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Title:

"Comparative Advantage and the Dependency Dilemma"

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Comparative Advantage and the Dependency Dilemma

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Abstract

This research examines the geopolitical ramifications of a peculiar aspect of the theory of comparative advantage. When countries specialize according to their comparative advantage, they become more dependent on one another. The degree of dependency can vary from low to high, involving goods that are of great or lesser importance to society. Such dependencies can create geographical and geopolitical risks. Thus, the increased productivity from free trade must be weighed against potential increases in risk, which might suggest trade interventions or restrictions that mitigate those risks.

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1. Introduction

The theory of comparative advantage explains how countries benefit from specializing in the production of goods and services for which they are the low opportunity cost provider and trading with countries that are the low opportunity cost providers of other goods or services. This theory shows that specialized production and trade creates efficiency gains that allow all countries to benefit from being involved in specialization and trade relationships.

Notwithstanding the benefits of cross-country trade, the realities of the world imply that economic interdependence involves a series of tradeoffs, which means a more nuanced consideration of the overall benefits of free trade is in order. While trade can encourage cooperation and peaceful relations between nations, it can also exacerbate vulnerabilities by concentrating the production of essential goods in the hands of other nations. From this perspective, disruption in supply chains or deterioration in diplomatic relations could have severe consequences, ranging from economic turmoil to geopolitical instability. With free trade, it is possible, for example, that one country becomes specialized in the production of one or just a few goods, thereby becoming fully dependent on other countries for the provision of many other essential goods that are not available domestically. A country facing this kind of risk may well choose to manage trade in such a way as to enable it to source essential goods from a diversified group of countries or possibly even to produce some amount of the good internally, notwithstanding its lack of comparative advantage in the production of this good.

The tradeoff between geographical or geopolitical risk and production efficiency is the topic of this paper. The paper is divided into four sections. The next section describes the Ricardian model of comparative advantage with particular attention paid to the issue of

dependence. Section 3 provides a historical perspective of the agonizingly drawn-out modern attempt to promote the free-trade mantra among countries that care about more than worldwide productivity. Section 4 presents some examples of important instances when dependence on a trading partner created economic or geopolitical turmoil.

2. The Ricardian Model: Gains from Trade, Specialization, & Dependence

The Ricardian Model, developed by David Ricardo (1817) is the classical theory that explains comparative advantage and the benefits trade. According to this model, a country should specialize in the production of the good for which it is the low opportunity cost producer. If all countries do this, world production is maximized and there is more to go around, benefiting all countries that take part in the international trading system.

It should be noted that a country need not be a better producer of a good than another country to benefit from specialization and trade. The term *absolute advantage* is used to describe a situation in which one country is more efficient overall in the production of a particular good. One country can have an absolute advantage or an absolute disadvantage in the production of all relevant goods, but it is comparative advantage or opportunity costs that determine the benefits from trade. The principle of comparative advantage and the benefits of barrier-free trade has been a cornerstone of the economic profession and major driver of the world economic order in recent decades. Thus, it is important to review this principle in detail.

Consider countries A and B in Table 1. Country A can produce either 15 units of cloth per day or 5 units of food or some linear combination of these. Country B can produce either 20 units of cloth per day or 10 units of food or some linear combination of these. Note that country

B can produce both more cloth and more food per day than country A. We say that Country B has an absolute advantage in the production of both goods.

