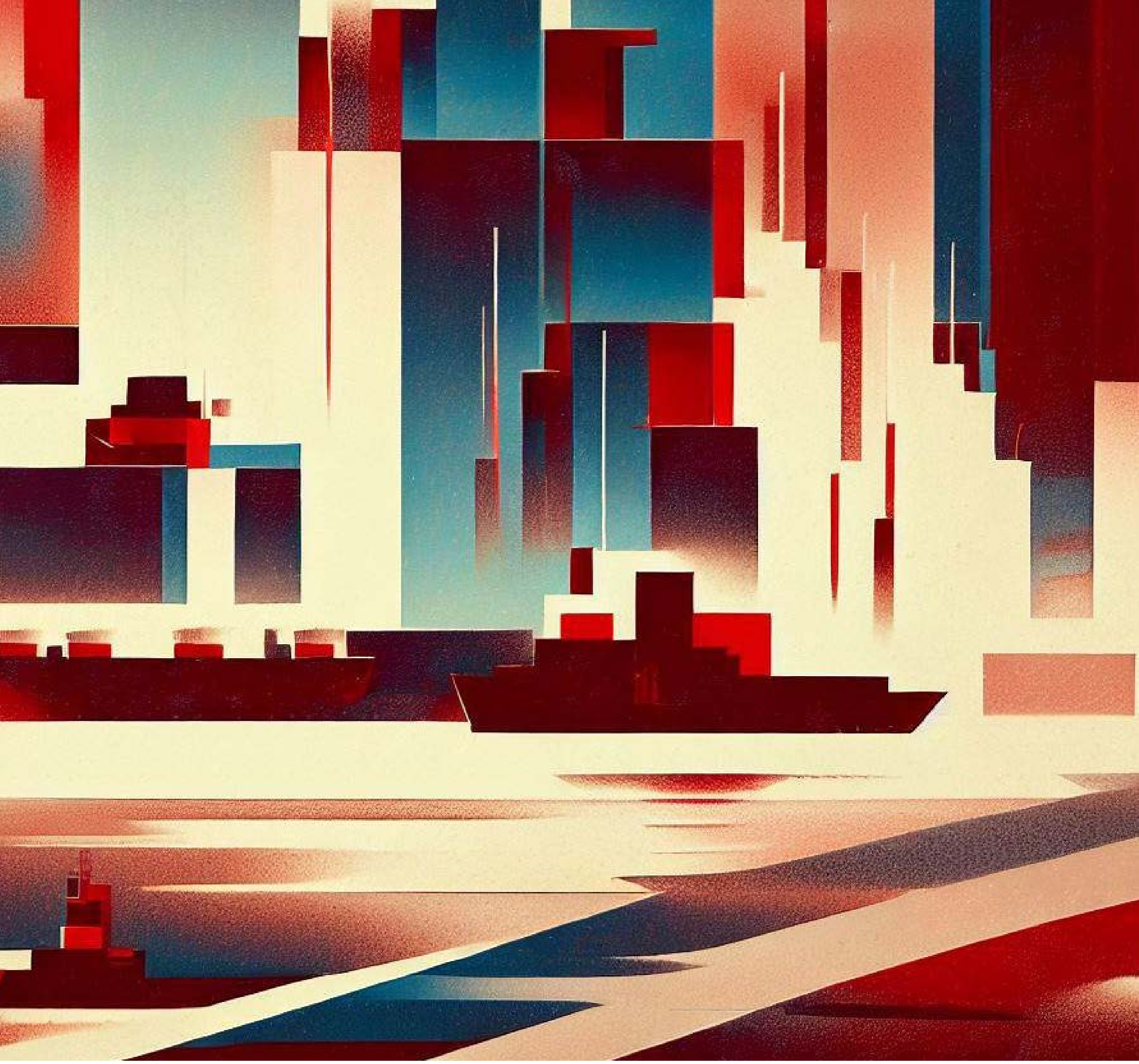

JULY 31, 2023

U.S. Supply Chains and Biden's China Challenge

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EXECUTIVE SUMMARY

This paper introduces a new supply chain measure called revealed comparative dependence (RCD), based on publicly available national and global trade data. The paper shows how high RCD can be used to identify product classes where the United States is excessively dependent on Chinese imports.

