



Journal of Contemporary Eastern Asia
ISSN 2383-9449

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Journal of Contemporary Eastern Asia Vol. 20, No. 2: -
DOI: 10.17477/jcea.2021.20.2.0

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Asymmetric Interdependence and the Selective Diversification of Supply Chains

Stephen R. Nagy¹, Hanh Nguyen²

The COVID-19 pandemic has highlighted the risks of an over-concentration of supply chains in one country. It has motivated stakeholders to pursue diversification strategies. However, a paradox exists. Stakeholders have shied away from a complete decoupling and preferring to selectively enhance economic ties with China. This article explores this paradox by examining supply chain concentration in China as a form of asymmetric interdependence and the countermeasures from the U.S., Japan, Australia, and India to minimize vulnerabilities. It argues that while the COVID-19 disruptions have brought to light the risk of supply chain overconcentration in China, countermeasures are also driven by coercive diplomacy and the deepening U.S.-China rivalry. The paper also examines the feasibility of diversification efforts by focusing on the capacity and capabilities of alternative supply chain hubs. It finds that while states are actively seeking ways to prevent China from using asymmetric interdependence of supply chains and trade to gain political leverage, there are structural limits to the degree of diversification in the short to mid-term.

Keywords: asymmetric interdependence, supply chain, U.S.-China competition, Indo-Pacific, supply chain diversification

1. Introduction

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The COVID-19 pandemic brought global economic activities and supply chains to a standstill in 2020 (Xu, Elomri, Kerbache, & El Omri, A., 2020). Supply chain disruption associated with the pandemic, an increased use of economic coercion and its impact brought attention the opportunities and challenges of an over concentration of supply chains in China (Uren, 2020). As a response, governments pursued both domestic and international efforts to diversify supply chains. Japan announced subsidies to encourage businesses to either enhance their domestic manufacturing or diversify production networks to Southeast Asia (Takeo & Urabe, 2020). The Biden administration signed an executive order to conduct a review on supply chains critical to U.S. national security (White House, 2021a). Australia, Japan and India recently launched the Supply Chain Resilience Initiative (RSCI), which aims to share best practices regarding diversification and match suppliers (METI, 2021).

However, there are developments contrary to this trend. Despite rhetoric on diversification, governments have not announced or enacted tangible measures to re-orient supply chains substantially. Furthermore, countries continue to push forward with the trade liberalization agenda. In November 2020, 15 countries, including members of the Association of Southeast Asian Nations (ASEAN), China, Japan, South Korea, Australia and New Zealand, signed the Regional Comprehensive Economic Partnership (RCEP) (ASEAN, 2020). In December 2020, the European Union also announced the conclusion of negotiations for a new investment deal with China called Comprehensive Agreement for Investment (CAI) (European Commission, 2020). These developments raise questions about the credibility and the extent of supply chain diversification efforts. Furthermore, the business community has not shown enthusiasm for governments' efforts. A survey conducted by the American Chamber of Commerce in China revealed that 83% of participants did not plan to move production chains out of China (AmCham China, 2020).

These developments are also not fully explained by international relations theories such as structural realism and liberal institutionalism. Given structural realism's preoccupation with power distribution and related security implications to states, diversification of supply chains might be construed as sensible efforts to reduce states' vulnerabilities, thus improving their position in the balance of power. Nevertheless, it cannot explain the current trend of creating even wider trade networks, exemplified by RCEP and CAI agreements. Similarly, since liberal institutionalism emphasizes how institutions and economic connections can establish interdependence among states, mitigating the power of states, the conclusion of new trade agreements is a vindication for the continued march of globalization despite recent setbacks. However, it failed to take stock of the need for supply chain diversification to strengthen them against external shocks, whether they are natural disasters, man-made crises, or calculated geopolitics in the cases of economic coercion.

With this contradiction in mind, this paper addresses the paradox of: Why do countries want to re-orient supply chains out of China? Why do these countries, at the same time, enhance economic ties with China? To bring light to these questions, the authors will perform a detailed analysis of the drivers and challenges to supply chain diversification. It finds that the concentration of supply chains in China represents a form of asymmetric interdependence, which China can wield as a coercive tool to secure strategic gains vis-à-vis other states. Diversification is thus based on four factors. First, diverse and widely dispersed supply chains will be less vulnerable to the sudden and dramatic impact of “black swan” events, such as the COVID-19

pandemic in 2020 or the 2011 Tohoku earthquake. Second, China's employment of economic coercion compelled other countries to review the risk of closer economic ties with China, especially whenever their interests do not align with China's. Third, the intensifying Sino-U.S. rivalry runs the risk of creating a bifurcated system with wide-reaching consequences such as disrupting global supply chains, rising production costs, and reduced economic growth. Finally, structural issues in China's economy, such as growing labor cost, protectionist policies and upcoming demographic winter, diminish China's status as an unrivaled manufacturing hub.

Despite these concerns, there are limits to what governments can do in the short to midterm to reduce their vulnerabilities and minimize their asymmetric interdependence with China. First, China retains several structural advantages for businesses, such as a growing middle class, a large, skilled labor force, a highly developed logistic ecosystem, and the government's efforts to improve the business environment for foreign investors. Consequently, China remains a top priority for firms and governments, both as a highly profitable consumer market and as a critical manufacturing hub. Second, reshoring the entire supply chains to home countries is economically impractical. Third, alternative locations in Southeast Asia also have their constraints. They either do not have the comparable capacity or need to deal with critical bottlenecks such as lack of skilled labor, poor infrastructure and a reliance on Chinese parts and components (Nagy and Nguyen, 2020).

Instead of characterizing supply chain diversification as an attempt to disengage with China or a step to rewind globalization, it is akin to a hedging strategy. Countries and businesses want the benefit of continued engagement with China, but they are wary about the potential risks of overreliance. Therefore, the goal is to build a diverse and secure network of supply chains that are resilient to harmful effects of economic interdependence. In reality, several businesses have followed this approach by adopting "China plus one" strategy, in which businesses diversify their investments and supply chains to other countries while continuing to operate in China.