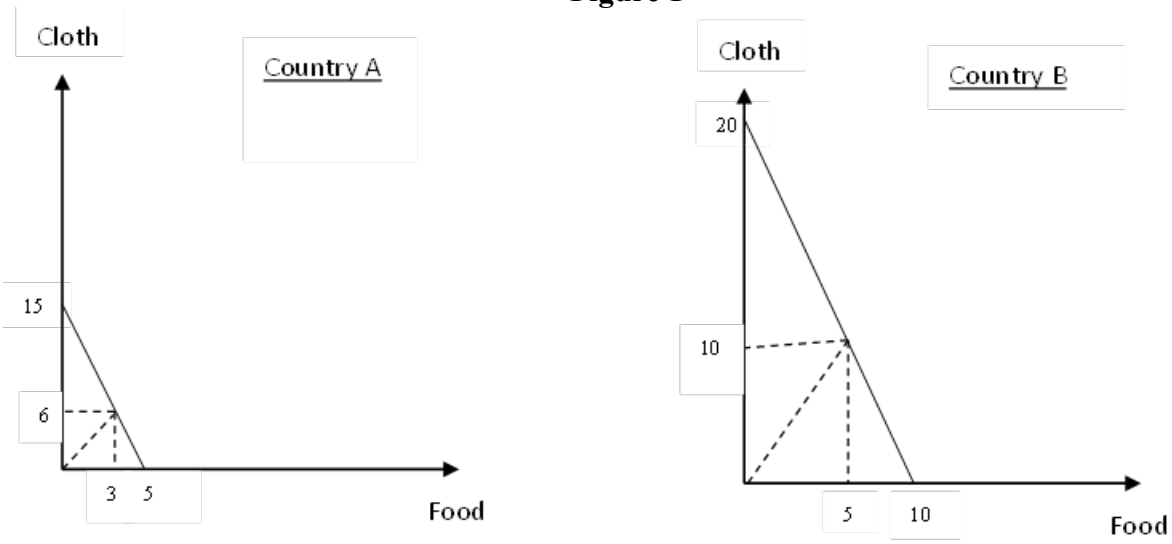
Table 1
Daily Production Capabilities

	Cloth	Food
Country A	15	5
Country B	20	10

In Ricardian theory, it is *comparative advantage*, however, that generates the benefits of trade. Note that country A's opportunity cost of producing one unit of food is three units of cloth and country B's opportunity cost of producing one unit of food is two units of cloth. We say that country B has a comparative advantage in producing food because it has a lower opportunity cost. Equivalently Country B's opportunity cost of producing a unit of cloth is 1/2 of a unit of food and country A's opportunity cost of producing a unit of cloth is 1/3 of a unit of food. Thus, Country A has a comparative advantage in the production of cloth.

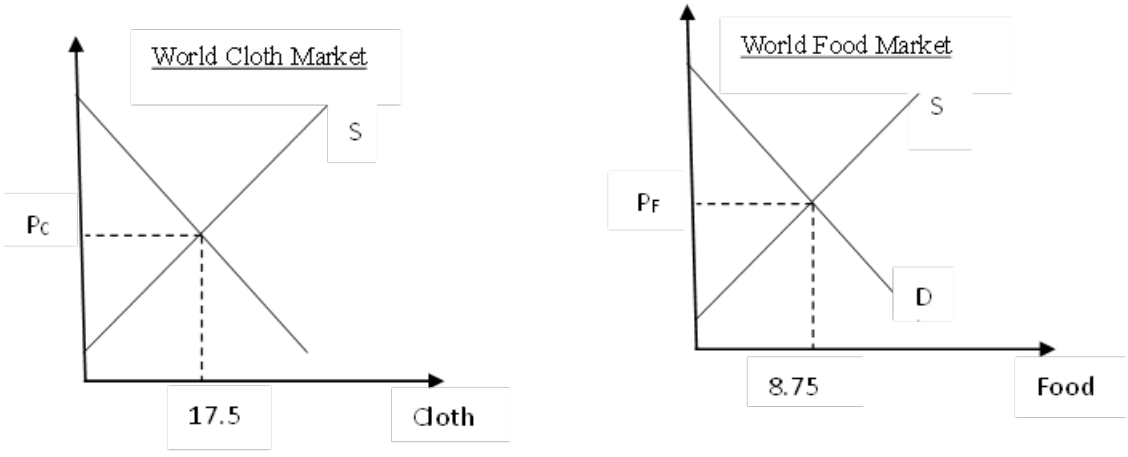
Figure one shows the Production Possibility Frontiers (PPF) for countries A and B, respectively. Each country operating in autarky (i.e., independently) can achieve any point on its PPF. Ricardian comparative advantage theory is a theory of production. It says nothing about a society's tastes and preference for goods. If we assumed that tastes in each country are such that the people desire to consume cloth and food in a fixed ratio of two units of cloth for each unit of food, then country A will operate at point (3,6) on its PPF and country B will operate at point (5, 10) on its own PPF. The total world production will therefore be eight units of food and sixteen units of cloth when the two countries do not trade.

Figure 1



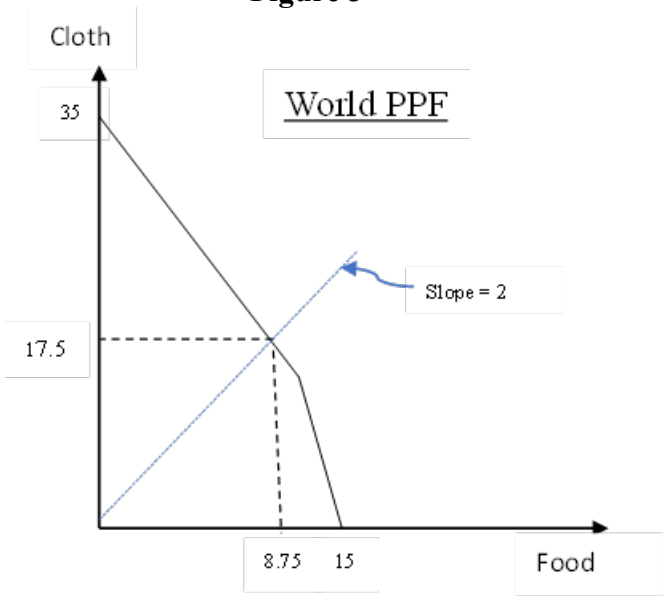
Next, consider a world market forming in which trade occurs and the forces of supply and demand determine the equilibrium prices and quantities produced. Figure 2 shows 17.5 units of cloth and 8.75 units of food produced by the world market, a greater total amount of both goods than was produced in autarky.

