

Trade Partner Diversification and Changes in Asymmetric Trade Dependence

Zhanming Hu

Jingqiao Education, Xiangtan City, Hunan Province, China

Abstract

Trade partner diversification is often treated as evidence that economic dependence has declined. In global supply chains, however, a change in direct suppliers may leave important parts of the original relationship intact. Hirschman's analysis of foreign trade and national power explains why limited alternatives can place one country in a weaker position when a trade relationship is disrupted, while Farrell and Newman's network approach helps explain why dependence can remain in important upstream positions even after bilateral trade changes. Japan's rare-earth diversification after 2010 illustrates both problems. Japan expanded its sources through overseas projects, long-term supply agreements, recycling, technologies that reduced rare-earth use, and especially the Australia-Malaysia supply chain developed around Lynas. These measures gave Japanese firms more ways to respond to disruption, although their effects differed across projects and stages of production. China remained much harder to replace in refining, heavy rare earths, and permanent-magnet production. The Japanese experience shows that diversification reduces asymmetric dependence most clearly when new relationships create enough production capacity to replace the parts of the original supply chain that had been difficult to replace.

Keywords

Asymmetric trade dependence; trade partner diversification; supply-chain diversification; rare earths; Japan.

1. Introduction

International trade creates interdependence, although the risks are rarely distributed evenly. A country with several reliable sources can adjust to disruption more easily than one that relies on a single supplier for an essential industrial input. The difference becomes especially important when substitutes are limited and a shortage can affect industries far beyond the product itself. In these situations, the importance of a trade relationship comes partly from the economic benefits it creates and partly from the difficulty of continuing without it.

Trade partner diversification is one common response to this vulnerability. Firms can reduce purchases from a dominant supplier and develop relationships with producers elsewhere. A lower bilateral import share clearly records a geographical change in trade, but it says much less about the production chain behind the goods that eventually reach the importer. Raw materials may come from one country, processing may take place in another, and the final product may arrive through a third. Sometimes the new supplier brings genuinely separate production capacity. In other cases, the country listed as the direct exporter changes while the same upstream source remains essential.

A decline in direct trade can therefore occur faster than a decline in actual dependence. The difference depends on what the new relationships can provide when the original source becomes uncertain. A small supplier may be useful in normal trade without being able to cover a serious shortage. A larger and more established source can change the consequences of

disruption by keeping part of the importing country's production operating. Third-country connections can also have different meanings. They may preserve hidden dependence when they lead back to the original supplier, or they may form part of a genuine alternative when they provide independent mining, processing, or other critical functions.

Japan's rare-earth experience after 2010 makes these distinctions particularly visible. Japan entered the period with a highly concentrated supply structure and later developed projects in Australia, Malaysia, Vietnam, the United States, and India. Japanese firms also invested in recycling and technologies that reduced the use of particular rare-earth elements. According to Japan's Ministry of Economy, Trade and Industry (METI), China's share of Japan's rare-earth imports fell from 85 percent in 2009 to 58 percent in 2020 (Ministry of Economy, Trade and Industry). That decline provides clear evidence of direct trade diversification. The more difficult question is how far the underlying dependence changed with it. The answer differs across suppliers and across stages of the rare-earth value chain.

2. Asymmetric Trade Dependence and Alternatives

The weakness in an unequal trade relationship often becomes visible when one side tries to replace the other. Large trade flows can indicate that a partner is economically important, but they do not fully explain how costly it would be to lose that relationship. Albert O. Hirschman develops this problem in *National Power and the Structure of Foreign Trade*. His analysis connects foreign trade with national power by showing how one country can gain influence when the other has fewer alternatives and faces greater difficulty adjusting to the loss of trade (Hirschman 13-52). The important feature of the relationship is therefore not simply its size. The distribution of available choices matters as well.

Suppose Country A relies heavily on Country B for an essential product. Adding Country C improves A's position only if C can replace a meaningful part of the lost supply. A supplier that provides only small quantities under normal conditions may add another trade relationship without greatly reducing the consequences of a serious disruption. The effect of diversification depends on whether the new source can provide enough material, whether that supply is reliable, and whether it remains available when the main relationship is placed under pressure. A supply structure may appear diversified under normal conditions and prove far less flexible when the main source is disrupted. This also explains why similar changes in bilateral trade shares can correspond to different changes in dependence. One country may redirect imports toward several smaller suppliers that still rely on the same upstream source. Another may make a smaller change in its trade pattern while developing one supplier capable of replacing a substantial share of lost production. The second country can gain greater room to adjust even when the visible change in trade is less dramatic.

