

Chapter 12

Situating Academia in Economic Security Strategies: Lessons from Taiwan

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Abstract: The text analyzes Chinese coercive strategies targeting the cognitive domain, both in terms of academia and key technological sectors, identifying critical gaps in those domains in reference to the Copenhagen school of IR. Apart from identifying threats connected to the erosion of academic freedom (limiting research and innovation potential, but also free and open academic environment), as well as critical technologies, having strategic importance for the security of Taiwan, the report provides also political advisory to other countries, including integration of research security into national security strategies, implementation of tiered international cooperation system, restriction of access to sensitive research facilities, as well as establishment of capacity-building initiatives fund.¹

Keywords: Taiwan, academia, economic security, research security, talents, technology

A part of the Huntingtonian third wave,² Taiwan is a democratic success story. Its transition from the authoritarianism of the White Terror era (1949–1992) to the robust and inclusive democracy it is today also created an environment conducive to fostering the production of knowledge and unobstructed discourse in the academic sphere. Its dedication to civil liberties is reflected in its

¹ The keywords and abstract of this report is based on the text provided by the Author, but was generated by the Editors.

² Samuel Huntington, “Democracy’s Third Wave,” *Journal of Democracy* 2, no. 2 (1991): 12–34.

high scores in Freedom House's annual Freedom in the World report³ and its ranking of 37th globally—and first in Asia—in the 2023 Academic Freedom Index, a comprehensive global assessment of academic freedom.⁴ These achievements underscore the “democracy-education nexus,” which frames procedural democracy and academic freedom as mutually reinforcing processes.⁵

However, Taiwan's hard-won democratic system, including academic freedom, faces significant threats due to increasing geopolitical volatility. The Beijing regime claims Taiwan, Penghu, Kinmen, and Matsu as part of its own territory despite never having controlled them and has not renounced the use of force to annex them. While China's coercive tactics are evident in traditional domains of warfare (land, air, sea, space, and cyberspace),⁶ its influence increasingly extends into the emerging sixth domain, the cognitive domain,⁷ targeting academia. This aligns with broader efforts by the Chinese Communist Party to manipulate culture, education, and media to influence democracies.⁸

Chinese influence in Taiwanese academia operates mainly on two key pillars: people and technology. The first pillar involves shaping narratives about China and cross-strait relations,⁹ promoting self-censorship,¹⁰ and leveraging academic exchanges to apply economic pressure on Taiwanese universities reliant on full-fee-paying Chinese students amid domestic demo-

³ “Taiwan,” Freedom in the World, Freedom House, <https://freedomhouse.org/country/taiwan>.

⁴ “Academic Freedom Index,” Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), and the V-Dem Institute, 2024. <https://academic-freedom-index.net/>.

⁵ John Dewey, *Democracy and Education* (Simon and Schuster, 1997); Jantha Sisira Kumara and Ramanie Samararatunge, “The Effect of Academic Freedom on Electoral Democracy in the Asian Region,” *Public Administration and Development* 44, no. 3 (2024): 137–149.

⁶ James A. Siebens, *China's Use of Armed Coercion* (Taylor & Francis, 2023); Bonny Lin et al., “A New Framework for Understanding and Countering China's Gray Zone Tactics,” RAND Corporation (blog), March 30, 2022, https://www.rand.org/pubs/research_briefs/RBA594-1.html.

⁷ Ying-Yu Lin, “China's Cognitive Warfare Against Taiwan and Taiwan's Countermeasures,” *Taiwan Strategists*, no. 20 (2023): 37–54.

⁸ Doublethink Lab, “CITW 2023 in Taipei: Uniting to Counter Evolving PRC Threats,” Medium, July 10, 2024, <https://medium.com/doublethinklab/citw-2023-in-taipei-uniting-to-counter-evolving-prc-threats-e5ea4fdbecb8>.

⁹ Yu-Li Wang and Luc Chia-Shin Lin, “Is Involvement Effective? A Case Study of Exchange Programs' Influence on Mainland Chinese Communications Major Exchange Students' Support for Taiwan,” *Journal of Cross-Strait Relations* 27, no. 2 (2023): 316–335.