The paper suggests that RCD can be used to inform the Biden Administration's industrial policy. The Department of Commerce can use RCD to publish a list of high-vulnerability goods. Policymakers can pay special attention to goods on the list to reduce dependence on China, while considering rolling back tariffs on goods not on the list.

INTRODUCTION

The Biden Administration wants to improve the resilience of U.S. supply chains — the ability to recover quickly from a supply disruption anywhere in the world. A key element is preventing a supply chain crisis "from hitting in the first place."[1]

But China is the elephant in the room. It is both a strategic competitor[2] and the United States' largest trading partner outside of North America.[3] The concern is that China might weaponize its industrial might for geopolitical gain — something it may be doing now (Keeley 2018) and for which the United States is admittedly ill-prepared.[4] The economic damage to the United States from a war with China[5] would be considerable, as Babbage (2023) described:

> *U.S. supplies of many products could soon run low, paralyzing a vast range of businesses. It could take months to restore trade, and emergency rationing of some items would be needed. Inflation and unemployment would surge, especially in the period in which the economy is repurposed for the war effort . . . Stock exchanges in the United States and other countries might temporarily halt trading because of the enormous economic uncertainties.*

To avoid such a scenario, some China hawks call for a complete decoupling of economic ties,[6]

1. *From President Biden's February 24, 2021 remarks upon issuance of his Executive Order on America's Supply Chains.*
2. *According to Biden's National Security Advisor, Jake Sullivan, China is "determined to overtake U.S. technological leadership and willing to devote nearly limitless resources to that goal" (Sullivan 2022).*
3. *According to Biden's Commerce Secretary, Gina Raimondo, "China is our third largest export market, and those exports directly support 750,000 American jobs. The benefits from these exports go not only to our large multinationals but also to more than 25,000 small and medium-sized enterprises that exported $33 billion to China in 2020" (Raimondo, 2022).*
4. *For example, the Department of Defense is unable to estimate the degree to which Chinese components are present in its most advanced weapon systems (Martin et al. 2023).*
5. *At least one U.S. general expects a war with China (over Taiwan) in 2025 (Shapero 2023).*
6. *For example, President Trump's U.S. Trade Representative, Robert Lighthizer, says "Once you decide [China's] a foe, you have to start the process of stopping the shipment of hundreds of billions of dollars each year that they're using to rebuild their military" Bade (2022).*

but President Biden doesn't want to eliminate the substantial economic benefits arising from international trade. His industrial policy is one of *selective decoupling*, focusing on foundational technologies, critical/essential goods, and goods made from forced labor.[7]

Selective decoupling, however, implies acceptance of vulnerabilities in economic and national security. Managing these vulnerabilities is arguably Biden's biggest challenge in enhancing the resilience of U.S. supply chains.

In this paper, we offer an approach, based on a novel metric, to characterize and respond to these vulnerabilities. We apply this approach to a subset of traded goods, advanced technology products — a focal point of industrial policy in both China and the United States. We derive lessons for policymakers and offer some policy recommendations consistent with Biden's industrial policy. We make no presumption as to the merits of Biden's policy; we take it as given, and our aim is to improve its effectiveness.

REVEALED COMPARATIVE DEPENDENCE

Balassa (1965) developed a metric for evaluating the manufacturing know-how of a nation, *revealed comparative advantage* (RCA):

(1) RCA FOR A PRODUCT = PRODUCT'S SHARE OF EXPORTS / PRODUCT'S SHARE OF WORLD TRADE

When RCA > 1, a nation is said to have a comparative advantage that is "revealed" by international trade data because it is exporting more than its fair share of a product. In other words, the rest of the world prefers to purchase from that nation. And when RCA < 1, a nation is exporting less than its fair share of a product; the rest of the world prefers to buy elsewhere. Within the international economic development literature, RCA is used to operationalize economic complexity theory.

One might consider using a similar metric for evaluating the dependence of one nation on the manufacturing know-how of the rest of the world. We call this metric *revealed comparative dependence* (RCD). By analogy with RCA,

(2) RCD FOR A PRODUCT = PRODUCT'S SHARE OF U.S. IMPORTS/ PRODUCT'S SHARE OF WORLD TRADE

If RCD for a product is greater than 1, then the nation imports more than its fair share of that product. We say that the nation has a comparative dependence on imports that is "revealed" by international trade data.