Hirschman's bilateral framework becomes less complete once the apparent alternative is itself embedded in a longer production chain. Strategic materials may be mined in one country, refined in another, and incorporated into components elsewhere before reaching the final user. The direct exporter can therefore represent only one visible part of a much wider production relationship. In industries with several specialized stages, changing the final supplier may leave an earlier bottleneck untouched.

Farrell and Newman extend this analysis beyond bilateral trade by focusing on the positions countries occupy within wider economic networks. Their concept of "weaponized interdependence" explains how control over central network positions can create leverage when other actors depend on access to those positions (Farrell and Newman 42-79). Their theory was not developed specifically for rare-earth supply chains, but its network perspective remains useful when one country is difficult to bypass at a critical stage of production. A

network can look geographically broad while still depending heavily on a small number of important nodes.

A new supplier can therefore create two different outcomes. It may open a separate route around the original partner, giving the importer a genuine alternative. It may also leave the same bottleneck further upstream. If several suppliers continue to depend on one processor, the number of bilateral relationships has increased while an important source of vulnerability remains.

This distinction becomes clearer when trade partner diversification is separated from supply-chain diversification. Trade partner diversification changes the countries from which goods are purchased directly. Supply-chain diversification changes the production routes behind those purchases. New contracts may alter trade flows relatively quickly, while mines, processing facilities, technical capacity, and logistics often require years of investment. Direct purchasing patterns can therefore change long before the capacity behind them is able to replace the original source.

For asymmetric dependence, this difference is central. New partners matter when they reduce the difficulty of maintaining supply without the original partner. The visible number of suppliers is useful evidence, but the deeper change lies in the choices that remain available when the relationship is disrupted.

3. Direct Trade and Actual Dependence

Once dependence is understood through the ability to replace a relationship, the meaning of reduced dependence becomes more concrete. A country becomes less exposed when the loss of its main supplier produces a smaller disruption than it would have produced before. This improvement can come from several directions. Another foreign producer may supply part of the missing material. Domestic recycling can recover material already inside the country. Technological substitution can reduce the amount of a difficult input required in production. These responses appear differently in trade statistics, but they all affect the economic cost of losing the original source.

Trade partner diversification is therefore only one part of a broader adjustment. If a manufacturer reduces its use of a scarce material by half, its exposure can decline even when its list of suppliers does not change. The same is true when recycling provides an additional domestic source. Conversely, a country may add several foreign suppliers without gaining much protection if those suppliers are too small or depend on the same processing stage.

The development stage of an alternative also affects its value. A memorandum announcing future cooperation creates a possible source, while an operating mine provides current production. Even an operating producer may have little spare capacity during a sudden shortage. These differences matter because a project can appear in a diversification strategy long before it becomes capable of replacing lost supply. The time between an agreement and stable production is therefore part of the dependence problem itself.

Different stages of production create a similar complication. A new mine may reduce reliance on one raw-material source while separation and refining remain concentrated. A country can also diversify common materials while remaining dependent on a smaller quantity of a specialized element. The trade volume of a product does not necessarily identify the part of the chain that would be hardest to replace.

As alternatives become stronger, the asymmetry described by Hirschman can weaken even if ordinary trade continues. The original supplier may remain commercially important, yet the importing country now has more room to adjust if the relationship is disrupted. Reduced dependence does not require the disappearance of trade. It requires a change in how costly the loss of that trade would be.

Japan's post-2010 strategy included several forms of adjustment at the same time. Overseas projects attempted to widen raw-material supply, commercial agreements improved access to producers outside China, recycling recovered rare earths already within the Japanese economy, and material-saving technologies reduced the need for some difficult-to-source elements. The Japan External Trade Organization (JETRO) recorded all of these approaches in its 2012 review of Japanese rare-earth measures (Japan External Trade Organization 32). Their effects differed because they addressed different parts of the same vulnerability.