¹⁰ Jaw-Nian Huang, “China's Influence on Taiwan's Media: A Model of Transnational Diffusion of Chinese Censorship,” in *China's Influence and the Center-Periphery Tug of War in Hong Kong, Taiwan and Indo-Pacific*, ed. Brian C. H. Fong, Jieh-min Wu and Andrew J. Nathan (Routledge, 2020), 205–223, <https://doi.org/10.4324/9781003088431-17>.

graphic challenges.¹¹ The second pillar highlights the strategic link between economic and academic security. China seeks to dominate key technological sectors, such as semiconductors and dual-use technologies, to advance its hegemonic ambitions.¹²

Taiwan's approach to knowledge security must address these threats, recognizing the critical intersection of academic freedom, national security, and economic resilience as it faces increasing belligerence from its authoritarian neighbor. The objective of this paper is thus twofold. Firstly, it provides a comprehensive overview of Taiwan's economic security and academic security policies, identifying critical overlaps and gaps. Secondly, it evaluates the current framework in light of the geopolitical situation around Taiwan and draws positive and negative lessons for other democracies seeking to build up their academic security agendas.

The Copenhagen School Comes to Taipei: The Emergence of Economic Security and Research Security

The inclusion of concerns related to economic and academic affairs in security discourse reflects the debate between “traditionalists” and “wideners” in the field of security studies. The first group of scholars, largely affiliated with the realist school, tends to restrict the subject to politico-military issues. Meanwhile, the wideners, whose views generally stem from constructivist theories of international relations, seek a more holistic approach to security, which includes the economic, societal, and environmental sectors.

Within the broad “wideners” camp, the Copenhagen School's concept of securitization, in particular, provides a robust framework for analyzing academia and research security as critical areas of inquiry in security studies. Securitization, as Wæver describes, is a “speech act” that involves framing

¹¹ Ralph Jennings, “For Mainland Chinese Students, Taiwan's Universities Are ‘like Paradise.’ But there's a catch,” *Los Angeles Times*, March 26, 2017, <https://www.latimes.com/world/asia/la-fg-taiwan-china-students-2017-story.html>.

¹² Tzu-I Lee, “Bordering Secrecy: An Empirical Study on Cross-Border Trade Secret Misappropriation in the Semiconductor Sector,” *Connecticut Journal of International Law* 39, no. 2 (2024): 166–237, <https://ssrn.com/abstract=4827530>; Larry Diamond, James O. Ellis and Orville Schell, eds., *Silicon Triangle: The United States, Taiwan, China, and Global Semiconductor Security* (Hoover Institution Press, 2023).

an issue as an existential threat through discourse, irrespective of the threat's objective reality, and legitimizing extraordinary measures to address it.¹³

This discursive process entails four key components: securitizing agents, threats, referent objects, and the audience. In the case of securitization of academic research, governments of liberal democracies act as securitizing agents, framing the involvement of malign authoritarian actors with their research institutions as threatening to their normative and tangible interests. These threats include the erosion of academic freedom and the irregular transfer of strategic technologies. The referent object in this process is a free and open academic environment with robust research and innovation capacity that supports the development of strategic, high-tech outputs. Last but not least, the audience includes academic elites and private sector executives reliant on academia-industry cooperation to materialize such outputs.

By framing the protection of the integrity of research institutions and processes as vital to national security, liberal democracies, including Taiwan, construct a foundation for the adoption of research security measures. This demonstrates how securitization theory enables us to understand the interplay between academic security, economic security, and geopolitical volatility in the evolving landscape of global security.

Towards the Emergence of Intertwined Economic Security and Research Security Regimes

In the Taiwanese context, the discursive process of securitization is inherently tied to the country's complex relationship with the People's Republic of China. On the one hand, as the People's Republic of China defines the "resolution of the Taiwan issue"—implying annexation of its territory—as a core objective within its strategy of "Great Rejuvenation of the Chinese Nation" (中華民族偉大復興), Taiwan faces an existential threat amid a sustained coercive campaign carried out across various domains.