This paper employs a comparative methodology. It evaluates the strengths and weaknesses of ASEAN and China as global supply chain hubs, using the World Economic Forum's Global Competitiveness Index which include factors such as market size, workforce skill, infrastructure, business environment and innovation capability. These factors provide a whole picture of China and ASEAN's comparative advantages, thus giving insight into how international businesses have not left China en masse in search of new production locations despite risks of supply chain concentration. They also illustrate why Southeast Asian states are unable to replace China as a central hub for production networks. To further support these arguments, this paper analyzes Japan's trade and investments with China and ASEAN at three critical junctures. As a leading investor in both China and ASEAN, especially in the manufacturing sector, the activities of Japanese businesses are a good indicator for supply chain trends.

This paper will be structured in five sections. The first part offers a theory-based review on interdependence. Then it will take stock of hitherto efforts to diversify supply chains in the wake of the COVID-19 pandemic and the rationales behind this effort. The third section identified challenges to diversification efforts while the fourth part analyzes Japan's trade and investment data in China and ASEAN. Finally, the last part summarizes the paper's findings.

2. Complex Interdependence and Supply Chain Disruption

The economic boom after World War II led to the emergence of a new trend in the global economy, where countries became increasingly connected through the cross-border flow of people, goods, information, and ideas. Growing interconnectedness between countries and regions blurred the line between domestic and foreign policies. This new phenomenon, called "interdependence," is "the growing sensitivity in economic transactions between two or more nations to economic developments within those nations" (Cooper, 1972, p. 159). To Cooper, economic interdependence implies a two-way sensitivity between nations, meaning one nation cannot enjoy benefits from growing interconnectedness without exposing itself to a certain degree of dependence. Keohane and Nye further strengthened the concept of "complex interdependence," which they described as a fragmented polity where growing interdependence between states diffused power and leveled hierarchy in international relations (Keohane & Nye, 2012). With more players and connections, varying issues and states' goals, shifts emerged in the power distribution while military power no longer enjoys dominant position. Even though Keohane and Nye acknowledged that complex interdependence led to increased sensitivity and vulnerability, they asserted that countries attempting to manipulate interconnectedness for their benefits would face particular challenges, such as the constraints of international norms or implications to their dependence (Keohane & Nye, 2012).

Complex interdependence also has its detractors. In documenting how Nazi Germany manipulated interdependence from foreign trade, Hirschman emphasized that in an interdependent relationship, while both sides would be affected in case of dispute, some would lose more than the other (Hirschman, 1945). This asymmetric vulnerability occurs when one side gains disproportionate leverage over the others and is the source for friction (Wright, 2013). Complex interdependence also creates and enforces enduring power asymmetry (Farrell & Newman, 2019). Commercial pursuit of efficacy and market power creates self-reinforcing network topologies, where certain actors are located at the center of the network, possessing a higher level of connection and enjoying a greater degree of dependency from other players (Farrell & Newman, 2019). In this case, certain states can weaponize the global networks for their benefits, with the support of network structures and their domestic institutions, by gleaning critical knowledge from information flows (panopticon effect) or deny access to the hub for third parties (chokepoint effect).

Even though Darrell and Newman used the U.S. dominance in financial and communication networks as an example, their theory can also be applied to the concentration of supply chains. Supply chains emerged during the New Globalization, in which ICR revolution in the 1990s lowered communication costs significantly, thus facilitating the global dispersion of manufacturing previously tied to consumer markets (Baldwin, 2016). Offshoring and supply chains transformed the nature of trade and comparative advantages among nations and facilitated the great transfer of know-how and economic prosperity from developed nations to a small group of developing countries. More and more industries adopted highly integrated global supply chains to maximize comparative advantages of many production locations and allocate scarce resources more efficiently (Abe & Ye, 2013; Henderson & Nadvi, 2011).

This trend also increased the complexity of supply chains, leading to systemic risks, where risks from one node of the production process spread to the entire system (Haraguchi &

Lall, 2014). The impact of supply chain disruption is rarely one-dimensional since it affects not only suppliers but also the government, financial institutions and consumer markets. A typical cause is natural disasters. For instance, the Thailand floods and the East Japan earthquake and tsunami in 2011 unleashed severe and widespread damage to manufacturing plants, resulting in a shortage of critical parts and components in many industries, such as specialty paint and microcontrollers for the automobile industry, forcing manufacturers to cease operation or reduce capacity at other plants (Congressional Research Service, 2011). Stalled production also pushed down national GDP and led to price increase, for example desktop and mobile hard disk drive produced in Thailand (Kajitani, Chang, & Tatano, 2013; Haraguchi & Lall, 2014).

Scholarship on asymmetric interdependence has so far focused on the impact of this phenomenon in sectors like trade and energy, and to a certain extent, finance and communication. Simultaneously, information and communication technology, wage gap, trade and transportation costs were identified as factors shaping supply chains (Baldwin, 2012). This paper attempts to connect two sets of scholarship by adding a political dimension, arguing that the overconcentration of supply chains in China represents a form of asymmetric interdependence, which can be weaponized in political disputes or to achieve strategic gains.

3. Drivers for Supply Chains Diversification

Since its re-opening to the global economy in 1979, China has grown to become a manufacturing hub for many sectors and global businesses. In 2018, China accounted for 13.45% of global exports, ahead of the U.S. (8.98%) and Germany (8.43%) (China Power a). In the same year, China already contributed 28% of global manufacturing output, followed by the U.S. (16.6%) and Japan (7.2%) (Richter, 2020). Figure 1 shows manufacturing output by China and the world in a 10-year period from 2009-2019 when China consistently accounted for about 1/6 to 1/4 of global manufacturing output. China's manufacturing capacity is diverse, playing an essential role in a wide range of global value chains, from industries requiring a sophisticated level of technology such as precision instrument, automotive ad communication equipment, to industries with low added values such as chemicals, textiles and apparent (UNCTAD, 2020).