Figure 2



How is it possible that more has been produced than was possible in autarky? Figure 3, which presents the world PPF, provides the answer.

Figure 3



The two countries together can provide a maximum of 35 units of cloth per day. As food is also needed, it should be produced by country B since its opportunity cost of producing food is two units of cloth, which is lower than country A's opportunity cost of 3 units of cloth. Note that given world consumption preferences of two units of cloth per unit of food, the world production will take place at 17.5 units of cloth and 8.75 units of food. This is the equilibrium determined in the world supply and demand markets in figure 2.

Market forces are such that all the world's food production takes place in country B. It produces the entire 8.75 units of food, and it also produces 2.5 units of cloth. Country A produces only cloth. It uses all its resources to specialize in the production of 15 units of cloth, which is the good for which it is the low opportunity cost producer. The major point addressed in this paper is that, in the scenario presented above, if a natural calamity, a war, or any supply shock were to happen to the food industry in B, or if geopolitical tensions were to arise between

country B and Country A, the supply of food flowing to country A might be severely curtailed or even cut off.[2]

Ricardo's famous insight and the mantra of free trade are cornerstones of the economic profession and have been at the foundation of international economic policy for many decades. The difficulty that the world has had with living up to the free-trade gold standard is likely due to the presence of other important costs and benefits of trade that have not been given their due attention. The dependency problem is perhaps one of the most important. The history of difficult trade negotiations and examples of trade-based economic and geopolitical turmoil are discussed in the subsequent sections.

3. Historical: Dominance of Free Trade

3.1 Bretton Woods Conference

The Bretton Woods Conference, held in July 1944 was a gathering of 44 nations after World War II with intent to compose new rules for the international monetary system. From the conference, the International Monetary Fund (IMF) and the World Bank or the International Bank of Reconstruction and Development (IBRD) were created (Igwe, 2018).

3.2 General Agreement on Tariffs and Trade (GATT)

In 1947 after a series of negotiations the General Agreement on Tariffs and Trade (GATT) was signed to reduce trade barriers and govern trade among nations. GATT operated within

[2] Professor Tim Mathews has pointed out that the extreme assumption of the two linear PPFs for country A and country B, respectively, is what ensures, in the above model, that one country will be entirely specialized in the production of only one good. If one considers economies with varied resources and alternative production technologies, it is likely that countries will trade while producing both goods. This is an important insight which we appreciate. The stark presentation in the above model forcefully highlights the dependency issue but certainly does not reflect the full complexities of production and trade.

"negotiating rounds" where member countries discussed issues with trade and further reducing restrictions in trade between members. Rounds often functioned on the basis of reciprocity, a mutual agreement to the reduction of trade barriers between two countries. "One country offers to reduce a barrier to trade and a second country 'reciprocates' by offering to reduce one of its own trade barriers" (Crowly, 2003). Over a period of 40 years GATT experienced outward success with trade among members growing 25 times its value in 1950.

The Uruguay Round negotiations where the last round of negotiations under GATT between 1986 and 1994. The negotiations set out to address a buildup of global issues. Agricultural Subsidies with disadvantages for developing nations, non-tariff barriers slowing rates of trade, lack of protections for Intellectual property rights, Integration of textiles into GATT, etc. In attempt to correct these issues Uruguay Round expanded GATT's protections and authority with the creation of the World Trade Organization [WTO] in 1995. The WTO replaced GATT's position overseeing trade systems in January 1995 (Crowly, 2003).

3.3 Effectiveness of the World Trade Organization (WTO) & Doha Round

How effective is the WTO at facilitating efforts towards free trade? The results of the Doha round beginning in 2001 bring this into question. The Washington consensus has played a central role in facilitating trade liberalization. However, its effectiveness depends upon policy and implementation for each independent government. Alternatively, the effectiveness of the WTO has been halted by the Doha round negotiations. The Doha Development Agenda negotiations began in November 2001 and are the latest trade negotiations among members of the WTO. The Doha round set out to reform international trading through revised trade rules and lower barriers to trade. The round stalled with collapses in negotiation.