On the other hand, economic links between Taiwan and China remain strong. Amid the "Taiwan Miracle" of the mid-1980s, Taiwanese businesspe-

¹³ Ole Wæver, "Securitization and Desecuritization," in *On Security*, ed. Ronnie D. Lipschutz (Columbia University Press, 1995), 46–86.

people (台商, taishang) began to play an influential role in linking China with global markets by exporting capital, managerial know-how, and capitalist ideology of efficiency across the Taiwan Strait.¹⁴ The growth in the frequency and volume of cross-strait exchanges in economic and social realms created economic dependencies between both sides. This phenomenon also became consequential for research security, given the intensification of academic exchanges between both sides and the appetite to capitalize on China's burgeoning market's hunger for cutting-edge technologies.

The expanding dependencies on China generated externalities for Taiwan's domestic politics. Citizens grew increasingly concerned that continued expansion of economic relations with China would erode Taiwan's autonomy and increase Beijing's influence over its democratic processes and institutions. This led to the inception of the 2014 Sunflower Movement.¹⁵ One of the triggers of this bottom-up mobilization was the proposed Cross-Strait Service Trade Agreement, which the then-ruling Chinese Nationalist Party (Kuomintang) sought to pass without a clause-by-clause review in the Legislative Yuan. The movement contributed to the landslide victory of the pro-sovereignty Democratic Progressive Party in 2016,¹⁶ which implemented measures to manage risks associated with excessive economic dependence on China. Although these policy responses were implemented before the advent of the term "de-risking," they effectively function as de-risking strategies which underpin Taiwan's approach to economic security.¹⁷

In the Taiwanese context, the existing research security measures focus primarily on the protection of critical technologies that have strategic importance for national security. Previous studies on research security in Taiwan pointed to the limited understanding of this concept as a distinct policy concern or subject

¹⁴ Shelley Rigger, *The Tiger Leading the Dragon: How Taiwan Propelled China's Economic Rise* (Stanford University Press, 2020).

¹⁵ Ming-sho Ho, *Challenging Beijing's Mandate of Heaven: Taiwan's Sunflower Movement and Hong Kong's Umbrella Movement* (Temple University Press, 2019).

¹⁶ Ming-sho Ho and Thung-hong Lin, "The Power of Sunflower: The Origin and the Impact of Taiwan's Protest against Free Trade with China," in *The Umbrella Movement*, ed. Ming-sho Ho and Thung-hong Lin (Amsterdam University Press, 2017).

¹⁷ Jakub Janda et al., "Fortifying Economic Security: The EU's Response to China's Risk," Wilfried Martens Centre for European Studies, June 17, 2024, <https://www.martenscentre.eu/publication/fortifying-economic-security-the-eus-response-to-chinas-risk/>.

of academic inquiry.¹⁸ Many economic security and research security issues are governed by the same laws and overseen by the same executive agencies.