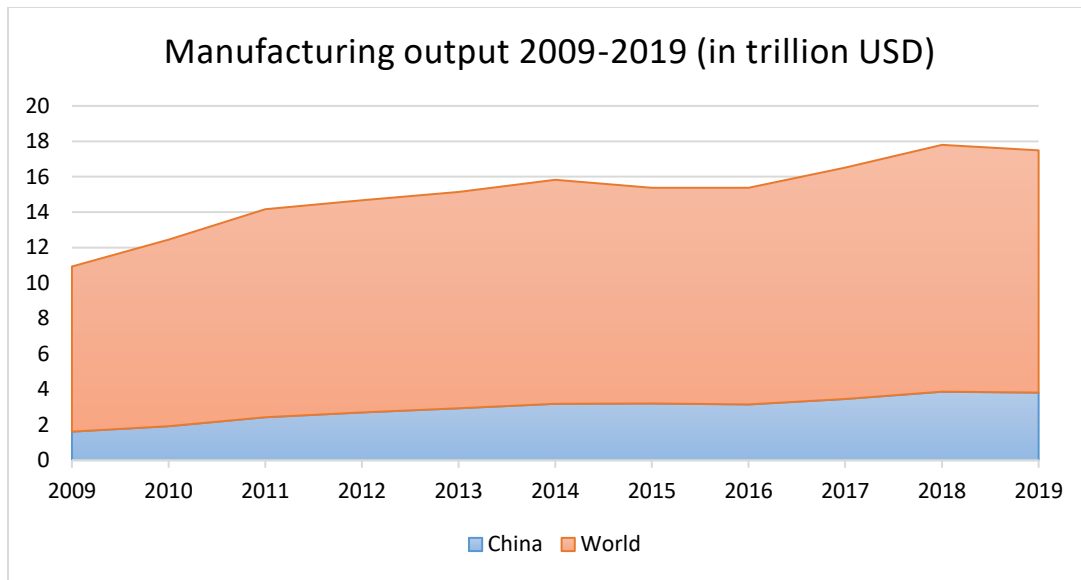


Figure 1. Manufacturing output 2009-2019 (in trillion USD)

**output measured on a value-added basis in current USD*

Source: Authors' compilation based on data provided by World Bank

Nevertheless, this level of supply chain concentration in China brought inherent risks. First, there is the looming risk of “black swan” events, whether they are natural disasters or man-made crises. The COVID-19 pandemic recently served as a warning of the risks associated with production networks overly concentrated in one country. Movement restrictions and factory closure led to a shortage of parts and components, forcing other factories to either slow production or cease operation. Furthermore, disruptions during a pandemic had severe consequences regarding the supplies of medical equipment. Given that the U.S. relies on China for supplies of personal protective equipment (PPE) such as gloves or hospital gowns, active pharmaceutical ingredients and commonly used drugs, the PPE shortage in the U.S. at the beginning of the pandemic came as no surprise as factories could not immediately accommodate a massive influx in demand (Runde & Ramanujam, 2020; Lincicome, 2020).

Second, China also has established record of engaging in economic coercion, using access to its enormous market and asymmetric trade ties to “punish” other countries when their actions do not align with China's interests. Reasons for China's coercive actions vary, from territorial disputes (Japan and the Philippines), support for American alliance network (South Korea), hosting and awarding prizes for political dissidents (Norway and Mongolia) to countering China's influence (Australia) (Harrell, Rosenberg & Saravalle, 2018; Nagy, 2013). These actions were met with a combination of Chinese coercive measures, including export and import restrictions, popular boycotts, corporate pressure and tourism restrictions. While China has avoided restrictions on imports that are critical to its economic growth and the value of lost exports to China of targeted countries was relatively inconsequential, its measures still inflicted significant damage for individual exports and economic sectors (Glaser, 2021). Behind the increased use of economic statecraft is Chinese leaders’ re-evaluation of interdependence. China has long adopted an ambivalent attitude toward engagement and interdependence, where it extracts the benefits of engagement but shields itself from subsequent destabilizing effects of

interdependence (Boustany & Friedberg, 2019). Xi Jinping's rise to power has shifted this balance towards a greater emphasis on risk-minimization and the deployment of dependencies as a coercion tool towards other countries (Gewirtz, 2020a). The recently introduced dual circulation policy embodies this intention as it aims to boost China's innovation to wean itself off dependence on foreign technology while increasing dependence of other countries on China (Hass 2021; Blanchette & Polk 2021).

Third, the U.S.-China rivalry also brought new uncertainties to bilateral economic engagement with widespread repercussions to global supply chains. Even though the Biden administration toned down the harsh rhetoric towards China, it has not lifted any of Trump's trade tariffs and investment restrictions. Furthermore, restrictions against Chinese tech firms remained in place while the U.S. recently announced more targeted sanctions against Chinese officials involved in human rights abuses in Xinjiang and Hong Kong (Soo, 2021). In response, China has not changed its tariff policy on American exports and imposed tit-for-tat sanctions on U.S. officials (BBC, 2021). A recent review of the U.S.-China economic relationship noted that China appeared to be diversifying its trade and investment linkages away from the United States while maintaining a high degree of interdependence in the technological area (Segal & Gerstel, 2021). This sign, along with China's recent dual circulation policy, signaled that China is preparing for a protracted competition.