Members of the WTO have sought to lower barriers to trade in almost every fashion except with the WTO (Baldwin). The failure of the Doha round negotiations has led to more regionalized and bilateral trade, a step away from the multilateral aims of the WTO (Baldwin, 2016).

3.4 Washington Consensus [Working on better ratio of citations and quotes]

The Washington Consensus was a list of 10 policy areas focused on discussion of debt and economic recovery in Latin American Countries. Written by Economist John Williamson, the policies were primarily supported by the World Bank, US treasury, the International Monetary Fund, numerous think tanks, and later Latin American countries, who agreed on the "destructive power of macroeconomic instability towards growth." (Spence, 2021) The leading organizations backing the Washington Consensus were the International Monetary Fund (IMF) and the World Bank. Both organizations were products of the 1944 Bretton Woods Conference with a mission of overseeing and removing restrictions surrounding open trade. The main point of the Washington Consensus was intended as a call to action for shaping and placing policy into action. (Babb, 2021)

Table 2

Suggested Policy	Description
Fiscal Discipline	Control government spending to avoid large budget deficits.
Redirection of Public Spending	Shift focus from subsidies to investments in education, healthcare, and infrastructure.
Tax Reform	Broaden the tax base and implement moderate tax rates.
Market-Determined Interest Rates	Allow interest rates to be set by the market, not government intervention.
Competitive Exchange Rates	Maintain a stable exchange rate to promote exports.
Trade Liberalization	Reduce barriers (tariffs, quotas) to encourage international commerce.
Inward Foreign Direct Investment	Welcome foreign investment into the country.

Privatization of State-Owned Enterprises	Sell government-controlled businesses to private entities.
Deregulation	Reduce government regulations on businesses for more market freedom.
Secure Property Rights	Establish a legal system that protects property rights and ownership.

(Williamson)

The policies of the Washington Consensus were quickly "standardized" and applied to similar situations in third world countries, eastern Europe, and African Nations. In each case reforms were cherry picked as a way of prioritizing needs. This approach to reform was guided by a theory of "big band or shock therapy" according to Babb. Introducing as many reforms as possible would naturally form a "self-enforcing dynamic" making a return to the economies' "old [inefficient] ways" impossible. The goal of these overwhelming reforms was growth. (Babb, 2021)

Nevertheless, Babb (2021) states:

> "By the beginning of the twenty-first century, it was apparent that countries that had most fervently implemented the Washington Consensus recipe, such as Latin America and Eastern Europe, were failing to thrive … In contrast, it was impossible to ignore that China, a nation that had mostly ignored Washington Consensus prescriptions, had achieved both astounding long-term economic growth…"

Spence emphasizes that following the Washington Consensus step by step is not a guarantee of growth. There are not many complex macroeconomic and geopolitical factors to represent and consider in one model. Much like a model's simplification of reality the Washington Consensus could not anticipate all outward realities (Spence, 2021). Only after a failure in many "shock therapy reform attempts did the world bank, the IMF, & think tanks

amend the reforms were not "sufficient" and thus the consensus was augmented to include a mix of new and old policy reforms. (Babb, 2021)

4. Geopolitical Tensions

Tension and Geopolitical risks are often elevated in instances where countries have become heavily reliant on others for critical goods and resources. The following cases underscore the interconnectedness of economic interdependence and geopolitical dynamics, shaping the course of international relations.

4.1 OPEC Oil Embargo

The OPEC Oil embargo was a consequences of the Yom Kippur War, a conflict between Israel and other Arab nations over territories occupied by Israel. The OPEC (Organization of the Petroleum Exporting Countries) is a group of oil-producing nations with control over a large share of the world's oil and production. The OPEC Oil crisis began in 1973 when OPEC restricted oil to nations supporting Israel in the Yom Kippur War. The following rise in prices left oil dependent countries vulnerable.

The embargo caused a massive increase in oil prices due to limited supply and dependence on a single source of oil. The US responded to this crisis by over time expanding domestic oil production (Offshore drilling, oil fields, etc.), diversifying its imports (Canada, Mexico, Venezuela), and advancing implementation of alternate power sources (renewable energy, nuclear power, coal, etc.) (Noraini Zulkifli1, 2022).

4.2 Russia & Ukraine War (Pipeline)

Then Nord stream pipelines are a set of undersea gas lines connecting a flow of natural gas from Russia to Germany. The pipeline is one of a few major sources of natural gas in Europe. Before the start of the Russian-Ukraine war in February 2022 European dependency on the pipeline was a source of major concern. European countries hold varying ranges of dependency on the Nord stream pipeline. Some countries like Germany hold several imported sources of Natural gas while Moldova is entirely dependent on Russian gas and hold high risks connected to the Russian-Ukraine War (Arash Beidollahkhani, 2023).