4. Case Study

4.1. Japan's Rare-Earth Supply Diversification

At the beginning of the 2010s, Japan's rare-earth imports were highly concentrated on China. METI later reported that China accounted for approximately 85 percent of Japan's rare-earth imports in 2009 (Ministry of Economy, Trade and Industry). Rare earths were important to Japanese manufacturing, including automobiles, electronics, motors, and high-performance magnets. The problem was not only the size of the Chinese share. Japan had few alternative sources that could replace a large amount of supply quickly.

The uncertainty surrounding Chinese rare-earth supply in 2010 made this weakness much more visible. Japanese firms had to consider how production could continue if the dominant source became unreliable. The response that followed was broader than simply finding a second country. JETRO's 2012 report lists overseas resource projects, long-term supply relationships, reduced-use technologies, and recycling as major parts of Japan's strategy (Japan External Trade Organization 32).

Toyota Tsusho and Sojitz, for example, concluded a memorandum with Vietnam's Lai Chau-VIMICO Rare Earth Company for joint development of the Dong Pao mine. Hitachi Metals entered a master supply agreement with the American producer Molycorp, which controlled the Mountain Pass mine in California. Toyota Tsusho also planned rare-earth oxide production with Indian Rare Earth at an expected annual scale of roughly 3,000 to 4,000 tons (Japan External Trade Organization 32). These projects widened the range of countries from which Japan might obtain rare earths, but they did not all create the same amount of immediate replacement capacity.

The difference matters because an announced project and a functioning supply chain do not change dependence to the same degree. A memorandum for future mine development expands long-term possibilities. An agreement with an existing producer may provide material sooner. A source that combines stable production, processing, and long-term delivery can offer stronger protection when another supplier is disrupted. Japan's overseas projects therefore represented different stages of diversification rather than equivalent alternatives.

The Lynas project developed furthest in this direction. In March 2011, JOGMEC and Sojitz agreed to provide Lynas with US\$250 million through loans and equity. The agreement allocated at least 8,500 tonnes of rare-earth products per year to the Japanese market for ten years, which JOGMEC described at the time as approximately 30 percent of the Japanese market ("Sojitz and JOGMEC"). The scale of the agreement gave Japan access to a source large enough to change the consequences of losing part of its Chinese supply.

The production structure behind the agreement was equally important. Lynas was developing the Mount Weld mine and concentration plant in Western Australia together with separation and refining capacity in Malaysia. JOGMEC identified Mount Weld Mining as responsible for mining and concentration and Lynas Malaysia as responsible for separation and refining ("Sojitz and JOGMEC"). Japan therefore gained access to a route in which both the resource and a major processing stage were outside China.

Malaysia's role shows why third-country involvement cannot be treated as evidence of hidden dependence by itself. A third country can preserve the original dependence when it simply re-exports material that still relies on the original supplier. It can also strengthen diversification when it performs a necessary production stage outside that original route. Australian ore was not enough on its own; it had to be processed into products that Japanese manufacturers could use. Malaysian processing was therefore part of the alternative rather than a superficial change in trade geography.

The Australia-Malaysia chain also illustrates why the number of countries involved says little by itself. A longer international supply chain can still reduce dependence if its stages form a separate and usable route. At the same time, several direct suppliers can provide limited protection if all of them rely on the same upstream bottleneck. What matters is the structure connecting the suppliers, not simply the nationality of the final exporter.

Japan's diversification also worked from the demand side. JETRO reported that Shin-Etsu Chemical commercialized production facilities capable of halving dysprosium use for certain high-performance magnets. METI selected 49 projects in fiscal year 2011 to support reduced or substituted use of rare earths and rare metals, including projects involving motors that used less or no dysprosium. Honda and Japan Metals & Chemicals also developed a mass-production recycling process for rare-earth material recovered from used nickel-hydrogen batteries (Japan External Trade Organization 32).

These measures changed dependence in a different way. A manufacturer that uses less dysprosium needs less replacement supply during a disruption. Recycling creates another source from material already inside the country. Neither measure necessarily produces a new trade partner, so a narrow analysis of import shares would miss part of the adjustment. The International Energy Agency later estimated that Japan's total rare-earth demand became 30 percent lower than its 2010 level following demand-side policies and industry responses (International Energy Agency). This reduction made the supply problem itself smaller even before considering new foreign producers.