While a complete decoupling is unlikely given the level of interconnectedness between China and the U.S., some degree of disentanglement will be the main feature for U.S.-China relations in the future (Boustany & Friedberg, 2019). Businesses will face higher tariffs and potential coercive measures, raising the cost of doing business and disrupting their supply chains. Proposed restrictions to slow the diffusion of critical technology to China and regulate the inward flow of Chinese goods, capital and people to the U.S. will further hamper investment flow and diminish economic engagement. In the extreme case, businesses might need to duplicate and localize supply chains for two different markets, thus further raising production costs and reducing economic growth (Nagy, 2019). A survey by the American Chamber of Commerce in China revealed that 28% of businesses cited "uncertainties in the US-China economic relationship and bilateral tariffs" as the main reason for paring down investment plans in China, with tech companies being the most affected by tariffs (AmCham China, 2020).

Fourth, structural issues in China's economy also compel businesses to move production chains to other countries long before the COVID-19 pandemic. The foremost issue is higher wage. In a 10-year-period, China's minimum wage more than doubled from 1,120 CNY/month to 2,480 CNY/month in 2020 (from 173 USD/month to 385 USD/month) (Trading Economics a). In particular, wages in the manufacturing sector rose from 36.665 CNY/year in 2010 to 78.147 CNY/year in 2020 (from 5,693 USD/year to 12,125 USD/year) (Trading Economics b). Higher labor costs will cut into business revenues and reduce profits, with the hardest hit being labor-intensive industries. Government policy is also another reason for companies to diversify their supply chains out of China. Even though China has actively addressed several complaints of foreign businesses, such as market access barriers, enforcement of intellectual property rights, or equal treatment for all investors, concerns still linger among international investors despite their acknowledgment of China's efforts (AmCham China, 2020; EuroCham China, 2020).

Furthermore, China's fast-fading demographic dividend further complicates business plans. Its population in the age range of 50 and older is set to increase at least 250 million, while the under-50 population might decrease at a comparable scale (Eberstadt, 2019). The most consequential impact of this development is an increasingly shrinking workforce, which means businesses will have more difficulties attracting employees, especially for positions with low pay, little benefits and poor working conditions. Labor shortage for labor-intensive jobs has become more frequent in China, forcing companies to move inland for rural workers, lower-wage countries in South Asia and Southeast Asia, or adopt industrial robots (Hsu, 2015; Roberts 2020).

4. Challenges to Supply Chains Diversification

After the outbreak of the COVID-19 pandemic, several countries have announced initiatives to review and diversify supply chains. Since 2020, the Japanese government has earmarked billions of USD to help Japanese firms shift production chains back home or Southeast Asia (Takeo & Urabe, 2020; Nohara, 2021). These subsidies proved to be a boon for companies involved in highly specialized manufacturing, especially the chipmaking industry (Regalado, 2021). The Biden administration recently ordered a comprehensive review of supply chains critical to U.S. national security (White House, 2021a). However, one could argue that American trade tariffs against China under the Trump administration could amount to a unilateral effort to compel firms to diversify their supply chains (Kawanami & Shiraishi, 2019). India, whose pharmaceutical sector is heavily reliant on active pharmaceutical ingredients imported from China, also took measure to enhance their supply chain resilience. For example, New Delhi unveiled Production Linked Incentive (PLI) scheme in March 2020 to boost domestic production of key starting material, drug intermediates, active ingredients and medical devices (Thacker, 2020). It later removed the minimum investment criteria and expedited approval process to encourage global players to join the scheme and nurture national champions from local manufacturers (The Pharma Letter, 2021).

Efforts to shore up and diversify supply chains do not stop at the national level. Japan, Australia, and India recently launched the Resilience Supply Chain Initiative (RSCI), which aims to share best practices, promote investment and facilitate buyer-seller matching (Australia's Department of Foreign Affairs and Trade, 2021). Furthermore, while supply chain diversification did not appear in the Quadrilateral Security Dialogue's summit statement, Quad members are implicitly committed to diversifying communication equipment suppliers through public-private cooperation (White House, 2021b).

Efforts to diversify supply chains face significant challenges. Despite security risks, China retains certain advantages for doing business there. It boasts an enormous consumer market, driven by a rising middle class with growing appetites for luxury products, travel and healthcare. China has the fastest-growing middle class among emerging economies, swelling from 39,1 million people in 2000 to around 707 million people in 2018 (China Power b). As China's economy continues to grow in the near term, albeit at a slower rate, the Chinese middle class is expected to rise to 1,2 billion people by 2027, accounting for one-quarter of the global middle class (Kharas & Dooley, 2020). As a result, China will continue to attract more foreign firms to set up business there. It has already become the most important market for many multinational companies both in terms of supply chains and revenues. China's skilled workforce

also makes it more challenging for firms to leave. Despite intermittent labor shortages and rising wages, China has sufficiently skilled labor to assume challenging tasks and produce high-quality products. The 2019 Global Competitiveness Report by World Economic Forum can provide a detailed comparison on how China performs regarding labor skill vis-à-vis other countries:

Table 1

Comparison of skills of the current workforce

	China	Switzerland	U.S.
Score	59.4	78.2	71.7
Rank/141	37th	1st	5th
Sub-categories			
Extent of staff training	58.3	79	72.3
Quality of vocational training	58.9	90.8	70.7
Skillset of graduates	59.1	81.4	71.2
Digital skills among active population	61	74.4	72.2
Ease of finding skilled labor	59.7	65.4	72.1

Source: Authors' compilation based on 2019 Global Competitiveness Report

According to Figure 3, China's score is above average in all five sub-categories regarding labor skills. In comparison with top performers like Switzerland and the U.S., China does not lag too far behind. Furthermore, the Chinese government has been investing heavily in vocational training to boost labor skills (Aredy, 2019). China is keenly aware that it can no longer rely on cheap labor to attract foreign investment and a higher-skilled workforce will serve its ambition to become an unrivaled technological powerhouse.