For example, the United States had a revealed comparative dependence (RCD>1) for clothing in 2019, because clothing accounted for 3.7% of U.S. goods imports in 2019, compared to 2.8% of all global goods imports. If the price of imported clothing suddenly rose, or if the supply was disrupted, it would have a bigger relative impact on the United States than on the global economy as a whole. Conversely, the United States did not have revealed comparative dependence in the broad category of chemicals and pharmaceuticals, because it imported less than the global trade share of that product.

For the purposes of this paper, we are interested in a country-specific version of RCD, focusing on the revealed comparative dependence of the United States on China by product. So we alter the formula slightly to focus on imports from China.

7. *Commerce Secretary Gina Raimondo outlined the Biden China Policy in November 2022. "...we are not seeking the decoupling of our economy from that of China's. We want to promote trade and investment in areas that do not threaten our core economic and national security interests or human rights values."*

(2A) RCD = PRODUCT'S SHARE OF U.S. IMPORTS FROM CHINA/ PRODUCT'S SHARE OF WORLD TRADE

The basic idea is still the same. However, now we are comparing the impact of imports of a particular product from China to the overall importance of that product on global trade markets. The larger RCD, the greater the dependence on China.

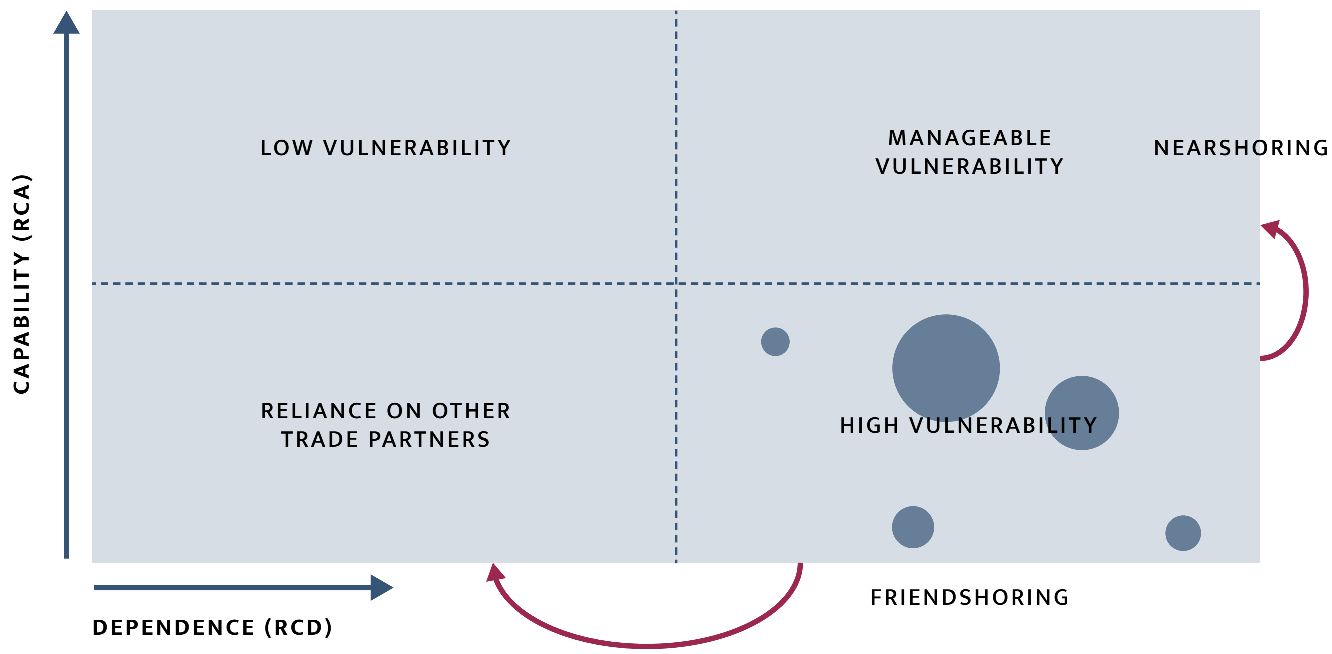
USING RCA AND RCD

Together, RCA and RCD can be used to evaluate the vulnerabilities of one nation on another's manufacturing know-how.