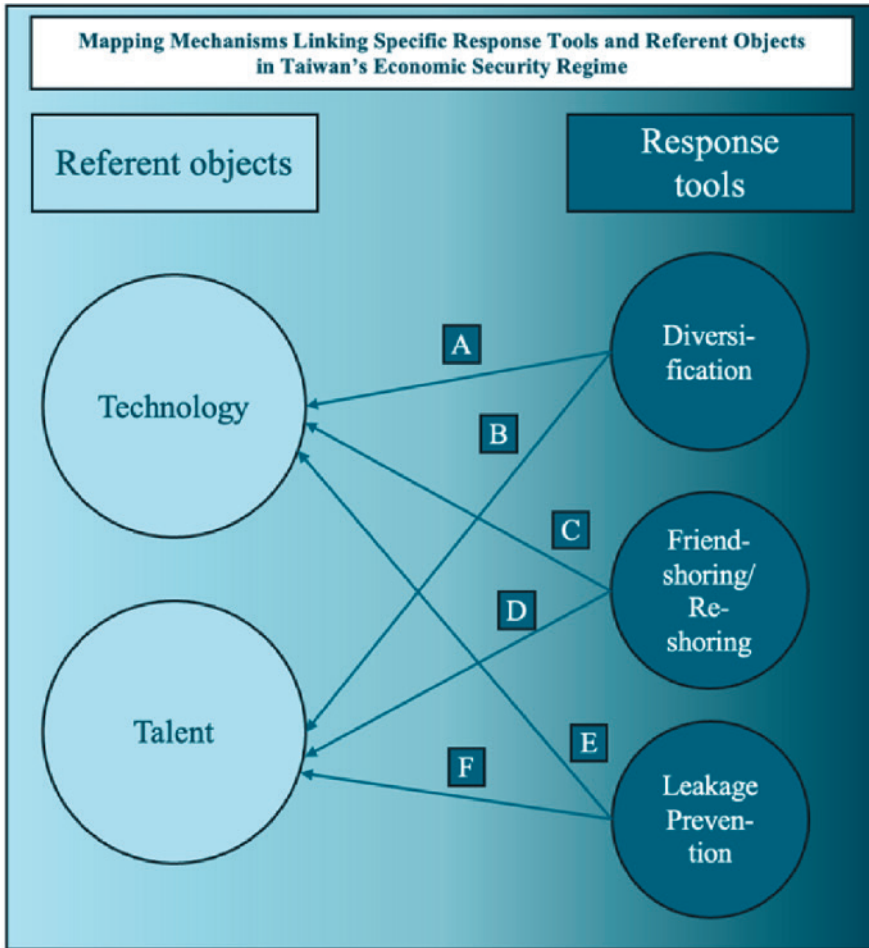


Figure 1. Mapping Mechanisms Linking Specific Response Tools and Referent Objects in Taiwan's Economic Security Regime

Source: Author's own elaboration.

For legend, see Appendix 1.

¹⁸ Ingrid d'Hooghe and Jonas Lammertink, "How National Governments and Research Institutions Safeguard Knowledge Development in Science and Technology," *Leiden Asia Center*, November 2022, <https://leidenasiacentre.nl/wp-content/uploads/2022/11/How-National-Governments-and-Research-Institutions-Safeguard-Knowledge-Development-in-Science-and-Technology.pdf>.

As illustrated in Figure 1, the Taiwanese economic security regime can be parsimoniously operationalized as consisting of two referent objects: (1.1) technology protection and (1.2) talent control, and three response tools: (2.1) diversification of economic relations, (2.2) friendshoring and reshoring, and (2.3) limiting the leakage of strategic technologies. Among the three tools enumerated here, the third one is most relevant to understanding the focus of Taiwan's research security regime. Therefore, the following sub-section provides a brief overview of the first two tools for context, while the subsequent sub-section offers a more in-depth perspective on the evolution of strategic technologies protection regime with implications for both economic security and research security.

Diversification, Friendshoring, and Reshoring as Tools of Economic Security

Taiwan's diversification strategy is central to its de-risking efforts. The key strategy underpinning this endeavor is the New Southbound Policy (新南向政策; NSP). Launched under President Tsai Ing-wen, the NSP targets eighteen countries in South and Southeast Asia and Oceania and is centered around four pillars: economic and trade cooperation, people-to-people exchanges, resource sharing, and regional connectivity.¹⁹ By promoting investment and production relocation, the policy has strengthened Taiwan's presence in the emerging markets of its neighborhood.²⁰ In terms of reducing economic dependencies on China, the policy bore fruit, as in 2022 Taiwan's investments in South and Southeast Asia reached €4.8 billion in 2022, surpassing—for the first time—the €4.62 billion invested in China. This trend intensified in 2023, with investments in the region totaling €3.97 billion, compared to €1.16 billion in China.²¹

¹⁹ Alan Hao Yang, "Strategising Taiwan's New Southbound Policy by the Practice of PPPP Configuration," *Journal of Contemporary East Asia Studies* 10, no. 1 (2023): 45–62.

²⁰ Shih-chung Liu, "The Impact of U.S.-China Trade Friction on Both Countries and the Global Economy," *Prospects & Perspectives*, no. 8 (2018): 1–4, <https://www.pf.org.tw/tw/pfch/33-7901.html>.

²¹ "王美花：南亞東南亞投資額首超中國 新南向里程碑 (Wang Mei-Hua: Investment in South and Southeast Asia Surpasses China for the First Time: A Milestone for the New Southbound Policy)," *Central News Agency*, November 29, 2023, <https://www.cna.com.tw/news/aip/202311290399.aspx>.

Complementing the NSP, which facilitates friendshoring,²² the “Action Plan for Welcoming Overseas Taiwanese Businesses” encourages reshoring through incentives such as land, talent, and low-interest financing. The plan, now in its third phase, has attracted 305 enterprises and over TWD 1.2 trillion (approximately €35 billion) in investment, bolstering Taiwan’s economic resilience and aligning with net-zero goals.