Business also require other factors beyond labor and the consumer market. One crucial factor is infrastructure. Since 1978, China has pursued a growth model based on fixed-asset investment (primarily into infrastructure) and low-wage/low-end manufacturing for export (Shambaugh, 2016). This model is an astonishing success, which catapulted China into modernity and lifted billions of people out of poverty. Another major benefit is the improvement and expansion of China's transport infrastructure. In a 30-year period, China's investment in transport infrastructure increased from a paltry 8.02 billion RMB in 1978 to 609.1 billion RMB in 2008 (Yu, De Jong, Storm, & Mi, 2012). Investment in infrastructure also became a national priority after the 8th Five-Year Plan (1991-1995) (Xiao, Lin, Fu, & Wang, 2020). The result is impressive. By 2018, China has 4.85 million kilometers of roadway, 143,000 kilometers of expressway, 131,000 kilometers of national railway and 29,000 kilometers of express railway (Xiao et al., 2020). Enormous improvement and expansion of transport infrastructure contributed to China's rapid economic growth, allowing it to attract foreign investment and develop a domestic suppliers network for the manufacturing industry. A comparison with other countries also revealed the fruits of China's infrastructure investment drive. China excelled in road connectivity, airport connectivity and liner shipping connectivity with the highest score. It also scored above average in the efficiency of air transport and seaport services and the quality of

road infrastructure. China's total score of 68.9 puts it at 24th out of 141 countries, not too far behind top performers like Singapore and the U.S.

Table 2

Comparison of transport infrastructure across several countries

	China	Singapore	U.S.
Total score (0-100)	68.9	91.7	79.6
Rank/ 141	24 th	1st	12th
Sub-categories			
Road connectivity	95.7	n/a	100
Quality of road infrastructure	59.7	90.9	74.5
Railroad density	17.9	100	41.3
Efficiency of train services	59	80.1	69.2
Airport connectivity	100	85.4	100
Efficiency of air transport services	60.7	95.5	79.6
Liner shipping connectivity	100	100	96.7
Efficiency of seaport services	58.6	90.8	75.9

Source: Authors' compilation based on 2019 Global Competitiveness Report

China accelerated regulatory reforms to facilitate a conducive business environment. According to World Bank's Doing Business Index, China has achieved substantial improvements in multiple areas such as securing construction permits, getting electricity, enforcing contracts and trading across borders (World Bank, 2020). Consequently, China's total score went from 65.29 (78th/190) in 2018 to 77.9 (31th/190) in 2020, which is a significant boost. This can be attributed to China's enthusiasm for reform as the government adopted the Doing Business Index as a benchmark in the national reform agenda and created multiple working groups addressing each of the Doing Business indicators (World Bank, 2020).

A lack of credible alternatives also complicates diversification efforts. A 2020 survey conducted by the American Chamber of Commerce showed that among companies that already started the relocation process or considered doing so, 59% picked developing Asian countries as the most preferred location, followed by the U.S. (22%) and Mexico (17%) (AmCham China, 2020). Southeast Asia, which includes many developing nations, is receiving attention from global businesses, including high-tech giants. Several of Apple's suppliers, including Foxconn and Pegatron, have expanded their production sites in Vietnam, while Samsung recently announced a major research & development investment in Hanoi (Hille, 2019; Khanh Vu, 2020). In 2019, multinationals like Sony, Harley-Davidson and Sharp Corp. also moved their production lines to Thailand (Industry Week, 2019). Indonesian President Widodo also announced that Panasonic and LG Electronics would move part of their facilities to the island nation (Parama, 2020).

Nevertheless, while Southeast Asia can assume some parts of the global supply chains, it would be naïve to think the region can fully replace China as the next manufacturing hub.

Southeast Asia's working force, numbered at around 350 billion people, is about half of China's (ASEAN Post 2018). This means the region can only absorb some of China's manufacturing capacity. Due to several development challenges. Furthermore, many Southeast Asian nations face critical development challenges that prevent them from competing with China for foreign investment. Figure 5 showed the level of competitiveness among several Southeast Asia nations based on the World Economic Forum's assessment. Even though labor cost in Southeast Asia is generally lower than in China, the level of workforce skill is uneven across member states. While Singapore's workforce is considered the top performer, backed by a world-class education system, the skill level in other Southeast Asian states ranges from average to substandard.

Regarding infrastructure, Singapore is again the top performer while Thailand, Indonesia and Vietnam's scores are on the average side. A baseline estimation by the Asian Development Bank showed Southeast Asia needs \$2,759 billion from 2016 to 2030 to cover its infrastructure need, an average of \$184 billion per year (Asian Development Bank, 2017). Investment and business activities also need a conducive environment enabled by legislation and innovation capability. While Singapore is considered the best place in these areas, Indonesia and Thailand's performance is only above average. Cambodia and Vietnam are the worst performers. The region's low score in innovation capability will be a major drawback as technologies create significant changes in the global economy.

Table 3

Global competitiveness of China and Southeast Asia

	Singapore	Thailand	Indonesia	Vietnam	Cambodia	China
Overall rank/141	1 st	40th	50th	67th	106th	28th
Institutions	80	55	58	50	42	57
Infrastructure	95	68	68	66	55	36
Labor skill	79	62	64	57	43	64
Market size	72	76	82	72	48	100
Innovation capability	75	44	38	37	31	65

Source: Authors' compilation based on 2019 Global Competitiveness Report

Southeast Asia also relies on Chinese intermediate goods for its exports. China is Southeast Asia's most important trade partner, while the region recently replaced the U.S. as China's leading trade partner. As the economies of China and Southeast Asia have increasingly intertwined with each other, both sides also became close partners in the regional production network. Electrical machinery, equipment, and parts thereof are ASEAN's leading exported goods to and imported goods from China. Their share in the total volume of exports and imports has been consistently in the range of 25-30% (ASEAN Secretariat, 2018, 2019, 2020). This circumstance presents a new dilemma for international businesses: Even if they diversify their supply chains to Southeast Asia, they still rely on parts and components supplied from China. This means their business operations are still exposed to disruption risks, albeit at a lower degree.

