Techno-Geopolitical Uncertainty and International Business: Implications of the United States Chips and Science Act

Yadong Luo
Professor of Management
Emery M. Findley Jr. Distinguished Chair
Miami Herbert Business School,
University of Miami,
Coral Gables, Florida, United States 33146
Email: yadong@miami.edu
Tel: (305)284-4003

Ari Van Assche
Professor, Department of International Business
HEC Montréal
3000, chemin de la Côte-Sainte-Catherine
Montréal, Québec, Canada H3T 2A7
Email: ari.van-assche@hec.ca
Tel: (514) 340-6043

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ABSTRACT

Growing techno-geopolitical uncertainty affects international business in many ways, calling for more scholarly attention to the causes of, and responses to, this uncertainty. The United States (US) Chips and Science Act epitomizes the country's recent embrace of geopolitical techno-nationalism in its economic rivalry with China, which has major implications for international business scholarship and management practice. The Act exhibits two features that fly against America's traditional liberal policy stance. First, its reliance on subsidies emulates the sort of illiberal market-distorting policies that the US has accused China of pursuing. Second, its use of guardrail provisions pursues the weaponization of global value chains for geopolitical purposes. We demonstrate how the Act is part of a broader trend of geopolitical techno-nationalism in the US, examine its distinctive features, and study the geo-strategies that multinational enterprises (MNEs) need to adopt to deal with the resulting techno-geopolitical uncertainty. We illustrate why and how the Act may be a paradigm shift from neo-liberalism to techno-nationalism and what causes this shift. We emphasize four strategic responses to be considered by MNEs – geo-strategies, reconfiguration, resilience, and corporate diplomacy.

Key Words: Geopolitics, Techno-nationalism, US-China rivalry, Geo-strategies, Decoupling

INTRODUCTION

International business is entering an era that we call *techno-geopolitical uncertainty,* and we see the United States (US) CHIPS and Science Act, signed into law in August 2022, as emblematic of this. Around the globe, multinational enterprises (MNEs) in strategic industries are encountering a slate of new legislative, governmental and regulatory policies in various countries that aim to regulate global value chains for geopolitical gains, most notably in high-technology sectors. For better or worse, countries are abandoning their liberal commitments to an open and rule-based multilateral system to take more protective approaches to their trade and investment relationships based on national security concerns (Moffitt, 2016). As techno-nationalism resurges, technological decoupling becomes aggravated in complex ways such that technological capabilities become linked directly to a country's national security and geopolitical power (Farrell & Newman, 2020; Luo, 2022).

We define the techno-geopolitical uncertainty as the propensity of disruptions caused by significant policy changes taken by powerful nation states who seek interlocked techno-nationalist and geopolitical gains vis-à-vis rival states. The rise of techno-geopolitical uncertainty takes place against the backdrop of a liberal international order in crisis. For seventy years, global economic activity has been governed by a sprawling and expanding liberal international order (Ikenberry, 2018). After World War II, the US and its allies created a complex global governance system that was organized around openness, rules, and multilateral cooperation. Over time, the US became this order's hegemonic leader, anchoring alliances, stabilizing the global economy, and advocating 'free world' values. This American-led order expanded outward after the Cold War, with countries in East Asia, Eastern Europe and Latin America embracing pro-business reforms to boost their integration into the global economy. For MNEs and international business (IB) scholars studying them, the globalizing rule-of-law based system provided a relatively predictable international business environment in which MNEs mostly relied on market principles to determine how to expand their international business operations and configure their global value chains (Guillen, 2018).

Today, China's rise as a geopolitical rival to the US illustrates growing tensions between the world's two largest economies, and more broadly between the geopolitically and ideologically divided world. Some scholars see a crisis of American hegemonic leadership (Allison, 2017). Especially after the great recession of 2008, China as an increasingly powerful nation becomes more assertive in their contestation of the existing order (Doshi, 2021). In some cases, it has used active engagement with existing institutions to align international norms and values with those of China (Economy, 2022). In other cases, it has created parallel institutions and programs, such as the Asian Infrastructure Investment Bank and the Belt and Road Initiative, that are more responsive to Chinese interests (Kim & Kim, 2022). Other scholars see a deeper crisis of international order. China's apparent ability to profit within the international order has shaken the domestic consensus in the US on defending and preserving the open and rule-based multilateral system, calling into question the adequacy of existing entities such as the World Health Organization and the World Trade Organization (Weiss & Wallace, 2021). Regardless of origins of the crisis, the growing geopolitical rivalry between the US and China is transforming global governance, at times creating an illiberal, techno-nationalist policy environment that MNEs will need to learn to navigate (Luo, 2022; Petricevic & Teece, 2019).

In this paper, we argue that the US Chips and Science Act (hereafter the Act) provides a unique window into this new techno-geopolitically uncertain reality and what it means for MNEs. The Act exhibits two features that fit a larger political realist pattern of policies that the US has recently adopted. First, it flies in the face of America's traditional policy stance by emulating the sort of illiberal market-distorting policies that the US has accused China of pursuing. This raises concerns about the US willingness to lead and defend the liberal international order, presenting what we believe to be the dawn of a new geopolitical techno-nationalist era. Second, the Act pursues the weaponization of global value chains as a new tool of this geopolitical techno-nationalism, which will require MNEs to carefully consider geopolitical alliances and rivalries in the configuration of their activities around the world. Concerned with risks to national security and competition with China, the US has obstinately

been considering and adopting even more measures beyond the Chips Act to further scrutinize inbound investments from China, while also preparing to control outbound investments to China. To date, IB research has had little to say about geo-techno uncertainties in the global business environment and about geo-strategies that MNEs should adopt under such geo-techno uncertainty. We intend to address these.