To visualize this, we offer three applications: prioritization to inform industrial policy, preparation for international negotiated agreements, and trend analysis to identify potential risks to national security.

Let's start with prioritization. Figure 1 shows a quadrant chart where the vertical axis represents domestic capabilities (RCA) and the horizontal axis represents domestic dependence (RCD). The highest vulnerability is when a nation has no comparative advantage but a comparative dependence (the southeast quadrant). The lowest vulnerability occurs when a nation has a comparative advantage but no comparative dependence (northwest quadrant). When a nation has both a comparative advantage and a comparative dependence, its vulnerability can be described as manageable (the northeast quadrant). Finally, when a nation has neither a comparative advantage nor a comparative dependence, it must rely on other trading partners (southwest quadrant). If we indicate world trade value by the size of each data point (creating a bubble chart), we can better indicate opportunities and vulnerabilities. For example, for two traded products in the high vulnerability quadrant, the one with the larger world trade value might be seen as more important to a nation wishing to reduce its vulnerability.

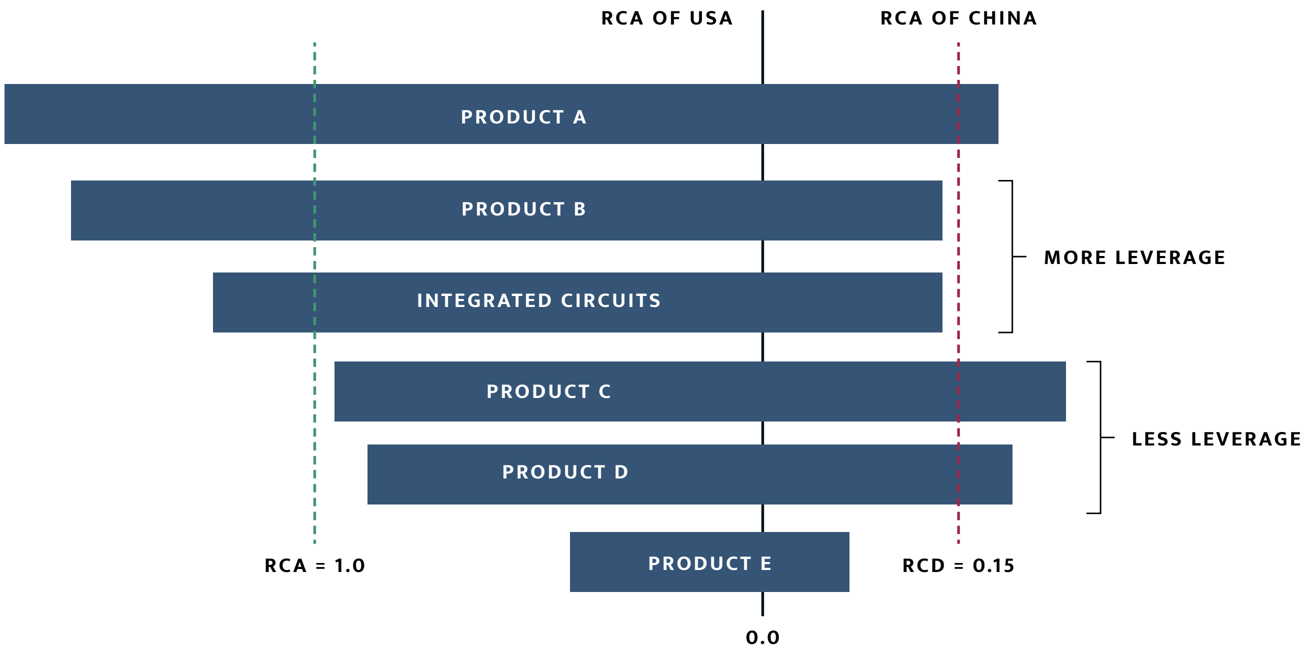
FIGURE 1: VALUE CHAIN VULNERABILITIES CAN BE CLASSIFIED IN A QUADRANT CHART. ADDITIONAL INFORMATION (E.G., VALUE OF WORLD TRADE) CAN BE ADDED AS BUBBLES, AND POLICY ACTIONS CAN BE CONSIDERED AS VECTORS, SHIFTING VULNERABILITIES VERTICALLY OR HORIZONTALLY.