4.1 impact of external shocks

This section analyzes Japan's trade and FDI flows with China and ASEAN at three different junctures, illustrating the challenges to supply chains diversification and the fact that Southeast Asia is unlikely to replace China as a central manufacturing hub. Each juncture represents a phase in which political and economic disputes exposed the risk of supply chain concentration and forced investors and businesses to contemplate manufacturing relocation. Japan was chosen because it has been one of the leading investors for both China and Southeast Asia and was heavily involved in creating an East Asian production network. Since Japan and China have been embroiled in territorial disputes about the sovereignty of the Senkaku Islands in the East China Sea, political tensions between two countries in 2010 and 2012 provided opportunities to examine the impact of external shocks on supply chains. In this sense, the ongoing U.S.-China trade disputes also represent another external shock to supply chain networks in China, which play a critical role in producing goods for the U.S. market.

4.1.1 First period (2009-2011)

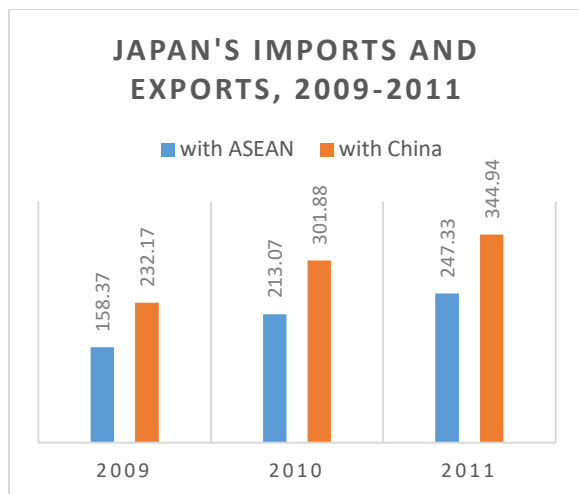


Figure 2. Japan's imports and exports, 2009-2011 (in billions of US dollars)

Source: Japan External Trade Organization, Japanese Trade and Investment Statistics

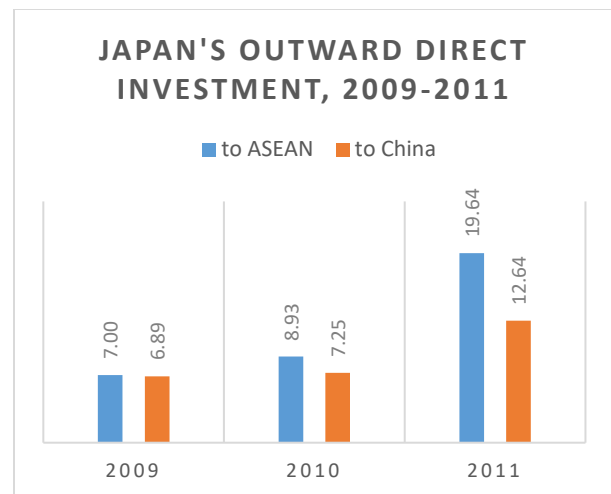


Figure 3. Japan's outward direct investment, 2009-2011 (balance of payments, in billions of US dollars)

Source: Japan External Trade Organization, Japanese Trade and Investment Statistics

In this period, territorial disputes between Japan and China over the Senkaku Islands re-emerged after a Chinese fishing trawler collided with Japanese Coast Guards' vessels in September 2010, leading to the detention of the Chinese skipper. Anti-Japanese protests broke out in several Chinese cities, where protesters vandalized Japanese businesses and smashed the windows of Japanese-brand cars (Liang, 2010). China also halted all shipments of Japan-bound rare earth elements, which are critical for making technology products such as electric car batteries. Since China accounted for over 90 percent of the global output of rare earth elements at

that time, the move was seen as an act of economic retaliation (Areddy, Fickling, & Shirouzu, 2010).

However, political tensions did not significantly impact Japan's trade with China as exports and imports volume grew from 301 billion USD in 2010 to 344 billion USD a year later. Trade data continued a recovery trend after the 2008 global financial crisis. Japan's trade with ASEAN countries also increased in this period, but it is still lower than the China trade. Nevertheless, the uptick in Japan's direct investment in China, from 7.2 billion USD in 2010 to 12.6 billion USD in 2011, is significantly lower than the jump in Japan's investment in Southeast Asia. Particularly, ASEAN countries saw a double increase of Japan's investment from 8.9 billion USD to 19.6 billion USD.

4.1.2 Second period (2012-2014)

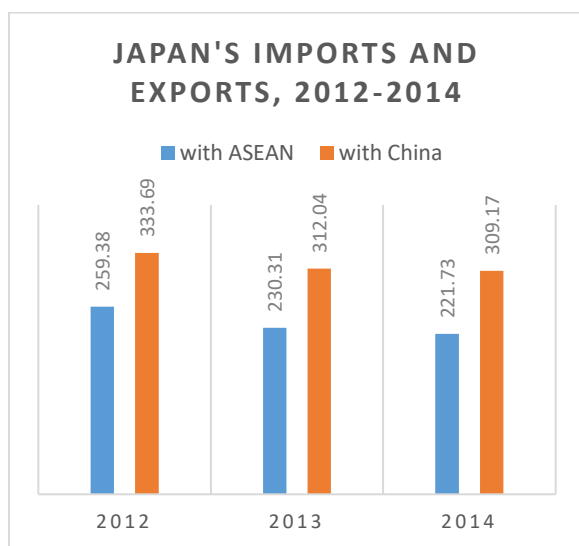


Figure 4. Japan's imports and exports, 2012-2014 (in billions of US dollars)

Source: Japan External Trade Organization, Japanese Trade and Investment Statistics