THE 2022 CHIPS AND SCIENCE ACT

The US Chips and Science Act is a recent example of techno-geopolitical uncertainty. The Act, passed by US Congress in July 2022 and signed into law a month later by President Biden, is designed to solidify the US lead in the semiconductor industry while containing China's rise in global competition. This "produce American" legislation sets aside US$280 billion to boost US competitiveness, with US$52 billion allocated specifically toward a range of subsidies, tax credits, and R&D incentives to incentivize the construction, modernization, and expansion of semiconductor fabrication and equipment facilities within the US.

These chips are the lifeblood of the modern economy, powering the core technology that runs everything from automobiles and smart phones to nuclear submarines, aerospace, and quantum systems. They virtually comprise the "brains" for everything, from artificial intelligence to machine learning and the internet of things. This in part explains why this legislation entails far-reaching implications, especially for international business, let alone it came out at a perfect storm moment when the Covid-19 pandemic, the Ukraine war, global supply chain disruptions, widened geopolitical frictions, nationalist sentiment, and global order waning all prevail.

Prior to the 1980s, the US was the uncontested global leader in the semiconductor industry, and it continues to be the principal player in several high value-added segments of the sector such as semiconductor manufacturing equipment, electronic design autonomation software, and chip design (Bown, 2020). However, it has over the years lost its competitive advantage in the manufacturing portion of the chips value chain. Between 1990 and 2021, the US share of global semiconductor

manufacturing capacity declined from 40 percent to less than 15 percent, due in large part to rising costs in the US and catchup investment initiatives adopted in both public and private sectors in other countries, notably in East Asia. Today, many chips that are designed in the US are manufactured by contract manufacturers – foundries – located in Taiwan, Korea, and increasingly China. Among US semiconductor companies, Intel is the largest, followed by Micro Technology, Broadcom, Qualcomm, Texas Instruments and Applied Materials. While these US companies dominate in fabless and integrated device manufacturing (or IDM), European counterparts (e.g., ASML) maintain a global competitive edge in sophisticated equipment, and Asian competitors (e.g., Samsung and TSMC) hold a stronger position in foundry. Some of America's largest tech firms, including Google, Apple, and Amazon, rely on Taiwan's TSMC alone for nearly 90% of their chip production (Capri, 2022).

Obviously, the US is not the only country offering subsidies and other incentives to entice the reshoring of key technologies and strategic sectors (e.g., China too has invested enormously in funding their strategic sectors). It is also important to note that the law is not the first episode of US industrial policy targeting the semiconductor industry. Between 1987 and 1997, the Defense Advanced Research Projects Agency (DARPA) dispersed around $870 million of federal funding to a consortium of the 14 most successful chip manufacturers, known as Semiconductor Manufacturing Technology (Bown, 2020). Viable industrial policies have been recognized to at times be pivotal to fostering competitive advantages and addressing national security concerns (Porter, 1998). As we will expand on below, however, it is unclear if this applies to the current US context (Calhoun, 2022).

What makes the Act unprecedented is its expressly geopolitical purpose – containing and weakening China and other "foreign countries of concern" (e.g., Russia, Iran) via "guardrail" provisions. Any semiconductor company (US or foreign) that receives federal financial assistance under the Act is prohibited to engage in any "significant transaction" involving the material expansion of semiconductor manufacturing capacity in China for a 10-year period without approval from the Department of Commerce. In a sense, the provision sets up a geopolitically tainted quasi-outbound investment screening instrument that the US government can repeatedly leverage to achieve

national security imperatives (*NPR*, 2022). The statute also gives the US government the ability to designate other countries as "foreign countries of concern" if those countries are "engaged in conduct that is detrimental to the national security or foreign policy of the United States." Even further, the law gives these agencies the right to reconsider or redefine which technologies are subject to the prohibition.

To date, other economies have not followed suit by imposing geopolitics-based guardrail provisions on their semiconductor manufacturing subsidies (e.g., China, Singapore, Taiwan, Ireland, Germany, Israel, South Korea). The European Union (EU), for example, introduced its own Chips Act to better coordinate against supply disruptions, strengthen and scale up production and innovation throughout the EU semiconductor value chain, but it does not embody any geopolitical terms, prohibitions, and sanctions. With the adoption of the Act, there is the risk that other large countries may copycat the US to safeguard their national interest.

The Act amplifies the broader geopolitical pursuit of the US against rising China. The Biden administration has continued the decoupling strategy of the previous administration by signing an executive order mandating 'China-free' supply chains within strategic industries and has expanded the bundle of other measures such as sanctions, export controls, license restrictions, and blocking investments and acquisitions by Chinese firms in US "strategic" sectors. It also exemplifies the US government's embrace of friend-shoring, that is, encouraging US companies to concentrate and diversify their supply chains within a group of geopolitical allies with shared democratic values (Harput, 2022). The goal is to prevent less-like-minded nations from unfairly leveraging their market position in key raw materials, technologies, or products to disrupt the US economy or those of its allies (*NPR,* 2022).