4.3 Japan and Rare Earth Elements (REEs)

Rare Earth Elements (REEs) are 17 chemical elements used in the production process of industries including electronics, automotives, and defense. Japan relies on China for 90% of all its REE imports. In 2010 China restricted its exports of REEs shocking Japan's economy and exposing its heavy dependency on China. This vulnerability motivated Japan to diversify its sources of REEs from other countries like Australia and Vietnam (Jilan Xu a, 2023).

4.4 Chips Act: US-China Trade War

During the Covid-19 pandemic the US reliance on specialized trade became especially clear. On August 9th, 2022, President Biden signed the CHIPS Act into Law. The CHIPS act sought to produce more semiconductors on US soil while reaching for three aims. According to Kannan there are three main reasons behind implementation of the Act. First, to reduce the ability to global shocks to disrupt the US supply of chips. During the pandemic worldwide shortages of semiconductors stopped the manufacturing of many products including electronics, household appliances, and planes. This slow in production pushed inflation of prices and demand among

consumers. Second, to increase US competitiveness in the international economy while creating more jobs. The USA's position in the semiconductor supply chain has dwindled over time. Congress expressed concern over falling behind countries like Tiwan and South Korea with more advanced manufacturing capabilities (Sutter, Sargent Jr., & Singh, 2023). Third, to prevent the sabotage of semiconductors in the manufacturing process. Semiconscious are useful in many industrial and military technologies (Kannan & Feldgoise, 2022). The loss of control over the production of CHIPS possesses a threat to national security and unwillingness to trade with China has raised political tensions. The US is concerned about the dependency built by specialized trade with China. Specialization builds dependency on another economy for important goods and services. Inability to manufacture or unwillingness to diversify imports of needed goods leaves the U.S. vulnerable to supply shocks as seen during the Covid pandemic.

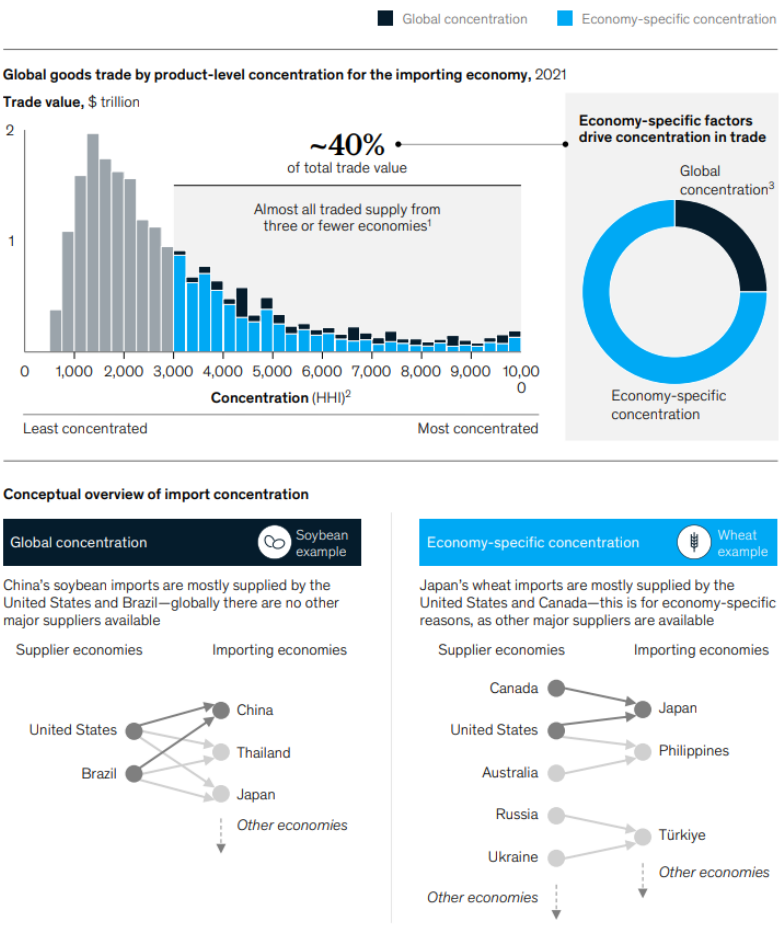
5. Trade Concentration Data

This section explores data on global concentration of trade. While the focus lies on interpreting existing data visualizations, a brief discussion of the data sources used in the original studies that generated the figures is provided for transparency. This analysis aims to connect the data to the research questions outlined in this paper.

Figure 4 depicts concentration in international trade. It identifies product categories where a very small number of countries (3 or fewer) dominate global supply, indicated by a Herfindahl-Hirschman Index (HHI). In the context of international trade, the Herfindahl-Hirschman Index (HHI) is a metric used to measure the level of concentration in a specific trade flow or product category. Based on the findings of the McKinsey Global Institute, 40 percent of global goods trade relies on three or fewer nations for the supply of goods.