The change in direct trade was still substantial. METI reports that China's share of Japan's rare-earth imports declined from 85 percent in 2009 to 58 percent in 2020 after measures that included upstream development projects and resource-saving research (Ministry of Economy, Trade and Industry). This represents a clear decline in bilateral concentration. It also provides a useful point of comparison with the changes taking place inside the supply chain.

Lynas remained important well beyond the immediate response to 2010. In March 2023, JOGMEC and Sojitz announced an additional AUD 200 million investment in the company. The plan included expanded light rare-earth production and the start of heavy rare-earth separation. Under the agreement, up to 65 percent of the dysprosium and terbium produced by Lynas from Mount Weld feedstock would be supplied to Japan ("Securing Supply").

By 2023, the remaining problem had become more specific. A stronger non-Chinese supply route already existed, but dysprosium and terbium remained much harder to replace. The later investment therefore addressed a different weakness from the broad geographical concentration that had dominated Japan's earlier response. Diversification had improved some parts of the chain more quickly than others.

The wider structure of the rare-earth industry explains why this unevenness persisted. The International Energy Agency estimates that China accounted for 60 percent of global mined production of magnet rare earths in 2024. Its share was much higher in later stages, reaching 91 percent in refining and 94 percent in sintered permanent-magnet production (International Energy Agency). Mining and downstream processing were therefore concentrated to very different degrees.

For Japan, this means that lower direct imports from China can coexist with continued dependence on Chinese capacity elsewhere in the industry. New mines can reduce reliance at the raw-material stage while refining or magnet production remains difficult to bypass. The category "rare earths" hides these differences because dependence does not have the same structure across every product and production stage.

Japan's response gradually became a combination of different alternatives rather than a single replacement strategy. Overseas mines could widen raw-material supply, the Lynas chain provided a more developed mining-and-processing route, recycling reduced additional import needs, and material-saving technologies lowered demand for especially constrained elements. No single measure had to reproduce the entire Chinese rare-earth industry.

Their value still depended on how much each option could do during a real disruption. Lynas became particularly significant because actual production capacity developed behind the commercial relationship. Projects at an earlier stage offered more limited immediate protection. Demand-side measures provided another kind of protection by reducing the amount of supply that needed to be replaced. Japan's diversification therefore changed both the sources of rare earths and the scale of the vulnerability it was trying to manage.

4.2. Changes in Asymmetric Trade Dependence

Japan's experience supports Hirschman's emphasis on alternatives while also showing that the effectiveness of those alternatives varies considerably. A planned project and an established production chain may both expand the number of potential suppliers, yet they do not provide the same protection against disruption. An additional supplier produces only a limited change in dependence when its capacity is too small to absorb a significant shortage.

Trade shares remain useful for measuring the geographical concentration of normal purchases. They are less able to show how an importing country would respond to the loss of its dominant supplier. Japan's experience indicates that production capacity becomes especially important under these conditions. Lynas altered Japan's position more substantially because an operating mining and processing route developed behind the agreement.

Farrell and Newman's network perspective explains why direct supplier diversification may still leave important parts of the original dependence intact. Several countries can appear as separate suppliers while relying on the same processing facility or specialized input. Geographical diversification can therefore increase without an equivalent reduction in vulnerability. The key question is whether the new relationship bypasses the position that made the original partner difficult to replace.

Country-level measures also conceal important differences across the rare-earth supply chain. Japan developed alternatives to Chinese mining more quickly than alternatives in refining, heavy rare-earth separation, and permanent-magnet production. Dependence therefore exists not only between countries but also within particular production functions. A country can become easier to replace in one function while remaining central in another.

This functional perspective also changes how third-country connections should be interpreted. Malaysia strengthened Japan's alternative because it processed Australian material within a separate supply route. A third country that merely re-exported material still dependent on Chinese processing would have produced a very different result. The existence of an intermediary country is therefore less important than the function that country performs in the chain.

Japan's later investments reflect these differences. The earlier Lynas project strengthened a non-Chinese mining and processing route, while the 2023 investment focused more directly on dysprosium and terbium, where alternatives remained weaker. Diversification progressed through different parts of the supply chain at different speeds rather than occurring once when another trading partner appeared.