The Act was driven in part by existing geopolitical tensions, but it will itself also likely intensify geopolitical confrontations between the world's two largest economies, fueling the existential crisis of the liberal international order and presenting new uncertainties and complexities facing MNEs (Bloomberg, 2022). Ironically, friend-shoring purportedly divides "free-market democracies" from

authoritarian regimes but the policies that are aimed to drive this international business reconfiguration, including the Act, sharply contradicts the market-based doctrine that has been deeply embedded in the US economic policies over the past decades (PwC, 2022).

In the short term, we anticipate that the beggar-thy-neighbor nature of the Act might amplify the competitiveness of the US semiconductor manufacturing segment and deter that of China. The long-term effects of the Act are less clear. No country is self-sufficient in every semiconductor supply chain segment (see Figure 1), and it is unclear that this is desirable from both a competitiveness and a national security viewpoint. The US, for instance, lacks such segments as photolithography tools (the most expensive and complex technology in the industry), highly skilled labor required for complex chip manufacturing, and advanced manufacturing base (PwC, 2022). It is unlikely that the Act provides sufficient incentives to make meaningful changes to this (Calhoun, 2022). Second, it is unclear that the Act will convince the most competitive semiconductor firms to place their most performing manufacturing plants in the US. Firms that decide to receive federal funding are required to reduce their engagement with China, a country that is already the largest semiconductor market, which is a commitment that many leading firms might not be willing to take. In 2020, China represented 53.7% of worldwide chip sales, or $239.45 billion out of $446.1 billion (PwC, 2022). A deeper analysis is needed to determine which type of firms are most likely to take on this offer, under what conditions, and what this means for US competitiveness. Third, and in line with China's recent Dual Circulation Strategy, the Act will force China to invest more heavily in technologies and be more self-sufficient itself. It may in this respect develop its own geo-strategically tainted guardrail provisions that will discriminate against US or foreign companies that have received funding under the Act.

WHY IS THE ACT A PARADIGM SHIFT?

We envision the Act to be emblematic of two landmark inflection points. First, it underscores the policy shift in recent US administrations to counter China's illiberal industrial policies in high-technology industries by emulating them. Second, it highlights the US government's attempt to

weaponize global value chains in strategic industries for geopolitical purposes. Both features reverse the liberal principles that have underlined both globalization activities and international business theories over the past decades, pushing further economic and technology decoupling in areas that one can argue are strategic in global competitiveness and national interests.

Emulating illiberal policies

The US has long accused China of using its state-led system to subsidize and distort its economy and international business (Bown & Hillman, 2019). This includes the complaint that China thwarts the liberal principle that domestic and foreign firms should trade on a level playing field by providing Chinese state-owned enterprises (SOEs) with unfair trade advantages and by imposing forced technology transfer deals on foreign businesses as condition for accessing the Chinese market (Mavroidis & Sapir, 2021). It is also at the center of concerns about the overly heavy influence of the state in the Belt and Road Initiative (BRI), where the government plays a key role in selecting BRI projects, financing them with preferential loans from Chinese state-owned banks, and using state-owned enterprises for their construction (Li et al., 2022). A burgeoning international business literature studies how this state capitalism shapes China's outward foreign direct investment and global competition (e.g., Buckley et al., 2007; Sutherland et al., 2020).

In the past, the US has largely responded to the illiberal aspects of this state capitalism by using the liberal international system. One approach has been to bring complaints to the World Trade Organization (WTO) against alleged Chinese violations and blocking the appointment of judges to the WTO Appellate Body against perceived judicial activism that condones Chinese illiberal policies (Mavroidis & Sapir, 2021). Another approach has been to negotiate new trade agreements such as the Trans-Pacific Partnership with the intent to create an economic bloc that has strong liberal standards including on investment, the environment, labor, IP rights protection, and state-owned enterprises.

The Act departs from this traditional approach by representing the sort of illiberal policy that the US has accused China of pursuing (Krueger, 2022). Instead of promoting a level playing field that

facilitates the private sector's ability to exploit America's areas of comparative advantage, the Act's reliance on a generous subsidy program signals that the US government is ready to embark on a global subsidy race that tries to defy comparative advantage to upgrade its industry.

It is important to acknowledge that there are scenarios when it is appropriate for countries to adopt subsidies in strategic industries, but we do not believe they apply in the current context. Subsidies are a good policy tool when used to correct market failures, that is, when competitive markets fail to deliver socially desirable outcomes (Lin & Chang, 2009). For example, subsidies can encourage businesses to invest in intangible assets such as research and development that benefit not only their firm, but the industry or society as well. They can also help start-ups survive an initial period of losses until they grow large enough to be profitable (infant industry argument). The Act's focus on influencing the location decisions of large and highly profitable firms in the manufacturing segment of the semiconductor industry, however, suggests that these conditions do not apply here (Calhoun, 2022).