As mentioned before, this high level of concentration in trade exposes countries to geopolitical risks. If a key supplier experiences political instability, it could disrupt critical supply chains for essential goods. Tensions between major trading partners could lead to trade restrictions or embargoes, further exacerbating these vulnerabilities for not only the importing nation but nearby countries. For example, despite the existence of other major wheat suppliers, Japan chooses to import majority of its wheat from the USA and Canada. This arrangement could potentially collapse or weaken leaving Japan vulnerable to supply chain disruptions for an essential food source. (Olivia White, 2023)

Figure 4



3

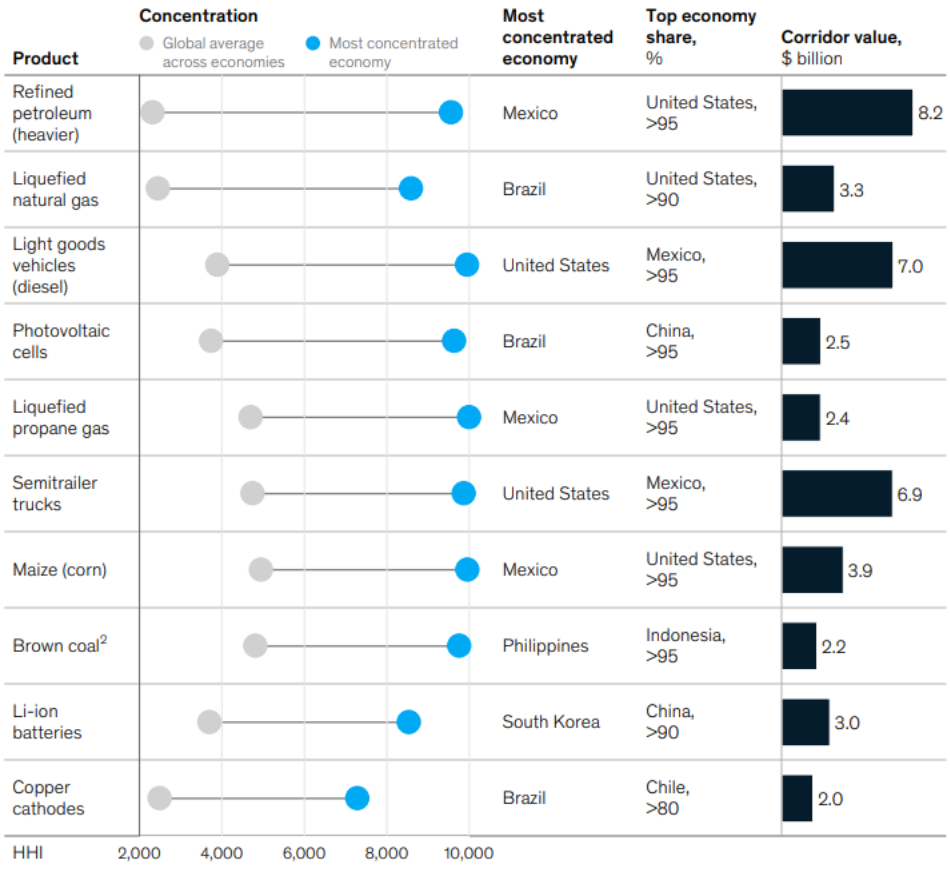
(Olivia White, 2023)

Figure 5 focuses on the top 10 most concentrated product categories in international trade. It excludes products with low trade volume, those dominated by a net exporter, and categories with unreliable data. These results show larger economies have above-average levels of import concentration for specific products.

[3] The McKinsey Global Institute kindly granted written permission to cite Exhibit 1 (Figure 4) and Exhibit 4 (Figure 5) from their January 2023 publication, "The Complication of Concentration in Global Trade."

This phenomenon can be credited to two key factors. Firstly, geographic proximity to neighboring countries offers lower transportation costs and faster delivery times. Secondly, regional trade patterns may lead larger economies to rely heavily on specific suppliers within their geographic sphere. The case of the United States importing nearly all its light goods vehicles from Mexico embodies this trend. (Olivia White, 2023).

Figure 5



(Olivia White, 2023)

6. The Case for Diversification

This section further presents the case for diversification as a means of meditating risk and enhancing resilience to economic disruption.