The chart also offers a way to think about public policy. For example, industrial policies might be categorized as inducing movement either horizontally or vertically. Certain policies (e.g., a modest tariff on imports) might shift products to the left while other policies (e.g., tax incentives to encourage foreign direct investment) might shift products upward. For products that fall into the high vulnerability category, a movement left reflects "friendshoring," and movement upward reflects "nearshoring." Both are of interest to nations seeking to reduce dependence on Chinese supply chains.

Now consider preparation for international negotiated agreements (e.g., trade agreements). Negotiators could utilize information on RCD to determine where they might have more or less leverage. Figure 2 offers an illustration. The figure indicates that the United States has more leverage over China with respect to integrated circuits (i.e., computer chips) because RCA > 1 and RCD < 0.15 (i.e., China's share of world trade).

FIGURE 2: IN DISCUSSIONS OVER NORMS OF INTERNATIONAL COMMERCE, U.S. NEGOTIATORS WOULD BENEFIT FROM INFORMATION ABOUT DOMESTIC VULNERABILITIES. FOR EXAMPLE, THE UNITED STATES HOLDS MORE LEVERAGE OVER CHINA IN INTEGRATED CIRCUITS (I.E., COMPUTER CHIPS) AND LESS LEVERAGE IN PRODUCTS C OR D.