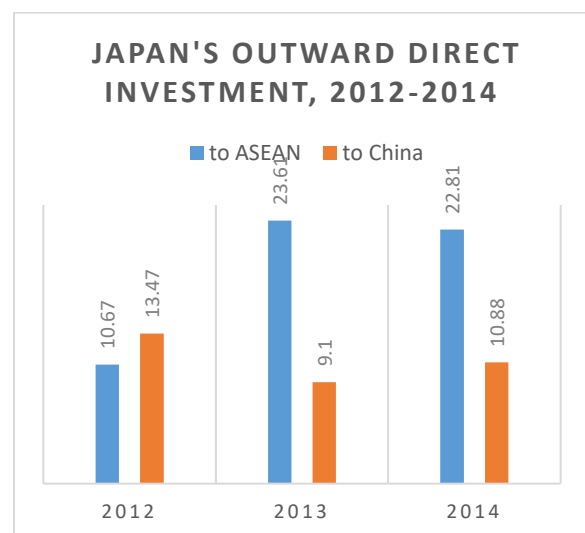


Figure 5. Japan's outward direct investment, 2012-2014 (balance of payments, in billions of US dollars)

Source: Japan External Trade Organization, Japanese Trade and Investment Statistics

Japan-China tensions rose again in 2012 after the Japanese government decided to nationalize three islets within the Senkaku Islands. This time, Japan's action was met with an even stronger reaction from China. Anti-Japanese protests erupted in hundreds of Chinese cities as nationalist protesters attacked Japanese stores and restaurants and vandalized Japanese automobiles (French 2017). Factories of Japanese multinationals were ransacked, leading to a temporary suspension of production. For example, Honda shut down all five assembly plants in China; Sony suspended operations in seven factories while Nissan closed two of its factories (International Business Time, 2012).

Compared to the first period, the 2012 disputes have a significant impact as more Japanese businesses were attacked and suspended operations. Images of angry protesters

attacking and looting factories must have left a strong impression on Japanese investors as investments in China declined to 9.1 billion USD in 2013, a significant decrease compared to the 2012 value of 13.4 billion USD. In striking contrast, Japan's 2013 FDI in ASEAN more than doubled from the previous year, surging from 10.6 billion to 23.6 billion USD. Even though the number diminished slightly to 22.8 billion USD in 2014, it was still remarkably higher than Japan's FDI in China, which totaled only 10.8 billion. Trade data provided a less clear picture as Japan's trade volume with China did not experience a noticeable downturn. Japan traded slightly less with China in 2013, from 333.6 billion USD to 312 billion USD, and this downward trend continued in 2014. Similarly, Japan's trade with ASEAN also went through a declining process in the same period.

4.1.3 Third period (2018-2020)

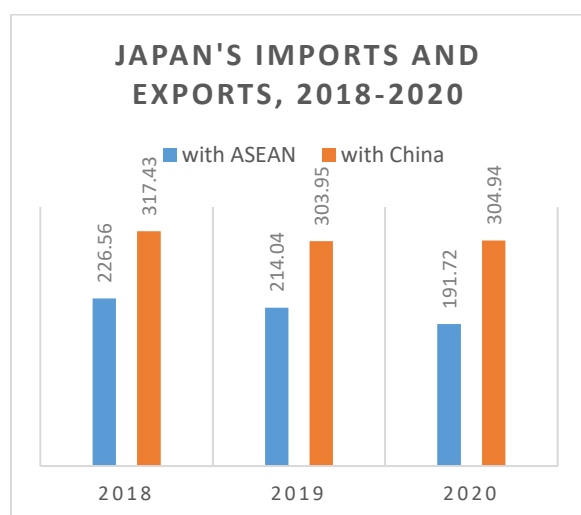


Figure 6. Japan's imports and exports, 2018-2020 (in billions of US dollars).

Source: Japan External Trade Organization, Japanese Trade and Investment Statistics

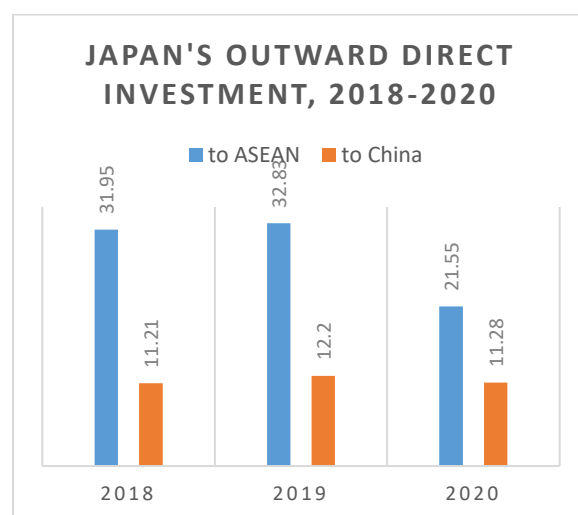


Figure 7. Japan's outward direct investment, 2018-2020 (balance of payments, in billions of US dollars).

Source: Japan External Trade Organization, Japanese Trade and Investment Statistics

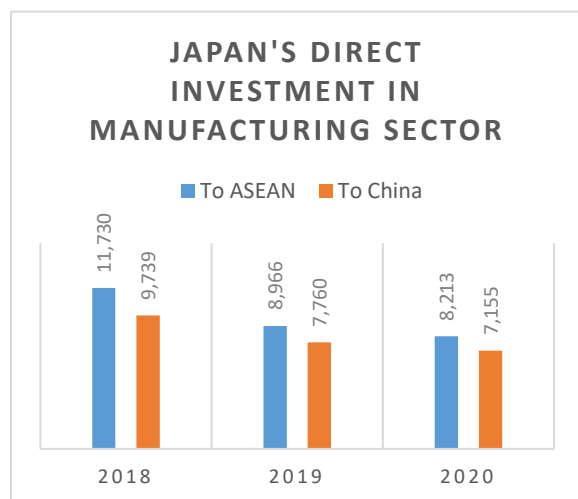


Figure 8. Japan's direct investment in manufacturing sector (balance of payments, in 100 million yen)