The US abandonment of liberal policies presents two concerns. First, the upside of such a policy remains unclear. Under its "Made in China 2025" Plan, China has channeled billions of yuan in subsidies to private firms in strategic sectors such as semiconductors, but the jury is still out whether this was effective (Hsieh, 2022). And even America's 1990s subsidization of R&D in the semiconductor industry ended up inducing its member firms to lower their R&D spending (Irwin & Klenow, 1996). Second, the downside can be large. The embrace of subsidies is a sign of the failure of multilateral subsidy control in the global system, suggesting that export mercantilism and other forms of selective subsidization will continue to be a persistent feature of policy responses around the globe (Evenett, 2019). Since most of the competitors of the US in semiconductor manufacturing are like-minded partners such as Taiwan, Korea and Japan, it points to a serious problem of policy coordination.

Weaponizing global value chains

More concerning, the guardrail provisions in the Act, represent an effort by the US government to weaponize global value chains to achieve its foreign policy goals. That is, they allow

the US government to increase its control over the global value chain activities of recipient firms not only within America's borders but also extraterritorially in a way that potentially hurts its geopolitical rivals.

To see how this weaponization works, it is important to recognize the power that MNEs have in global value chains (Gereffi, Humphrey & Sturgeon, 2005). Sitting at the top of a hierarchical chain, they have the muscle to select the firms that are included or excluded in global value chains, to determine their geographic location, and to determine the terms of supply-chain membership. It is this power as orchestrator of finely sliced economic activities that allows MNEs to control global value chains without owning them and to use them to enhance productivity and efficiency (Buckley, 2011; Narula et al., 2019).

The Act lets the US government harness this power for its own foreign policy purposes by mandating rules in the way recipients of federal funding manage their global value chains. Specifically, it prevents US and foreign recipients from developing any global value chain relations that may help build up China's semiconductor manufacturing capacity. Should TSMC or Intel receive funding, for example, they would be prohibited to build semiconductor facilities in China for ten years. Should Applied Materials or ASML receive funding, they would not be allowed to sell advanced semiconductor manufacturing equipment to US or foreign companies that build foundries in China. The Act thus forces global semiconductor companies to consider a critical tradeoff: do the benefits of the US federal assistance exceed the cost of decoupling their global value chains from China that is expected to be the world's largest semiconductor market by 2030?

The Act is part of a growing number of US policies that attempts to weaponize global value chains. This includes laws that endeavor to prevent MNEs from corporate complicity in human rights abuses along their global value chains. The 2021 Uyghur Forced Labor Prevention Act, for example, prohibits the import of products into the US that use raw materials such as cotton originating from China's Xinjiang Province in its goods. In doing so, the law aims to pressure MNEs to move their global value chains out of Xinjiang to induce China to refrain from engaging in alleged human rights

violations against its Uyghur population. The US government has also weaponized global value chains in their use of export controls to restrict Huawei's access to semiconductors. Not only did the US government curb exports of American-made chips to Huawei and its affiliates, it also stopped US semiconductor equipment manufacturers from exporting their products to any foreign-located companies that sold chips to Huawei (Bown, 2020b). Foreign-located firms were thus presented with a choice: continue to do business with Huawei and lose access to American-made tools or stop selling to Huawei and continue to buy American equipment.

The Chips Act differs from these actions in that it aims to beef up control over the *future* investments of MNEs. In a sense, the Act represents MNEs with an inverse real option problem. Accepting US federal funding takes away a semiconductor firm's right to take a future action regarding its tangible or intangible assets (e.g., investing in Chinese production facility, acquiring ownership share of a partner with facilities in China). In a context of high techno-geopolitical uncertainty, the cancelled real option may well prove to be an especially bitter pill to take for the most competitive and globally engaged MNEs that are market leaders in both the US and China.

DEEP ROOTED LOGIC

While free-market economists supplied the old order's founding narrative, geopolitical "realists" will most shape the coming order. Geopolitical conflict, we think, is an origin of techno-geopolitical uncertainty and many other globalization challenges facing international business (e.g., trade tensions, techno-nationalism, economic decoupling) since nation-state politicians make decisions for a variety of trade and economic policies that affect other nations bilaterally or multilaterally (Brzezinski, 2012).

A theoretical basis, logic and rationality that underpins the Act, and broader techno-nationalist trends, is the coercive political realist narrative behind it. Political realists portray the world as zero-sum competition in which states leverage their power of economic coercion and consider the principal actors in the international arena to be states, whose governments are concerned with their own state's security, act in pursuit of their own national interests, and struggle

for power (Mansfield, 1994; Mearsheimer, 2001). They are skeptical toward the relevance of ethical and governance norms to international relations among states. National politics is the realm of authority and law, whereas international politics, they claim, is a sphere without justice, characterized by active or potential conflict among states (Beitz, 1997; Wight, 1991).

The realism logic advocates to win competition by making the self-state stronger and rival states weaker (Beitz, 1997). It portrays the pathway to globalization as involving coercion (Wight, 1991), which paints a reductionist picture of international politics. In this picture, globalization rises when an overwhelmingly powerful country, a hegemon, creates and maintains, for its own benefit, sets of international institutions (or regimes) that govern aspects such as trade and investments. The hegemon will keep this system in place as long as it remains strong enough to do so and the benefits from keeping the system exceed the costs (Moffitt, 2016).