Prevention of National Core Key Technologies Leakage at the Nexus of Economic Security and Research Security

In addition to diversifying its investment relations, as well as promoting friendshoring and reshoring policies, Taiwan’s de-risking strategy incorporates measures to safeguard national core key technologies (NCKT) from exposure to foreign adversaries. These measures can be divided into two categories: technology protection, governed by the National Security Act (NSA), and talent control, which the Act Governing Relations between the People of the Taiwan Area and the Mainland Area (AGRPAMA) regulates.

The second Tsai Ing-wen administration (2020–2024) sought to recalibrate the focus of the country’s security policymaking to new areas of concern, which notably included the issue of strategic technologies leakage. This adjustment was rooted in a growing awareness that Taiwan’s leadership in critical technologies, particularly in semiconductors, is a double-edged sword: it bolsters Taiwan’s deterrence against potential aggression from China while also making it a target for Chinese technology espionage. Taiwan’s advanced semiconductor industry, including critical technologies such as the 14-nanometer process and heterogeneous integration through system-in-package, is crucial not only to global supply chains but also to Taiwan’s domestic economy and long-term industrial competitiveness. Protecting these technologies thus became an important focus of lawmakers.

In response to these realities, Taiwan enacted significant legislative changes. In June 2022, the Legislative Yuan passed amendments to the NSA,

²² Zoë Weaver-Lee, “Taiwan’s Companies Look beyond China, But Key Challenges Remain,” *Global Taiwan Brief* 8, no. 18 (2023): 12–14, <https://globaltaiwan.org/wp-content/uploads/2023/09/GTB-8.18-PDF-Final.pdf>.

establishing strict penalties for the leakage of critical technologies. These amendments criminalize economic espionage and prohibit the transfer of technologies critical to Taiwan's national security, economic development, or industrial competitiveness to foreign adversaries. Individuals who breach the revised provisions of the NSA can be subject to imprisonment and fines, including up to twelve years in prison and penalties of up to NT\$100 million (approximately €3 million).²³

To make the enforcement actionable, the Executive Yuan released the first official list of NCKT on December 5, 2023, covering twenty-two items across sectors including defense, space, semiconductors, agriculture, and information security. This list can be reviewed in Table 2 in Appendix 1. As of November 2024, the National Science and Technology Council is also planning to release a “second wave” of NCKT, increasing the total number to thirty-four items.²⁴ (See Table 3 in Appendix 1). These developments marked a shift from the previous regime, where research and economic security measures were primarily guidelines with limited enforceability. The only known document on research security was the Government-funded National Core Science and Technology Research Program Safety Control Operation Manual. While it provided a comprehensive overview of National Core Technologies (NB: a different term that NCKT introduced by the amendments to the NSA)²⁵ and delineated related procedures for implementing government-supported projects pertaining to these technologies, it was an administrative guidance rather than a legally binding document. By codifying safeguards for clearly defined NCKTs into law, Taiwan has significantly strengthened its research security regime to counter technological espionage and protect its strategic industries.

²³ Brian Hsiang-Yang Hsieh and Henry Jin-Han Hsieh, “Amended National Security Act Imposes Stricter Punishments on Trade Secret Misappropriation Following New List of Crucial Tech,” *IAM Media*, January 17, 2024, <https://www.iam-media.com/article/amended-national-security-act-imposes-stricter-punishments-trade-secret-misappropriation-following-new-list-of-crucial-tech>.

²⁴ “國家核心關鍵技術項目及其技術主管機關修正草案 (National Key Critical Technologies and Their Governing Authorities—Revised Draft),” ROC (Taiwan) National Science and Technology Council, November 1, 2024.

²⁵ For details on the National Core Technologies, see Table 1 in Appendix 1.