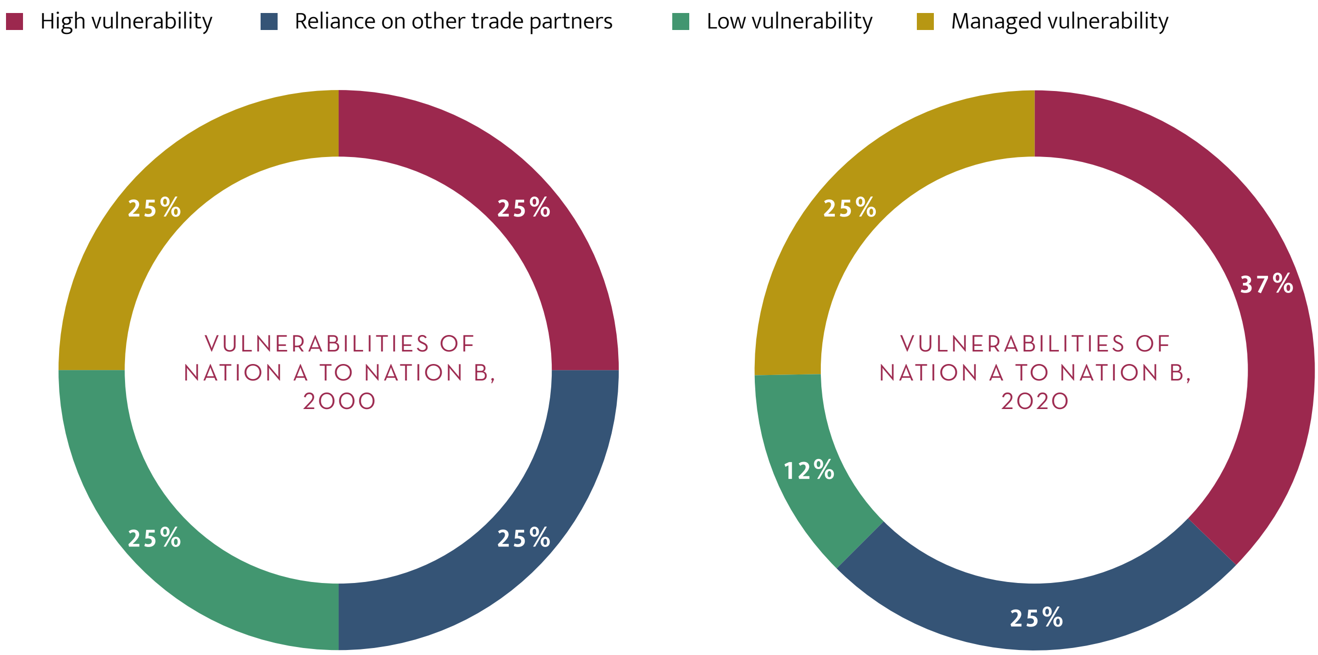


Finally, let's consider trend analysis. Figure 3 shows two pie charts, representing the same two nations and products but two decades apart. The colors red, green, and yellow are chosen to represent high, low, and manageable vulnerabilities. In this hypothetical example, Nation A's vulnerabilities are growing — its high vulnerability (red) slice is increasing as its low vulnerability (green) slice is shrinking. Such a dynamic indicates potential national security concerns.

The 2020 pandemic, which originated in a manufacturing-centric region of China, quickly created supply disruptions felt around the world, and led to calls for re-shoring, nearshoring, friendshoring, and more resilient supply chains.

The Biden Administration, which recently added "resilience" as one of its key pillars in its strategic plan for advanced manufacturing, is seeking better metrics for resilience to aid in its governmental efforts.[8]

FIGURE 3. THESE TWO PIE CHARTS ILLUSTRATE A SHIFTING OF VULNERABILITIES OF NATION A TO NATION B IN THE FIRST TWENTY YEARS OF THE 21ST CENTURY. IN THIS HYPOTHETICAL EXAMPLE, THE HIGH VULNERABILITY SLICE (RED) IS GROWING WHILE THE LOW VULNERABILITY SLICE (GREEN) IS SHRINKING. SINCE THE OTHER TWO SLICES REMAIN THE SAME SIZE, WE CONCLUDE THAT NATION A IS BECOMING LESS SECURE VIS-Á-VIS NATION B.



RCD may address this need. Within the realm of supply chain resilience metrics, Han et al. (2020) identify three dimensions: readiness, response, and recovery. Each includes multiple capabilities for which metrics are available. RCD would fit within the readiness dimension and, more specifically, within the capability of situational awareness. In recent years, a few academic papers (Ali et al. 2017, Chowdhury and Quaddus, 2017, and Eltantway, 2016) have been written on metrics for situational awareness. None of these papers, however, considered the need for metrics to inform the public sector; instead, each focused on the need of private sector firms.

The limitations of RCD reflect that of international trade data, upon which it relies. Four such limitations pertain to specificity, differences between export and import values, nontraded goods, and trade in value added.

8. *In October 2022, at the annual meeting of the National Association of Business Economists, Susan Helper, a Biden Administration political appointee in the Office of Management and Budget, asked for help in developing better metrics for supply chain resilience.*

Specificity of traded goods is limited by the classification system adopted by all nations, which is based on a six-digit HTS code. Nations are free to develop more specific codes (i.e., more digits but the first six remain consistent with the international system), and they often do for tariff purposes. The United States, for example, employs 10-digit codes. The ATP list developed by the U.S. Census Bureau is based on 8- and 10-digit codes. Because estimation of RCD requires, in the denominator, the value of world trade in a product, six-digit codes must be used, and this requires six-digit codes to be used in both the numerator and denominator. This requires a more general level of aggregation for ATPs. The resulting analysis is less precise than it would otherwise be. Those who estimate RCD are therefore limited in specificity.

Export and import values differ for the same trade flows because they are reported and recorded separately. In theory, the value of world exports in any particular traded good should equal the value of world imports for that same good. But this isn't so. Often the difference is relatively small, but sometimes the difference is great. If given the choice, researchers prefer import data because that is usually checked more carefully by customs officials. But since RCA is based on export data, any analysis employing both RCD and RCA (as in Figure 1) will be based on different data for the same underlying trade flow. This should not be a problem as long as export data are used to determine world trade for RCA and import data are used to determine world trade for RCD.

Not all goods/services are traded in international markets, and for some, trade is not a significant portion of consumption. This includes many types of services (e.g., haircuts), goods where transportation is prohibitively costly, and goods where there are significant barriers to trade (e.g., export controls). For goods that are seldom traded, RCD is not particularly illuminating.