The Act is one of the latest endeavors by the US Congress and government to advance its geopolitical techno-nationalism pursuit. Like other new techno-nationalism measures, it combines geopolitical, economic, national security, and ideological considerations. New techno-nationalism is a strain of systematic competition thinking that links cross-border technological exchanges directly to a nation's national security, advocating strong interventions by the state against opportunistic or hostile state and non-state actors from other countries (Luo, 2022). Per the realism logic, countries must seek to attain geopolitical gains, building on the premise that the world has entered a new era of systemic rivalry between competing geopolitical powerhouses that differ markedly in ideological values, political systems, and economic models (Farrell & Newman, 2020). This logic rests on the assumption that the competing powerhouses seek to implement technology-enabled mechanisms that enforce and empower vastly different standards around data privacy, surveillance, censorship, transparency, digital money, and intellectual property (Luo, 2022).

There are also numerous reality-based reasons that propel the adoption of the law. While a full assessment of these reasons goes beyond the scope of this article, we think there exist several noteworthy reasons behind. First, this legislation was prompted by ideological friction – ideology

plays a vast role in geopolitics (Huntington, 2011). Ideological values have been used to unite or divide geopolitical power for centuries (Beitz, 1997). When ideological bias proliferates in one country (or bloc) against another, claiming a mantle of political and social supremacy over the "other," adversity could become pronounced (Allison, 2017). This ideological bias promotes a mindset that the other systems, especially those in sharp contrast to their own, are illegitimate, dysfunctional, and even unworthy of merit, and thus they feel that they have to suppress the latter and bring those with the differing view to the "right way" (Featherstone, 1990). This bias creates a predisposition toward negativity, cynicism, and the belief that the countering philosophy is doomed to collapse (Huntington, 2011).

Second, semiconductors are increasingly inextricably linked with national security and national interest, and especially after the global chip shortage of 2020. They are not only essential to our modern life but they ubiquitously serve for both commercial and military purposes. Maintaining the global competitiveness of this sector and protecting national security are thus legitimate. Under the banner of techno-nationalism, intervention by numerous governments along geopolitical lines is intensified (Capri, 2022; Luo, 2022). For instance, the EU joins forces with the US to counter China's attempts to dominate next-generation technologies like 5G (PwC, 2022). The American way – the Act – is certainly debatable, depending on which perspective one takes. From the IB perspective, the weaponization of technology-driven global value chains will potentially disrupt MNE operations, dilute efficiency-seeking attained from global specialization, and exacerbate already highly tensional geopolitics (thus additional uncertainties).

Third, this legislation arose due in part to flagging multilateralism and weakening liberal international order. Postwar institutions (e.g., UN, WTO) help provide economic stability and security for the world. Global order matters because geopolitics often lack higher authority to adjudicate disputes and confrontations among states and importantly this order offers some global standards and norms that can help guide and govern bilateral and multilateral tensions (Moffitt, 2016).

Weakening international governance allows, unfortunately, the prevalence of techno-nationalism around the world (Moisio, 2018).

TWO COMPETING TECHNO-NATIONALISM SYSTEMS

The Act signifies a strong shift to resort to techno-nationalism after decades of neoliberal globalization, open trade, and multilateral order, representing a critical moment of change in the dominant logic behind international business (trade, investment and global value chain, etc.). Nonetheless, this geopolitical (new) techno-nationalism, which stresses the primacy of geopolitics in global business, differs from developmental (conventional) techno-nationalism adopted in many (especially emerging) economies for decades (e.g., Japan, China, South Korea, India, Singapore, etc.), and in many regards these two techno-nationalism systems, which co-exist today, are competing and incompatible, making many MNEs difficult to adjust and adapt.

While both systems are commonly designed to strengthen the competitiveness of domestic industries, invest heavily in state-funded R&D, and localize production ecosystems, developmental techno-nationalism emphasizes the role of the authorities of the nation-states play as policymakers in the field of science and technology, viewing national R&D efforts and progresses as key drivers of the economic growth, social development, and prosperity of the nation (Meier & Rauch, 2000). Countries following this system welcome foreign MNEs and FDI (both inbound and outbound) to invest in technology-intensive industries in these host countries. These governments often pragmatically adopt a mix of nationalistic and liberal policies in pursuit of national technological goals through a combination of state activism and more openness toward foreign investors (Luo, 2022). Thus, in contrast to geopolitical techno-nationalism that deprecates globalization, developmental techno-nationalism embraces globalization, including FDI from all other countries. In fact, many Western MNEs have benefitted from such a policy environment, especially when local competition is weak (Meyer, 2004). The MNEs, meanwhile, are also important contributors to technological development for these economies (Montresor, 2001).

Because geopolitical techno-nationalism assumes the political realism logic, while developmental techno-nationalism is built on the Schumpeterian logic (a nation's success is determined by how well that nation innovates and harnesses technology), the two systems collide in how a nation treats another nation. Developmental techno-nationalism intends to strengthen the competitiveness of domestic industries, with no interference that may weaken the development of other nations (Moisio, 2018). It assumes a positive-sum game for national competitiveness, envisaging that science and technology of other countries, including rivals, may even facilitate the collective development of multiple countries through FDI-related knowledge spillover (Farrell & Newman, 2020). On the contrary, geopolitical techno-nationalism aims to weaken the competitiveness of a rivalry country's key industries via sanctions, prohibitions and restrictions, underscoring zero-sum competition and discounting potential synergies from economic interdependence (Meier & Rauch, 2000).