Relevant changes were also introduced to the AGRPTAMA, which effectively strengthened Taiwan's talent control measures. AGRPTAMA oversees engagements involving individuals from the People's Republic of China, including its Special Administrative Regions of Hong Kong and Macau, in Taiwanese research and tertiary education institutions. While individuals from China who obtain household registration in Taiwan are permitted as faculty members or researchers, they are prohibited from participating in work related to national security or confidential scientific and technological research unless they have maintained household registration in Taiwan for over twenty years.²⁶

The recent amendments set forth a review mechanism for cross-strait travel by personnel engaged in NCKT projects commissioned by the government or supported by a government grant. The Mainland Affairs Council explain that there are two categories of individuals who are covered by the new regulations: (1) "individuals or personnel affiliated with legal persons, organizations, or other institutions who are involved in national core technology business that are commissioned by, receive grant from, or are funded by government agencies (institutions) of a certain level;" and "2. those who are involved in the said business or had resigned from their jobs in the said business whose commission, grant, or funding had completed or ended less than 3 years ago."²⁷

This is in response to the process of securitization of critical technologies—including tangible assets such as the technologies themselves as well as intangible ones, such as talent—by Taiwan's government agencies. The MAC and the Ministry of Justice Investigation Bureau views talent poaching from Taiwan's semiconductor and high-tech industries as a major risk to the country's global competitiveness and national security.²⁸ Notably, the MAC explicitly linked the amendments to the NSA, which operationalized technology as a referent object

²⁶ Mei-chu Huang and Fion Khan, "Thirty locations raided in talent, tech poaching investigations," *Taipei Times*, September 3, 2024, <https://www.taipetimes.com/News/taiwan/archives/2024/09/03/2003823210>.

²⁷ "Executive Yuan Approves the "Draft Amendments to Part of the Provisions of the Act Governing Relations between the People of the Taiwan Area and the Mainland Area," ROC (*Taiwan*) Mainland Affairs Council, February 17, 2022, https://www.mac.gov.tw/en/News_Content.aspx?n=2BA0753CBE348412&sms=E828F60C4AFBAF90&s=6A543758F2225F94.

²⁸ Yu-fu Chen and William Hetherington, "Security act amendments need to be enacted: TSP," *Taipei Times*, August 17, 2023, <https://www.taipetimes.com/News/taiwan/archives/2023/08/17/2003804868>.

in the process of securitization, and the AGRPTAMA, which operationalizes talent as another referent project. Consequently, the changes to these two core documents ought to be analyzed in tandem when assessing the emergence of intertwined economic security and research security regimes.²⁹

Taking Stock: Lessons from Taiwan's Experience in Economic and Research Security

Three main lessons can be enumerated based on the evaluation of Taiwan's experience with attempting an intertwined economic security and research security regime:

1. Embedding Research Security in the National Security Framework
While Taiwan does not explicitly define the concept of research security, it clearly integrates relevant mechanisms into its wider security policy framework, including economic security. By addressing vulnerabilities in tangible assets, such as technologies, and intangible ones, such as talent, Taiwan employs a dual approach of incentives and penalties. Measures such as diversification, friendshoring, and reshoring complement the enforcement of strict penalties for technology leakage. However, Taiwan could strengthen the cooperative dimension of research security by fostering collaboration with like-minded partners, particularly under initiatives such as the New Southbound Policy.
2. Context-Specificity of the Taiwan Model
Taiwan's research security framework is uniquely tailored to its geopolitical challenges, specifically its adversarial relationship with China. This targeted approach benefits from Taiwan's ability to enact policies that directly address the China threat, leveraging the fact that its relations with the People's Republic of China are generally not considered as state-to-state relations. However, replicating this model in other contexts, such as Central and Eastern Europe states targeting Russia's malign influence in the research domain, may result in significant challenges as democratic coun-

²⁹ ROC (Taiwan) Mainland Affairs Council. Executive Yuan Approves the "Draft Amendments to Part of the Provisions of the Act Governing Relations between the People of the Taiwan Area and the Mainland Area." February 17, 2022, https://www.mac.gov.tw/en/News_Content.aspx?n=2BA0753CBE348412&sms=E828F60C4AFBAF90&s=6A543758F2225F94.

tries need to appropriately balance security measures with cross-border collaboration among trusted partners.

3. Unlocking the Potential of Bottom-Up Initiatives Legislative changes in Taiwan, particularly the amendments to the NSA, made the process of identifying national core key technologies more democratic by involving academics and researchers. The platforming of voices from universities and research institutes addresses a critical need for an inter-sectoral, multi-stakeholder approach to research security. At the same time, further encouragement and financial support for bottom-up initiatives could enhance the acceptance of top-down policies. These initiatives would promote broader stakeholder engagement in safeguarding research security.