Trade statistics typically record the value of imports and exports where all value is attributed to the nation of export, whether or not this is accurate. In recent years, some data have become available on trade in value added, and this data would be a better choice for estimating and interpreting RCD (and RCA) if it were available for nearly all traded goods. Unfortunately, trade statistics have not yet reached this point.

Similarly, if a nation effectively controls foreign inputs into its domestic manufacturing sector, the approach outlined here will exclude that leverage. This is important because China is thought to exert effective control over certain material inputs (e.g., critical minerals) into its domestic manufacturing sector. In some cases, China's effective control includes inputs from nations that are known to be U.S. allies; in such cases, a policy of friendshoring may not reduce vulnerabilities.

METHODOLOGY

We estimated RCD using 2021 data (accessed from the Comtrade database maintained by the United Nations) for the United States vis-á-vis China for advanced technology products (ATPs), a list first developed in the 1980s by the U.S. Census Bureau to better track trade in high-technology goods than that used by the International Trade Commission (ITC).[9] Since

9. *ITC used the DOC3 definition of high technology, which was based on goods produced from sectors with high R&D intensity. This resulted in classification of many low-tech goods as high-tech. Census chose instead to focus on products that are considered high-technology across ten fields. Census found that ATP was more accurate because it was less aggregated than DOC3 (McGuckin et al. 1989).*

that time, Census has revisited and updated the ATP list — adding and subtracting goods as it deems fit. Census uses different codes for imports and exports to reflect the fact that codes for U.S. imports are more detailed than that of U.S. exports. For our purposes, this creates a challenge — we need the same import and export codes to estimate RCD. We solve this problem by truncating the Census ATP codes (eight and ten digits) to international HTS codes (six digits), which are used by every nation to record trade flows. This reduces the number of ATP product categories. For example, in 2021, there are 556 10-digit ATP import codes and 406 10-digit ATP export codes, which we truncate to 221 six-digit HTS codes common to both the import and export code list.

For each of these ATPs, we searched Comtrade for the value of imports and exports (in U.S. dollars) sufficient to estimate RCA and RCD. Because Comtrade only provides data on goods and not services (necessary for calculating both RCA and RCD), we gather data on the value of service exports and imports from the World Bank.

To translate the RCA and RCD estimates into vulnerabilities, we separate RCA values into products where RCA exceeds 1.0 (the fair share of exports) from those where it does not. Similarly, we separate RCD values into products where RCD exceeds 0.15 (China's share of world trade in 2021) from those where it does not. We then count the number of ATP products that fall into one of four vulnerability quadrants as described previously (high vulnerability, low vulnerability, managed vulnerability, and reliance on other trade partners). We repeated this same exercise for 2011 (but using an RCD value of 0.115 to reflect China's share of world trade in that year) to allow for a comparison across ten years to determine overall trends.

RESULTS AND DISCUSSION

Results are illustrated in Figures 4 and 5 and Tables 1 and 2. A spreadsheet with all values of RCA and RCD for each advanced technology product (ATP) can be obtained, upon request, from the author.

Figure 4 shows trends in vulnerabilities by comparing years 2011 with 2021. Whereas two of the four vulnerability slices remain about the same size (high vulnerability and managed vulnerability), two have changed significantly. Namely, the green slice (low vulnerability) has decreased 8%, and the blue slice (reliance on other trade partners) has grown 11%.

For those concerned about China's growing manufacturing capabilities, this may come as a surprise. It would seem that U.S. vulnerabilities are driven more by a decline in domestic capabilities than by an increase in China's capabilities. Furthermore, to the extent the United States depends on other nations for ATPs, it has done so by relying not on China, but on other trading partners.

Because the U.S. Census Department categorizes ATPs into one of ten fields,[10] we can explore vulnerabilities by discipline. We chose to examine just those fields containing at least 15 unique ATPs: aerospace, flexible manufacturing, life sciences, and information & communications. As Table 1 shows, the United States is least vulnerable in aerospace: no

10. *These ten fields include biotechnology, life sciences, opto-electronics, information and communications, electronics, flexible manufacturing, advanced materials, aerospace, weapons, and nuclear technology.*

dependence on China and substantial domestic capabilities. The United States is most vulnerable in information & communications: significant dependence on China yet only modest domestic capabilities. In the life sciences, the United States has considerable capability and yet still shows some dependence on China. In flexible manufacturing, the United States primarily relies on other trading partners.