Developmental techno-nationalism is in-territorial, meaning that policies are limited within the nation states, but geopolitical techno-nationalism is often extraterritorial, seeking techno-nationalism coalitions with other countries that share similar geopolitical objectives and also posing sanctions on third-country MNEs who do business with the rival country. In semiconductor, 5G and other next-generation technologies, the Trans-Atlantic technology alliance between EU and US has already been formed, with policy makers on both sides of the Atlantic appearing to be comfortable to embrace increasingly techno-nationalist strategies (Capri, 2022).

MNE RESPONSES

The Act poses new challenges for MNEs' global operations, from reorganizing global value chains to reconfiguring global R&D and manufacturing. It increases the difficulty for MNEs in finding a delicate balance between global market dynamics and incompatible national policies that stretch extraterritorially through the weaponization of global value chains. As such, leading semiconductor and technology MNEs may find themselves facing a paradox: they need compliance with home and

host country's national interest and government requirements, but they also grapple with increased inter-state tensions and associated interventions in various markets where they operate.

The Act, we think, will push many technology MNEs to rethink their geo-strategies and re-assess their exposure to geopolitical and geo-economic risks. Those greatly relying on market shares of both US and China (market dependence) and technology contributions (technology dependence) are likely to be particularly vulnerable to the effects of the Act. Above all, it accentuates complexity, uncertainty, and difficulty for them in fulfilling needed balance between independence (and related control and risk mitigation) and interdependence (and related partnerships, networks and ecosystems) between nations and between firms from and beyond China. MNEs need to respond to it in numerous areas, recalibrating geo-strategies, reconfiguring global value chains, augmenting resilience, and executing effective corporate diplomacies.

First, formulating *geo-strategies* that adapt to the Act and techno-geopolitical uncertainties is imperative for MNEs. Geo-strategies require MNEs to set up processes to identify and monitor geopolitical risks across a company's global footprint (Schuler, Rehbein & Cramer, 2002). MNEs also need to assess the impact of geopolitical competition on revenue, supply chain, market entry, M&A, R&D, and other global activities. If MNEs operate in geopolitically high-risk but competitively important markets, they will need to develop market-specific assessments that fuse corporate strategy and risk management. MNEs, from the US or elsewhere, that avail themselves of the Act's funding will find it increasingly difficult to balance between seeking efficiency and targeting global compliance. And, assuming China eventually builds more domestic semiconductor self-sufficiency, these companies will potentially find themselves nipped if China seeks reprisals against those that stood by the Act.

Second*, reconfiguration* is an essential response, describing an MNE's efforts to realign its global posture with new geopolitical conditions. Through the approach, firms aim to maintain evolutionary fitness by adjusting certain parts or regions of global operations in response to fundamental changes in geopolitics (Witt, 2019). This reconfiguration is a strategic adaptation to both

opportunities (from geopolitical cooperation) and threats (from geopolitical competition). To achieve so, MNEs may limit their internationalization efforts to friendly territory – that is, geopolitically aligned host countries or markets that uphold good ties with the home country (Petricevic & Teece, 2019). They can also augment their flexible architecture for global operations, signifying that critical components, technologies, designs, and production are not overly dependent on a few focused nations that preserve malignant political relations with other countries wherein the MNE has a vast strategic stake. Alternatively, they may strengthen regionalization – that is, putting more investment emphasis on neighboring countries of the firm's global hubs that hold friendly or cooperative ties with the home country. From a cost-benefit perspective in response to trade wars and protectionist policies, MNEs benefit by regionalizing their operations (Van Assche & Gangnes, 2019).

Third*, resilience* is a pivotal response to geopolitical techno-nationalism. To cope with geopolitical shocks and chronic stresses associated with the Act, foresight that accommodates extreme uncertainties becomes a scarce tacit knowledge that can guide the firm towards recovery and transformation from these shocks. In a world of complex geopolitical changes, a rigid, deterministic plan will not be adequate for long (Zahra, Petricevic & Luo, 2022). But making everything flexible can be an expensive and messy path, too. MNEs can cement their own geopolitical resilience by focusing more investment on cooperative areas between states, working with corporate peers to advocate for viable national policies, and relocating strategic investments from geopolitically risky countries to "neutral" ones that connect strongly with home, host, and other countries (Luo, 2022; Verbeke, et al., 2018). This approach requires geopolitical experience, quality networks and partnerships, structural agility, and resilient leadership.

Finally, *corporate diplomacy* is an important response, especially for those MNEs that have a high stake and power of influence in shaping techno-geopolitical conditions. This diplomacy differs from lobbying with legislative, regulatory and governmental institutions as it extends to representation, communication, negotiation, and other approaches that are often employed in the international diplomatic field (Doh, Dahan & Casario, 2022). In fact, the Act itself is the product of

strong lobbying by some US companies which want to US government protection and funding (NPR, 2022). Viable corporate diplomacy must be carried out by representatives - senior executives and business diplomacy professionals at the headquarters, regional offices and critical foreign markets, and also shared by related departments such as government affairs, risk management, and communications. To the extent possible, leading technology players from developed countries can also work together and take joint actions to defuse some techno-geopolitical disruptions or foster collaboration with various stakeholders. In fact, the European Chips Act, after such collective efforts by technology MNEs in the region, focuses more on market rationality and market segments that leverage the EU's high-skilled workplaces and world-class research system, and in which the EU has either already developed a comparative advantage or will not find itself at an initial disadvantage (Hancke & Calvo, 2022). Figure summarizes our general framework that illustrates the IB implications from the Act.

