technological containment against China may also expand to fields such as wind power, biotechnology, and artificial intelligence.

4.1.2 Hypothesis Testing

This study hypothesizes that Sino-U.S. relations are importance-oriented with minimal technology diffusion. When intimacy in security relations declines, technological intimacy also declines, prompting the U.S. to pursue limited Mencius Optimality.

First, Sino-U.S. ties are among the world's most important bilateral relations in both geopolitical and economic dimensions. In geopolitics, the U.S. National Security Strategy (2017) described China as a "competitor" and "revisionist power" challenging U.S. interests in the Indo-Pacific. The National Defense Strategy (2018) explicitly identified China as a "strategic competitor," while the National Security Strategy (2022) defined China as "the only competitor." At the same time, China adjusted its strategic positioning toward the U.S., shifting from advocating a "new type of great power relations" to "competitive coexistence" (Wang, F.,2024). Economically, the U.S. and China consistently rank first and second in global GDP according to World Bank statistics. Thus, both subjectively and objectively, their relations carry extreme importance.

However, the two sides have contradictions, frictions, and struggles due to factors such as the power, ideology, political systems, and cultural development (Wang, J. S.,2024). For example, the U.S. regards China as a strategic competitor, and there are contradictions and differences between the two sides in terms of ideology and political systems; in recent years, the intimacy between the two sides has shown a declining trend. Therefore, this paper defines Sino U.S. relations as oriented by importance.

The Sino U.S. technological cooperation process originated from the security issue—i.e., the U.S. hoped to use China to counter the challenges from the Soviet Union and Japan in the last century, and relaxed technological restrictions on China to achieve transnational joint checks and balances. In other words, the importance of the issue led to cooperation between the two sides. However, overall, this technological diffusion was minimal. In November 1949, the U.S. took the lead in establishing the Coordinating Committee for Multilateral Export Controls (COCOM) to block advanced technologies and strategic materials from socialist countries. After the end of the Cold War, the U.S. led the signing of the Wassenaar Arrangement, which still imposed an embargo on China for items including high-tech products (Feng,2023), and its embargo list has been continuously revised. In December 2019, the arrangement included computer lithography software related to semiconductor lithography process research and development, large wafer technology, and other items into the control scope; member states of the arrangement approve semiconductor exports to China in accordance with the N-2 principle—i.e., the technology is two generations behind the most advanced technology, and the review time will be appropriately delayed (Zhang,2020). Therefore, the Sino U.S. relationship, oriented by importance, involves a minimum degree of technological diffusion.

Second, intimacy has declined due to power shifts, ideological divergence, and systemic differences. Since Washington began framing China as a strategic competitor in 2017, perceptions of a zero-sum dynamic in security have intensified, reducing intimacy in both security and technological relations. The Section 301 investigation (Huang&Han,2017) exemplifies this declining intimacy.

Third, U.S. suppression strategies reflect limited Mencius Optimality. For instance, in March 2022, the U.S. sought to form the "Chip 4 Alliance" with Japan, South Korea, and the China's Taiwan Region (Han&Liu,2023; Ling&Luo,2021). This created an alternative cooperative framework that both pressured China to concede and substituted for direct U.S.-China cooperation. By raising intimacy with allies, Washington lowered the importance of its technological ties with Beijing.

4.1.3 Summary

The Sino-U.S. case validates Hypothesis 1: in importance-oriented relations, declining intimacy in security leads to declining intimacy in technology, prompting limited Mencius Optimality. Yet, such suppression risks greater losses for the hegemony, whereas stable cooperation could generate win-win outcomes.

4.2 U.S.-Japan Semiconductor Competition

4.2.1 Background

After World War II, Japan, with U.S. support, rapidly advanced its semiconductor capabilities. Japan adopted a "government-industry-academia" development model, in which the state coordinated universities and corporations in concentrated R&D, with shared results. This approach propelled Japan's semiconductor sector and produced firms such as Hitachi, Mitsubishi, Fujitsu, and Toshiba.

By the late 1970s, Japan had mastered integrated circuit memory chips (Irwin,1996) and, by 1985, surpassed the U.S. in global semiconductor market share (Drezner,2001). In 1988, Japan's share reached 51%, while the U.S. fell to 37% (Okada,2006).