Source: Japan's Ministry of Finance, Balance of Payments

Starting from March 2018, U.S. President Donald Trump initiated the trade war with China by approving safeguard tariffs on solar panels and washing machines. The move precipitated a series of tit-for-tat reactions, igniting concerns among businesses about the risk of supply chain concentration in China (Bown & Kolb, 2018). Later, the COVID-19 pandemic further exacerbated these worries as lockdowns and movement restrictions forced factories in China to suspend operation, creating a short-term disruption in the supply side (Shih, 2020). These risks apparently convinced political leaders of the need to diversify supply chains, leading to both national and international attempts to shore up supply chains against external shocks.

Japan is also pursuing supply chains diversification by subsidizing its firms to relocate back home or to Southeast Asia. However, trade and FDI data in this period raise doubt over whether these efforts would succeed. A year after the trade war began, Japan's trade with China dipped just slightly from 317.4 billion USD in 2018 to 303.9 billion USD in 2019. Even with the widespread impact of the pandemic in 2020, bilateral trade volume increased to 304 billion USD. At the same time, Japan's trade with ASEAN decreased gradually in this period to 191.7 billion USD in 2020. Regarding FDI, data indicates only a slight increase in Japan's investment in China and ASEAN after 2018 before declining in 2020. However, the decline in ASEAN-bound investment was more significant than China-bound investment. Japan's FDI in the manufacturing sector in China and ASEAN also showed no significant change in value and investment destination.

5. Alternative Strategies?

Taking into account of Japan's trade and FDI data, it is not difficult to understand China's allure to international investors and businesses. In particular, they created a unique advantage that is challenging for other countries to replicate. China's enormous market, relatively educated labor with reasonable cost, testing ground for new technologies, sufficient infrastructure and complex supplier network provide opportunities for both lower-priced manufacturers from developing countries and value-added products from advanced economies (Nagy & Nguyen, 2020).

Business sentiments reflect this analysis accurately. The 2019 China Business Climate Survey, conducted by the American Chamber of Commerce in China, showed that 83% of respondents do not consider relocating manufacturing or outsourcing outside of China, up from 80% in 2018 and 77% in 2017 (AmCham China, 2020). They acknowledged that China had achieved significant improvements in the investment environment and enforcement of intellectual property rights. They also expressed optimism about market growth, profitability potential and regulatory environment. For over 50% of respondents, China remains a top priority for global investment plans. The 2020 Business Confidence Report by the European Union Chamber of Commerce in China echo these views with 89% of respondents said they do not consider shifting current or planned investment out of China, following a consistent trend since 2013 (EuroCham China, 2020). However, respondents expressed a more skeptical attitude towards China's business environment, believing that Chinese companies continue to get better market access and receive better treatment than their foreign counterparts.

Among companies that consider or have already started the process of relocation, the diversification pattern is uneven. Businesses in resources and industrial sectors are more likely to move out of China (25%), followed by technology and R&D intensive industries (19%), consumer (16%), and services (8%) (AmCham China, 2020). This unevenness in diversification rate reflects concerns of firms and states that critical industries related to industrial manufacturing and technology are more likely to be exposed to disruptions, sanctions and restrictions as the U.S.-China strategic competition heightens. Diversification efforts have indeed focused on industries and technologies deemed critical to a country's national security. Consumer manufacturing and services are less likely to be affected and production activities in China will largely serve the Chinese market.

These developments reflect a strategy increasingly adopted by multinational firms called "China plus one" strategy. Simply put, businesses diversify their investments and supply chains to other countries while continuing to operate in China at the same time (Iida, 2015). Firms have been contemplating or moving parts of their production chains out of China long before the COVID-19 pandemic for various reasons: rising wages, increased frequency of labor disputes, disappearing tax incentives, and fear of reprisals for business decisions against China's interests (Witchell & Symington, 2013). Japanese firms were among the first to adopt this strategy due to a combination of the aforementioned risks and recurring political tensions between China and Japan (Iida, 2015). The worst crisis in bilateral relations to date, related to territorial disputes over the Senkaku Islands, led to large-scale anti-Japanese demonstrations and attacks against Japanese businesses in China in 2012.

There are certainly other approaches. Some companies try to hold the line by either moving production lines or opening new facilities in China's interior, which is less economically developed with lower labor cost (Witchell & Symington, 2013). However, the trade-off is higher transportation cost, which is only acceptable for businesses catering to the Chinese market. Furthermore, the COVID-19 pandemic and U.S.-China strategic competition will lead to an even

greater risk for businesses in the future. Consequently, more and more companies, especially multinational firms, will pursue the “China plus one” strategy to hedge against risks.

6. Conclusion

This paper offers a systematic analysis of the drivers and challenges to supply chain diversification. It argued that the concentration of production network in China represents a form of asymmetric interdependence, which puts stakeholders at significant risk. They range from unexpected disruptions from external shocks, China’s use of economic coercion, the U.S.-China rivalry and structural issues in China’s economy. Conscious of these risks, many of them predated the COVID-19 pandemic, political leaders and business executives responded with a range of initiatives aiming to diversify supply chains to other countries. Nevertheless, the odds are stacked against these efforts. China remains a top priority for investors as a highly profitable consumer market and a critical manufacturing hub due to several advantages. Simultaneously, alternative destinations in South Asia and Southeast Asia face certain development challenges to compete with China. In the near term, companies are thus more likely to adopt a “China plus one” strategy, in which they operate additional facilities in other countries with lower business costs yet still maintain a significant presence in China.

Acknowledgement

The authors received no financial support for the research, authorship, and/or publication of this article.

Declaration of conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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