CONCLUDING REMARKS

The future of the international liberal order hinges on the ability of major geopolitical and geo-economic powerhouses, US and China in particular, to lead and support it, yet recent policy actions such as the US Chips and Science Act suggest that the US government's willingness to assume this leadership role is wavering. The Act embraces subsidies that would likely be disputed at the WTO which has played a crucial role over the past twenty-five or so years in mediating international trade disputes and preventing damaging cycles of tariffs and retaliation outside internationally agreed upon rules and arbitration. Subsidies are expected to cause significant material injury to foreign chips producers that will have to compete with US-subsidized products in foreign markets. The Act is also openly mercantilist by requiring firms that receive funding to decouple their global value chains from China. Taken together, the Act spells a move towards geopolitical techno-nationalism in American IB policy.

It is too early to say that the Act signals the end of the liberal international order. The US decision to take up geopolitical techno-nationalism has in large part been a reaction against China's own developmental techno-nationalism, and this leaves room for negotiation between the two geopolitical rivals. It is unlikely that either the US or China want to see complete decoupling or the collapse of the multilateral system due to the high economic costs that would impose on themselves. Both parties may therefore be willing to limit the most extreme forms of beggar-thy-neighbor mercantilism, while preserving the legitimate quest for countries to protect national security. They may choose to keep the principles of openness, rules and multilateral collaboration that are at the heart of the liberal international order from which they both benefited, while allowing more latitude in the design of industrial policies. Considering the current tensions between both countries, however, such a negotiation will not be for tomorrow.

In the meantime, MNEs will need to carefully consider how the new techno-geopolitical uncertainty influences their global operations. Several geo-strategic responses we have outlined provide a first line of defense that MNEs will need to adopt to deal with the new global reality. Still, there are various challenging issues to be tackled by IB scholars as geopolitical fracture is continuously exacerbated by one event after another. As populism and authoritarianism rose in parallel and in confrontation, the existing world order was imperiled, resulting in constant new challenges for MNEs. As we stated, aggressive realism, now the dominant doctrine to handle geopolitics in numerous countries (US in particular), escalates (if not originates) the world order fracture. The impact of such fracture and related tensions on the global economy, international order, and international businesses will reverberate for years, even decades, to come, presenting many important questions for IB scholars to ruminate.

REFERENCES

Allison, G. 2017. *Destined for War: Can America and China Escape Thucydides's trap*? New York: Houghton Mifflin Harcourt.

Beitz, C. 1997. *Political Theory and International Relations*, Princeton: Princeton University Press.

Bloomberg, 2022. New Chips Act could become a $280 billion boondoggle. https://www.bloomberg.com/opinion/articles/2022-08-01/chips-and-science-act-could-become-a-280-billion-boondoggle.

Bown, C. 2020. How the United States marched the semiconductor industry into its trade war with China. *East Asian Economic Review*, *24*(4), 349-388.

Bown, C. P. 2020b. How Trump's export curbs on semiconductors and equipment hurt the US technology sector. *Trade and Investment Policy Watch*. https://www.piie.com/blogs/trade-and-investment-policy-watch/how-trumps-export-curbs-semiconductors-and-equipment-hurt.

Bown, C. P., & Hillman, J. A. 2019. WTO'ing a Resolution to the China Subsidy Problem. *Journal of International Economic Law*, *22*(4), 557-578.

Brzezinski, Z. 2012. *Strategic Vision: American and the Crisis of Global Power*. New York, NY: Basic Books.

Buckley, P. J. 2011. International integration and coordination in the global factory. *Management International Review*, 51(2): 269–283.

Buckley, P. J., Clegg, L. J., Cross, A. R., Liu, X., Voss, H., & Zheng, P. 2007. The determinants of Chinese outward foreign direct investment. *Journal of International Business Studies*, *38*(4), 499-518.

Calhoun, G. 2022. Semiconductor: the CHIPS Act. Is it really necessary? (Part 3) https://www.forbes.com/sites/georgecalhoun/2021/11/29/semiconductors-the-chips-act--is-it-really-necessary-part-/?sh=81ff4d3de936

Capri, A. 2022. CHIPS on the table: US doubles down on techno-nationalism. Hinrich Foundation, https://www.hinrichfoundation.com/research/article/tech/chips-us-techno-nationalism.

Doh, J. P., Dahan, N. M., & Casario, M. 2022. MNEs and the practice of international business diplomacy. *International Business Review*, 31(1), 101926.

Doshi, R. 2021. *The long game: China's grand strategy to displace American order*. Oxford University Press.

Economy, E. 2022. *The World According to China*. John Wiley & Sons.

Evenett, S. J. 2019. Protectionism, state discrimination, and international business since the onset of the Global Financial Crisis. *Journal of International Business Policy*, *2*(1), 9-36.

Farrell, H., & Newman, A. L. 2020. Chained to globalization: Why it's too late to decouple. *Foreign Affairs*, 99 (1): 70-80.