Appendix 1: Tables

Area	Technologies
Agricultural Science and Technology	Seedling propagation. Cultivation of edible and medicinal mushrooms. Technologies for breeding new crop varieties. Functional genomics and related biochips. Livestock stem cell technology.
Key Manufacturing Technology	Ninety-seven technologies defined in a separate list compiled by the Ministry of Economic Affairs, including seven main sectors: Semiconductor Technology: Advanced integrated circuits, wafers exceeding twelve inches in diameter, and related production processes. Military and Aerospace Equipment: Aircraft, helicopters, drones, and military-grade components such as engines, rotors, and landing gears. Advanced Materials and Chemicals: Fluorinated hydrocarbons, phosphorus compounds, and certain chlorinated chemicals used in specialized applications. Biotechnology: Genetic materials, stem cells, and advanced biomedical tools.

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Area	Technologies
Key Manufacturing Technology	Energy and Nuclear Technology: Nuclear reactors, isotope separators, and associated parts. Optoelectronics: Liquid crystal display panels and other high-generation TFT-LCD products. Pharmaceuticals: Narcotic drugs, precursors like ephedrine, and medical compounds such as ergot alkaloids and opiates.
Aerospace and Satellite Technology	Aerospace Technology. Remote Sensing Technology and Data. Satellite-Related Technology.
Ocean Science and Technology	Underwater research. Marine geology. Marine physics.
Advanced Integrated Circuit Design and Process Technology	Integrated circuit (IC) manufacturing process at or below three nanometers. IC design at or below five nanometers. Extreme ultraviolet (EUV) lithography technology.
Key Network Security Technology	Key cybersecurity technologies for in-depth defense within the national cybersecurity joint defense system. Core cybersecurity technologies developed to support national missions.

Table 1. National Core Technologies (國家核心科技) defined in the non-legally binding Government-funded National Core Science and Technology Research Program Safety Control Operation Manual (2019, last edited January 2023).

Source: Author's own elaboration based on ROC (Taiwan) National Science and Technology Council, *Government-funded National Core Science and Technology Research Program Safety Control Operation Manual*, 5–6.

Area	Technologies
National Defense Technology	Military Carbon Fiber Composite Materials Technology. Military Carbon/Carbon High-Temperature Ablation-Resistant Materials Technology. Military New Anti-Jamming Identification Friend or Foe (IFF) Technology. Military Microwave/Infrared/Multi-Mode Seeker Technology. Military Active Phased Array Detection Technology. Ramjet Engine Technology.
Space Technology	Satellite Control Technology. Space-Grade X-Band Image Download Technology. Space-Grade Image Compression Electronic Unit (EU) Technology. Space-Grade CMOS Image Sensor Technology. Design, Manufacturing, and Integration of Space-Grade Optical Payload Systems. Space-Grade Active Phased Array Antenna Technology. Space-Grade Passive Reflector Antenna Technology. Space-Grade Radar Image Processing Technology.
Agricultural Technology	Breeding and Propagation Technology—Liquid Strain Cultivation and Monosex Aquaculture Technology. Biochip Technology—Residue Testing for Agricultural Drugs and Biochip Detection of Plant and Animal Pathogens. Agricultural Facility Expert System Technology—Design, Operation, and Maintenance of Greenhouses and Aquaculture Water Environments.
Semiconductor Technology	IC Manufacturing Technology for Processes Below Fourteen Nanometers and Related Key Gases, Chemicals, and Equipment. Heterogeneous Integration Packaging Technology—Wafer-Level Packaging, Silicon Photonics Integration Packaging, and Related Materials and Equipment.
Cybersecurity	Chip Security Technology. Post-Quantum Cryptographic Protection Technology. Network Active Defense Technology.

Table 2. National Core Key Technologies (國家核心關鍵技術) set forth according to Article 3 of the National Security Act.

Source: Author's own elaboration based on ROC (Taiwan) National Science and Technology Council, *National Key Critical Technologies and Their Governing Authorities—Revised Draft*.