6.1 A Case for Diversification

The benefits of diversification have the potential to greatly outweigh the risks. In his paper Caselli found the benefits of diversification have outweighed the risks of specialization for numerous countries (F. Caselli, 2015). Diversification limits a country's dependence on a single market for trade. Limited dependence would naturally reduce vulnerability to economic shocks is a claim agreed upon by several authors such as Francis Kramarz in the paper Volatility in the small and in the large: The lack of diversification in international trade. Casilli's paper challenges the notion that international trade increases a countries internal economic volatility. Rather it is diversification that can help lower volatility within a country. This diversification of trade would not only lessen the blow of trade barriers from a single country but limit the impacts of domestic downturns in the home countries economy (F. Caselli, 2015).

6.2 A Case Against Diversification

Efficiency losses present a potential risk to diversifying countries. Excessive use of diversification has the potential to limit the gains of efficiency brought on by specialization. – finds diversification itself is not enough to stabilize shocks. The stability of exporting countries depends on the diversification of their customer base (Francis Kramarz, 2020). There exists a tradeoff between efficiency and stability when prioritizing diversification over specialization. "Specialization for maximum efficiency might make sense in an ideal world, but in our uncertain

reality, diversification provides a level of stability that outweighs some efficiency losses" (William C. Brainard, 1968).

7. Conclusion

This research examined the downsides associated with a core principle of comparative advantage. The main objective was to investigate the geopolitical consequences of increased interdependence that arise when countries specialize based on comparative advantage. While specialization advances economic growth, it also creates interdependencies between countries. The degree of this dependence varies, with some goods being critical to national security and societal well-being. This vulnerability exposes nations to geopolitical risks.

The benefits of increased productivity must be weighed against the potential rise in geopolitical risks. This presents a dilemma: prioritizing efficiency at the expense of a stable and secure trading system. Diversification of trade serves as a potential solution to mitigate overreliance on any lone source, thus reducing vulnerability. However, achieving this diversification requires careful consideration of trade-offs between efficiency and security.

This study focused on the theoretical foundations of comparative advantage and its geopolitical ramifications. Further research exploring the empirical application of diversification strategies and their effectiveness in mitigating geopolitical risks would be worthwhile.

Diversification can play a critical role in mitigating these risks and ensuring that the pursuit of efficiency and free trade is not undermined by the very dependencies it creates.