This process did not remove Japan's dependence on foreign production. Mines, processing facilities, transport networks, and international commercial relationships remained necessary. The main change was that disruption in one relationship became less damaging where another workable supply route had developed. Interdependence remained, while the vulnerability created by extreme concentration declined in parts of the chain.

The same development affects the asymmetry described by Hirschman. China can remain a major supplier while becoming less difficult to replace in the parts of the supply chain where credible alternatives exist. Bilateral trade may remain substantial even after the importing country has gained greater freedom to respond to disruption. A decline in dependence therefore does not require economic separation from the original partner.

Japan's experience also shows why diversification should not be judged as an all-or-nothing outcome. The change was substantial at some stages and limited at others. Direct import concentration fell, new production capacity appeared outside China, and Japanese firms reduced part of their demand. At the same time, refining, heavy rare earths, and magnet production remained highly concentrated in China. Both developments can be true within the same supply relationship.

The broader implication is that trade partner diversification reduces asymmetric dependence most clearly when new suppliers reach the parts of the supply chain that originally made the dominant partner difficult to replace. Where new capacity remains limited or continues to rely on the same upstream bottleneck, changes in direct trade can overstate the reduction in actual dependence. Where the new relationship provides a separate and usable production route, even continued trade with the original partner can take place under a less asymmetric structure.

5. Conclusion

Japan's rare-earth diversification after 2010 shows that a change in trading partners can produce a real reduction in asymmetric dependence without eliminating the original economic relationship. Japan developed new overseas sources, supported the Australia-Malaysia Lynas chain, expanded recycling, and encouraged technologies that reduced the use of constrained rare-earth elements. These responses gave Japanese firms more ways to manage a disruption in Chinese supply.

The results were uneven across the supply chain. China's share of Japan's rare-earth imports fell substantially, and non-Chinese raw-material supply became more important. Heavy rare earths and several downstream stages remained much more concentrated. The change in direct trade was therefore larger and faster than the change in some of the underlying production functions.

A new trading partner matters most when it gives firms a workable option they did not previously have during a shortage. Its effect becomes stronger when the new route also avoids the processing stage, specialized input, or other bottleneck that originally made one supplier difficult to replace. A partner that changes only the final trade route has a much smaller effect on actual dependence.

Japan continued to trade with China after diversification, and China remained central to the global rare-earth industry. What changed was Japan's ability to respond if part of that supply disappeared. Where alternative capacity had developed, the economic consequences of disruption became easier to absorb. Where critical functions remained concentrated, dependence stayed stronger. Trade partner diversification therefore changes asymmetric dependence according to how far it makes the original relationship realistically replaceable, not simply according to how far bilateral trade falls.

References:

- [1] Farrell, H., & Newman, A. L. (2019). Weaponized interdependence: How global economic networks shape state coercion. *International Security*, 44(1), 42–79. https://doi.org/10.1162/isec_a_00351
- [2] Hirschman, A. O. (1945). *National power and the structure of foreign trade*. University of California Press. <https://doi.org/10.1525/9780520378179>
- [3] International Energy Agency. (2026). Rare earth elements. <https://www.iea.org/reports/rare-earth-elements>
- [4] Japan External Trade Organization. (2012, August 9). 2012 JETRO global trade and investment report. https://www.jetro.go.jp/ext_images/en/reports/white_paper/trade_invest_2012_overview.pdf
- [5] Japan Oil, Gas and Metals National Corporation, & Sojitz Corporation. (2011, March 30). Sojitz and JOGMEC enter into definitive agreements with Lynas including availability agreement to secure supply of rare earths products to Japanese market. Japan Organization for Metals and Energy Security. https://www.jogmec.go.jp/english/news/release/release_00373.html
- [6] Japan Organization for Metals and Energy Security, & Sojitz Corporation. (2023, March 7). Securing supply of heavy rare earths to Japan with additional investment to Lynas. Japan Organization for Metals and Energy Security. https://www.jogmec.go.jp/english/news/release/release_00228.html
- [7] Ministry of Economy, Trade and Industry. (2025). White paper on international economy and trade 2025. <https://www.meti.go.jp/english/report/data/wp2025/wp2025.html>