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Area	Technologies
Space Technology	Propulsion System Design and Manufacturing for Launch Vehicles Delivering Small Satellites into Orbit. Flight Attitude Determination and Control Technology for Launch Vehicles Delivering Small Satellites into Orbit. Quantum Bit Design and Manufacturing Technology.
Semiconductor Technology	Millimeter-Wave Gallium Nitride (GaN) Power Amplifier Monolithic Microwave Integrated Circuit Design Technology. Gallium Nitride (GaN) Semiconductor Manufacturing Technology for High-Frequency Power Amplifiers. Silicon Carbide (SiC) Semiconductor Manufacturing Technology for High-Voltage Power Components. High-Performance Chip Design Technology for Artificial Intelligence Computing. High-Frequency Wide-Bandwidth High-Density Interconnect Chip Circuit Design Technology. Secondary Battery Cell Technology—High Energy Density and Long Cycle Life Design, Chemical Synthesis, and Manufacturing.

Table 3. Prospective new National Core Key Technologies (國家核心關鍵技術) intended to be added to the list according to Article 3 of the National Security Act and the National Science and Technology Council Regulations for the Identification of National Core Key Technologies.

Source: Author’s own elaboration based on ROC (Taiwan) National Science and Technology Council, *National Key Critical Technologies and Their Governing Authorities—Revised Draft*.

Mechanism	Referent Object	Response Tool	Description
A	Technology	Diversification	Promotion of engagements with new target areas, notably through the New Southbound Policy, particularly its “Economic and Trade Cooperation” and “Sharing Resources” pillars.

Mecha- nism	Referent Object	Response Tool	Description
B	Talent	Diversification	Promotion of engagements with new target areas, notably through the New Southbound Policy, particularly its “People-to-People Exchanges” and “Regional Connectivity” pillars.
C	Technology	Friendshoring/ Reshoring	Allocation of tangible relocation assets through schemes such as Action Plan for Welcoming Overseas Taiwanese Businesses.
D	Talent	Friendshoring/ Reshoring	Efforts deterring sensitive people-to-people engagements, notably including the Mainland Affairs Council’s Eight Must-Knows for Studying in Mainland China.
E	Technology	Leakage Pre- vention	New punitive mechanisms introduced by the 2022 amendments to the National Security Act.
F	Talent	Leakage Pre- vention	New review mechanisms introduced by the 2022 amendments to the Act Governing Relations between the People of the Taiwan Area and the Mainland Area.

Table 4. Legend to Figure 1.

Policy Recommendations

Applying Lessons from Taiwan Across Contexts

The lessons from the experience of Taiwan in constructing a research security regime also translate into actionable policy ideas for stakeholders in various contexts. Building upon the lessons learned, the following policy recommendations aim to guide stakeholders in developing robust research security frameworks:

1. Integrate Research Security into National Security Strategies: Recognize research security as a fundamental component of national se-

curity. Engage representatives from the research community in cross-sectoral security policy discussions to ensure comprehensive and informed decision-making.

2. **Implement a Tiered System for International Collaboration:** Develop a stratified framework that classifies countries based on assessed security risks. This system would regulate access to cross-border research collaborations, balancing the need for academic freedom with necessary security measures. In Taiwan, legislation is clearly pointed toward the People's Republic of China, as the former views the latter as the main origin of security threats. Such narrow targeting might not be feasible for other jurisdictions, but the tier structure could be a solid compromise to balance academic freedom with security measures. This approach would also allow for nuanced engagement, mitigating risks without broadly restricting international cooperation.
3. **Restrict Access to Sensitive Research Facilities:** Utilize the tiered system to manage physical access to specific research facilities rather than imposing blanket visa restrictions on students and researchers from particular countries. This strategy minimizes profiling and focuses on securing critical infrastructure, ensuring that access is granted based on security assessments related to specific research areas.
4. **Establish a Fund for Capacity-Building Initiatives:** Under the joint leadership of national security agencies and educational ministries, create a fund to support professional associations and academic unions. This fund would enhance their understanding of the security implications of their work and empower them to develop actionable policy recommendations. Such bottom-up initiatives can foster broader acceptance of top-down security measures and promote a culture of shared responsibility in safeguarding research integrity.

By adopting these policies, countries can develop research security frameworks that protect national interests while promoting international collaboration and academic freedom.

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