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Diagrams

Table 1: Daily Production Capabilities

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Figure 1: Autarky

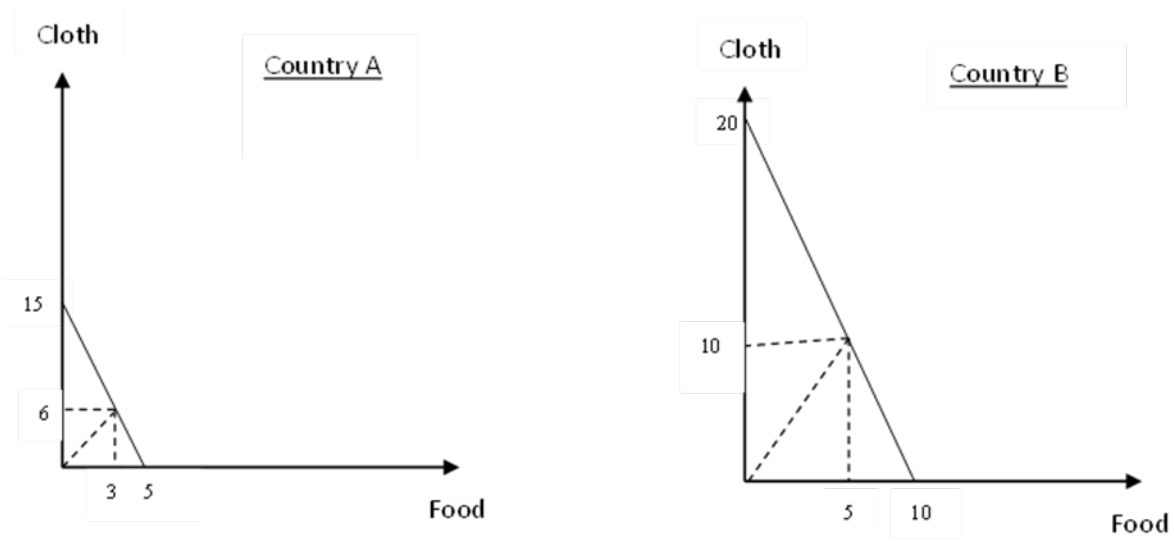


Figure 2: Free Trade

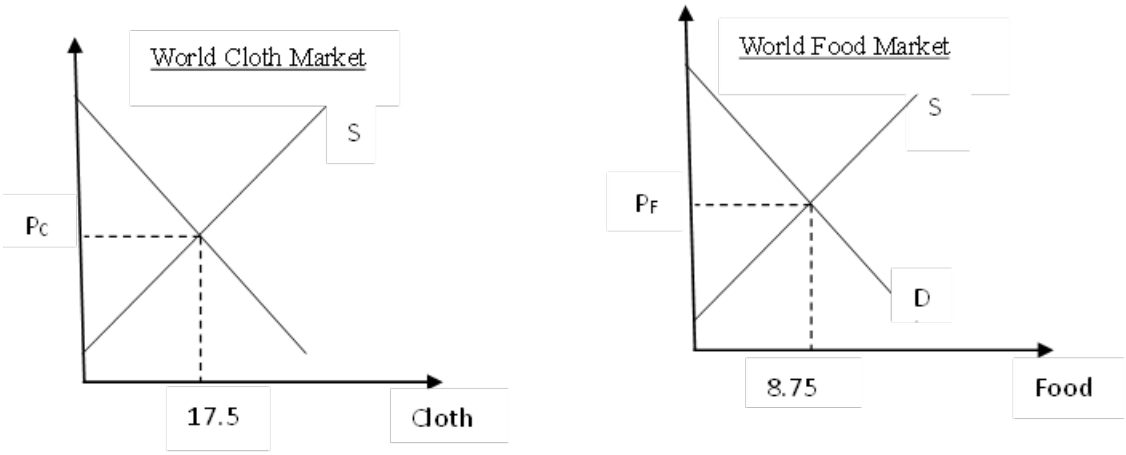
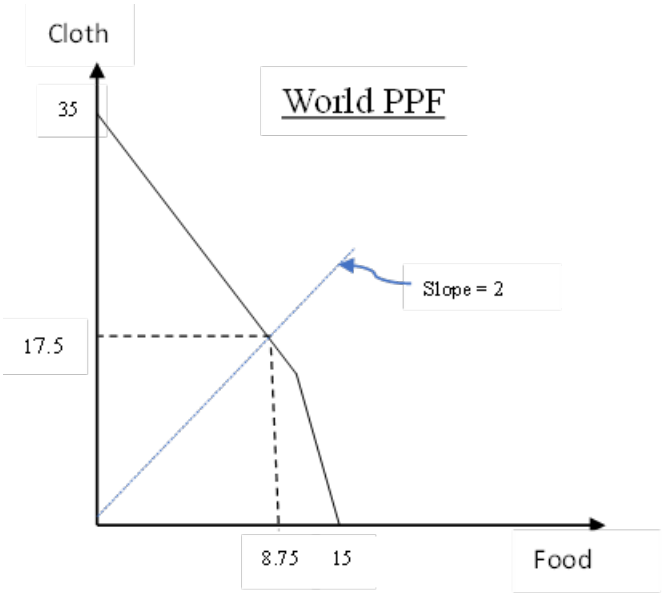


Figure 3: World PPF



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(Williamson)

Figure 4: Global Concentration of Trade

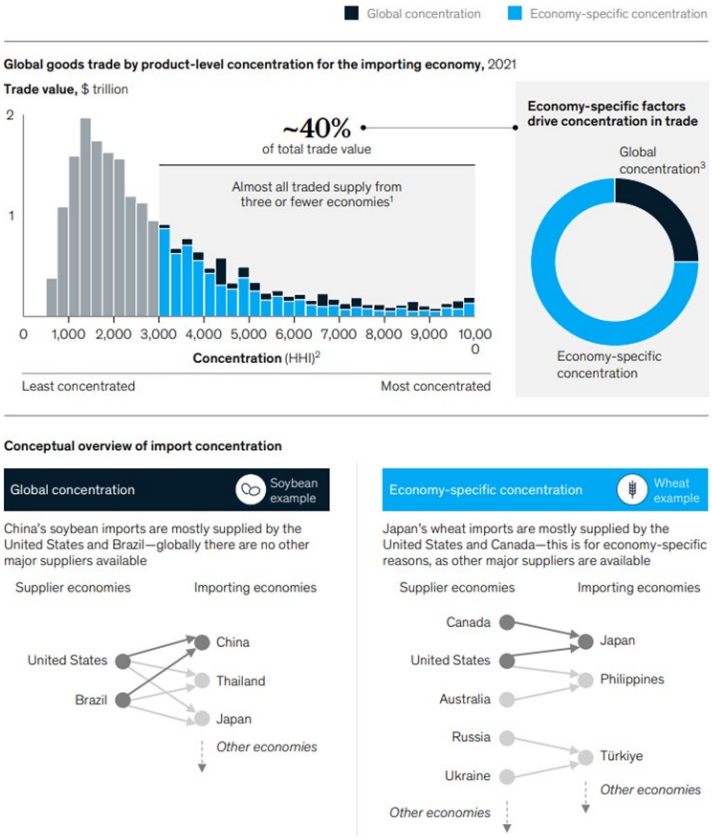

Figure 5: Global Concentration Skews