Japan's success eroded the interests of the U.S. semiconductor industry (Lin,2021), prompting targeted countermeasures from the U.S. In 1982, the U.S. Federal Bureau of Investigation (FBI) arrested technical personnel from companies including Hitachi and Mitsubishi on charges of allegedly stealing confidential information from IBM. In June 1985, the U.S. Semiconductor Industry Association (SIA) demanded an investigation into "unfair practices by the Japanese government." In July 1985, the U.S. launched a "Section 301 Investigation" against Japan under the Trade Act of 1974, and subsequently implemented a series of suppression measures. In September of the same year, the U.S., Japan, and other countries signed the Plaza Accord, leading to a sharp appreciation of the Japanese yen. In September 1986, the U.S. forced Japan to sign the U.S.-Japan Semiconductor Agreement, which "required Japanese enterprises to adopt voluntary export restrictions, the Japanese government to commit to addressing dumping by its enterprises in third-country markets, and included a secret pledge that U.S. semiconductor products would capture a 20% share of the Japanese market within five years" (Irwin&Klenow,1996). In the same year, the U.S. blocked Fujitsu's acquisition of Fairchild Semiconductor, a U.S. company. Due to the unsuccessful implementation of the agreement, in April 1987, the Reagan administration imposed a 100% punitive tariff on imported goods from Japan . The same year saw the Toshiba incident, in which Toshiba was sanctioned with the termination of cooperation and an export ban. In 1991, the two countries reached a new semiconductor agreement, which explicitly incorporated the 20% market share target into the text. By the end of 1992, the sales volume of foreign enterprises in Japan's semiconductor market exceeded 20% (Gantz,1999). During the same period, with U.S. support, the semiconductor industries of South Korea and China's Taiwan region achieved steady development. In July 1996, an agreement between Japan Electronic Industry Association (JEIA) and SIA, along with a joint statement by the U.S. and Japanese governments, replaced the U.S.-Japan Semiconductor Agreement. In the same year, the output value of the U.S. semiconductor industry surpassed that of Japan (Peng&Shi,2021), while Japan's semiconductor industry entered a period of decline.

4.2.1 Hypothesis Testing

This study hypothesizes that U.S.-Japan relations are intimacy-oriented, with moderate diffusion of technology. When the importance of security ties declined, importance in technological relations also declined, leading the U.S. to adopt Reversed Confucian Improvement.

First, in terms of alliance ties, political systems, and other aspects, the U.S.-Japan relationship exhibits a relatively high level of intimacy. After World War II, the U.S. exercised absolute guiding authority over the Japanese government and established and consolidated the "San Francisco System" through the signing of the Treaty of Peace with Japan, the U.S.-Japan Security Treaty of 1951, and the

U.S.-Japan Security Treaty of 1960 (Zhou,2023). Their relationship was once so close that “the U.S. Army, Air Force, and Navy would be permitted to use facilities and areas within Japan” (Japan–U.S. Security Treaty,1960). Meanwhile, due to its asymmetric dependence on the U.S., Japan places greater emphasis on the U.S.-Japan alliance (Jiang,2012). In terms of political systems, both the U.S. and Japan claim to be “democratic countries.” Driven by shared values, beliefs, and norms, they maintain a relatively close rapport, leading to the notion of the “durability of democratic alliances” (Wu&Li,2013). All these factors indicate that there exists a certain degree of “affinity” between Japan and the U.S. However, due to historical issues, its own development constraints, and other factors, Japan’s political importance and influence have always been limited. Therefore, the U.S.-Japan relationship is defined as intimacy-oriented.

The technological cooperation process between the U.S. and Japan can also be traced back to security issues. After World War II, to counter the Soviet Union, the U.S. carried out reforms in Japan based on the so-called “freedom” and “democracy,” making the two countries ideologically “affine.” It was this intimacy that drove their cooperation, hence the characterization of the U.S.-Japan relationship as intimacy-oriented. During the U.S.-Japan cooperation process, shortly after the U.S. invented the transistor, Japan began researching it. In 1951, the Electrical Communication Laboratory developed Japan's first domestically produced transistor. In 1952, Japan’s “Kobe Kogyo” (Kobe Industry) introduced transistor technology from the U.S. company RCA (Hatoyama,1980). In the 1950s, after the U.S. identified Japan as a “bulwark against communism,” it collaborated with Japan in various fields, including technological relations, to maintain this security relationship and achieve relationship balance through differential interaction. Specifically, from the 1950s to the 1970s-1980s, Japan and the U.S. established close technological ties: Japanese enterprises continuously expanded production, while the U.S. transferred technology to Japan by fully disclosing patents. This was because, from a security perspective, the U.S. hoped to foster Japan as a counterweight to communism; from a technological perspective, the U.S. believed Japan was far behind and posed no threat (Feng,2018). Therefore, in the U.S.-Japan technological relationship, the U.S. maintained the relationship through “interest granting” to Japan, involving a certain degree of technological diffusion, as a means to balance security issues.