Featherstone, M. 1990. *Global Culture: Nationalism and Modernity*. London: SAGE.

Gereffi, G., Humphrey, J., & Sturgeon, T. 2005. The governance of global value chains. *Review of international political economy*, *12*(1), 78-104.

Guillén, M. F. 2018. *Rude Awakening*. Philadelphia: University of Pennsylvania Press.

Harput, H. 2022. What do the friends of friend-shoring think its rationale is? Global Trade Alert. https://www.globaltradealert.org/reports/95

Hsieh, C.-T. 2021. Countering Chinese industrial policy is counterproductive. *Project Syndicate,* https://www.project-syndicate.org/commentary/america-misguided-economic-strategy-toward-china-by-chang-tai-hsieh-2021-09.

Huntington, S. P. 2011. *The Clash of Civilizations and the Remaking of World Order*. New York, NY: Simon & Schuster Paperbacks.

Ikenberry, G. J. 2018. The end of liberal international order? *International Affairs*, *94*(1), 7-23.

Irwin, D. A., & Klenow, P. J. 1996. High-tech R&D subsidies Estimating the effects of Sematech. *Journal of International Economics*, *40*(3-4), 323-344.

Kim, S. H., & Kim, S. 2022. China's contestation of the liberal international order. *The Pacific Review*, 1-26.

Krueger, A. 2022. American CHIPS off the Chinese block. *Project Syndicate*, https://www.project-syndicate.org/commentary/chips-act-subsidies-will-undermine-semiconductor-competition-and-innovation-by-anne-o-krueger-2022-08.

Li, J., Van Assche, A., Li, L., & Qian, G. 2022. Foreign direct investment along the Belt and Road: A political economy perspective. *Journal of International Business Studies*, *53*(5), 902-919.

Lin, J., & Chang, H. J. 2009. Should industrial policy in developing countries conform to comparative advantage or defy it? *Development Policy Review*, *27*(5), 483-502.

Luo, 2022. Illusions of techno-nationalism. *Journal of International Business Studies,* 53(3):550-567.

Mansfield, E. D. 1994. *Power, Trade, and War*. Princeton, NJ: Princeton University Press.

Mavroidis, P. C., & Sapir, A. 2021. *China and the WTO*. Princeton: Princeton University Press.

Mearsheimer, J. 2001. *The Tragedy of Great Power Politics*. New York, NY: W.W. Norton & Company.

Meier, G. & Rauch, J. 2000. *Leading Issues in Economic Development*. 7th Edition, New York: Oxford University Press.

Meyer, K. E. 2004. Perspectives on multinational enterprises in emerging economies. *Journal of International Business Studies,* 35:259–276.

Moffitt, B. 2016. *The Global Rise of Populism: Performance, Political style, and Representation*. Stanford, CA: Stanford University Press.

Moisio, S. 2018. *Geopolitics of the Knowledge-based Economy*. New York, NY: Routledge.

Montresor, S. 2001. Techno-globalism, techno-nationalism and technological systems: Organizing the evidence. *Technovation,* 21(7): 399-412.

Narula, R., Asmussen, C. G., Chi, T., & Kundu, S. K. 2019. Applying and advancing internalization theory: The multinational enterprise in the twenty-first century. *Journal of International Business Studies*, *50*(8), 1231-1252.

NPR, 2022. Why Biden's plan to boost semiconductor chip manufacturing in the US is so critical. *NPR Report*, August 12, 2022.

Petricevic, O. & Teece, D.J. 2019. The structural reshaping of globalization: Implications for strategic sectors, profiting from innovation, and the multinational enterprise. *Journal of International Business Studies,* 50: 1487-1512.

Porter, M. 1998. *Competitive Advantages of Nations*. New York, NY: Free Press.

PwC, 2022. The CHIPS Act: What it means for the semiconductor ecosystem. https://www.pwc.com/us/en/industries/tmt/library/chips-act.html.

Schuler, D. A., Rehbein, K., & Cramer, R. D. 2002. Pursuing strategic advantage through political means: A multivariate approach. *Academy of Management Journal*, 45(4), 659-672.

Sutherland, D., Anderson, J., Bailey, N., & Alon, I. 2020. Policy, institutional fragility, and Chinese outward foreign direct investment: An empirical examination of the Belt and Road Initiative. *Journal of International Business Policy*, *3*(3), 249-272.

Van Assche, A. & Gangnes, B. 2019. Global value chains and the fragmentation of trade policy coalitions. *Transnational Corporations Journal* 26(1):31-55.

Verbeke, A., Coeurderoy, R. & Matt, T. 2018. The future of international business research on corporate globalization that never was. *Journal of International Business Studies*, 49:1101–1112.

Weiss, J. C., & Wallace, J. L. 2021. Domestic politics, China's rise, and the future of the liberal international order. *International Organization*, *75*(2), 635-664.

Wight, M. 1991. *International Theory: Three Traditions*, Leicester: University of Leicester Press.

Witt, M.A. 2019. De-globalization: Theories, predictions, and implications for international business research. *Journal of International Business Studies*, 50(7): 1053-77.

Zahra, S., Petricevic, O. & Luo, Y. 2022. Toward an action-based view of dynamic capabilities for international business. *Journal of International Business Studies*, 53(4): 583-600.