Secondly, as the importance of the U.S.-Japan security relationship decreases, the importance of their technological relationship also declines. The background of U.S.-Japan semiconductor cooperation was the U.S.-Soviet Cold War, during which the U.S. prioritized security concerns and emphasized restricting the export of high technology from the U.S. and its allies to the Soviet Union (Lin,2021). The U.S. suppression of Japan occurred against the backdrop of the Soviet Union's stagnating growth and frequent leadership changes around the time Mikhail Gorbachev took office in March 1985, while the U.S. economy recovered during the Reagan administration. In 1985, U.S. Secretary of State George Shultz stated that the U.S. had “regained military strength, achieved economic recovery, and enhanced confidence,” while the Soviet Union was “facing economic difficulties, fragmented alliances, and adopting a defensive posture in many regions of the world.” “U.S. leaders were convinced that the global balance of power favored the U.S" (Shultz,1985). Based on these facts and perceptions, the overall importance of U.S.-Soviet relations declined, and the importance of the U.S.-Soviet security relationship also decreased accordingly, which in turn led to a decline in the importance of the U.S.-Japan security relationship. This situation meant that the U.S. could maintain its relationship with Japan with fewer "interest grants," prompting the U.S. to adjust its technological relationship with Japan to achieve a new balance.

Thirdly, the adjustment strategy adopted by the U.S. was the "Reversed Confucian Improvement". For instance, it forced Japan to sign treaties and open its markets, and rebalanced the relationship by reducing "interest grants" and shifting losses. Out of the need to maintain the cooperative process, Japan successively conceded to the U.S.' core concerns, such as agreeing to the U.S.-Japan Semiconductor Agreement in 1986.

4.2.3 Summary

In an intimacy-oriented relationship, when the importance of the security relationship between the two parties changes, the importance of their technological relationship also changes accordingly, triggering a new balance in the relationship. This completes the verification of Hypothesis 2. For intimacy-oriented relationships, the technological hegemony forces the latecomer to share losses. Out of the need to maintain the cooperative process, the latecomer has no choice but to accept passively, resulting in a lose-lose situation where both parties suffer losses.

Through the above analysis, it can be observed that in response to importance-oriented relationships, the technological hegemony creates a new cooperative process by involving third parties to reduce the importance of its relationship with the latecomer. This manifests as suppressing the latecomer and forming technological alliances, which this paper refers to as the limited Mencius Optimality. In contrast, for intimacy-oriented relationships, the technological hegemony leverages the latecomer's need to maintain the cooperative process, reduces "interest grants," and forces the latecomer to share losses. This also manifests as pressuring the latecomer to reach new agreements, which is termed the reversed Confucian Improvement.

A similarity between the two cases is that the technological hegemony resorts to suppression while attempting to maintain the cooperative process, ultimately resulting in a lose-lose scenario where all parties involved suffer losses. Regardless of whether the relationship is importance-oriented or intimacy-oriented, suppression by the technological hegemony will cause losses to both the hegemony and the latecomer, failing to guarantee benefits for the hegemony. Only by maintaining a stable cooperative process between the two parties can a win-win outcome be achieved.

5. Conclusion

As a technological hegemony, the United States has suppressed the semiconductor industries of both China and Japan, despite the differences in intimacy and importance of its relations with these countries. This study demonstrates that suppression by a technological hegemony can also be understood as a relational strategy to maintain cooperative processes. Specifically, Sino-U.S. relations are importance-oriented, while U.S.-Japan relations are intimacy-oriented. In both cases, security and technology relations are intertwined. For the U.S., cooperation with China and Japan in technology was initially based on the importance of security ties, maintained through interest-giving. Yet the degree of diffusion differed: minimal technology diffusion in the Sino-U.S. case, and moderate diffusion in the U.S.-Japan case. As changes occurred in security relations, technological relations were also affected, requiring rebalancing. To explain these dynamics, this paper developed the concepts of limited Mencius Optimality and reversed Confucian Improvement. The Sino-U.S. case reflected limited Mencius Optimality: the U.S. sought to rebalance by forming exclusionary alliances, substituting cooperation with China. The U.S.-Japan case reflected reversed Confucian Improvement: Washington reduced its concessions, forcing Japan to share the losses. Both strategies, however, revealed that suppression does not guarantee hegemonic gains; instead, they frequently result in mutual losses. This study therefore suggests that suppression and containment are not viable strategies for technological hegemony. Rather than producing stable advantages, they risk harming all parties. By contrast, maintaining stable cooperation fosters predictability and mutual benefit.

In the broader context, technological innovation is reshaping the international order (Wang, C. G.,2023b). While competition persists—such as Sino-U.S. rivalry in digital technologies and defense—there remain vast opportunities for cooperation, for instance in life sciences (Lang&Feng,2021). Strengthening communication and reducing suppression within shared issue-areas can create win-win outcomes. Ultimately, the purpose of maintaining cooperative processes should not be narrowly self-serving. Instead, states should seek to build a community of shared future for humankind, achieving their own interests through the harmonization of global relations.

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Author Contributions

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

Availability of Data and Materials

The authors confirm that the data supporting the findings of this study are available within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest to report regarding the present study.

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