One might ask: How have U.S. vulnerabilities in these ATP fields changed compared to a decade ago? The answer, as it turns out, is "not much." We find one general trend: toward reliance on other trading partners. High vulnerabilities increased noticeably only in the life sciences although U.S. capabilities remain very strong. Vulnerabilities in information & communications have been reduced as the United States increased its own capabilities some and relied on other trading partners even more. Aerospace was and remains a field of considerable U.S. strength.

FIGURE 4. U.S. VULNERABILITIES IN ATPS HAVE CHANGED IN THE PAST TEN YEARS. LOW VULNERABILITIES ARE FEWER WHILE RELIANCE ON OTHER TRADE PARTNERS HAS INCREASED. IN CONTRAST, THERE HAS BEEN LITTLE CHANGE IN THE PERCENTAGE OF HIGH VULNERABILITIES AND MANAGED VULNERABILITIES. OVERALL, THE DATA SUGGEST THE FRONTIER OF MANUFACTURING KNOW-HOW IS CONTRACTING IN THE UNITED STATES.

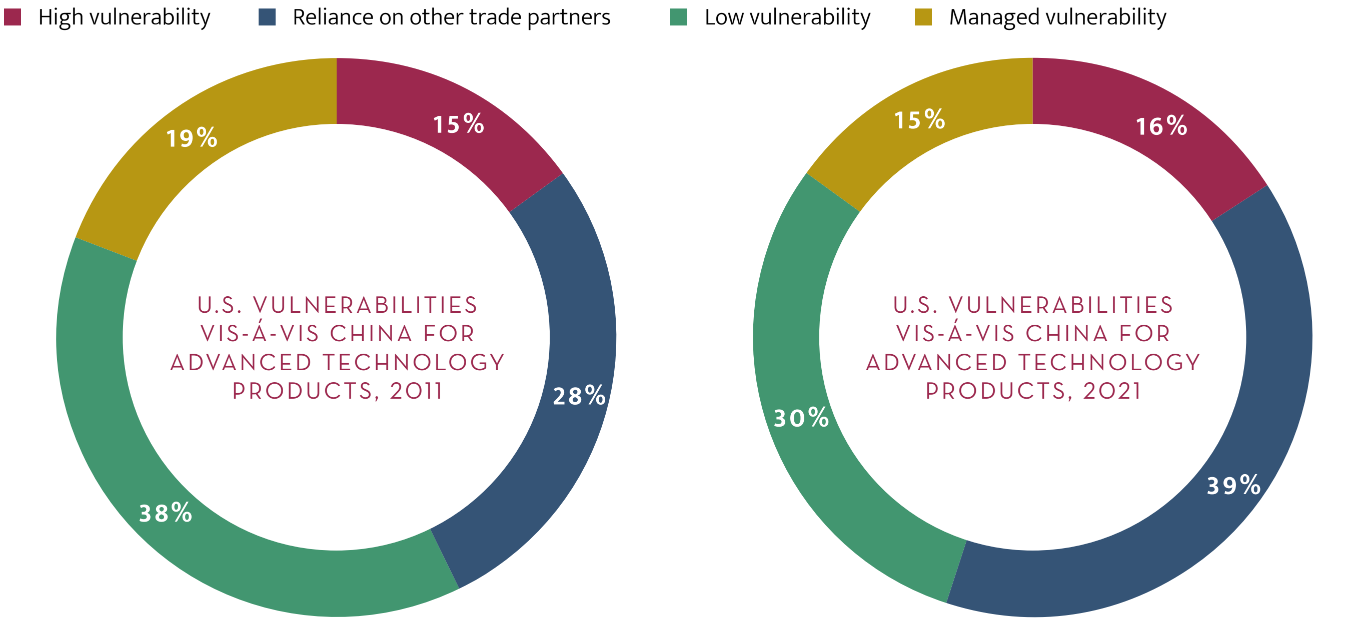


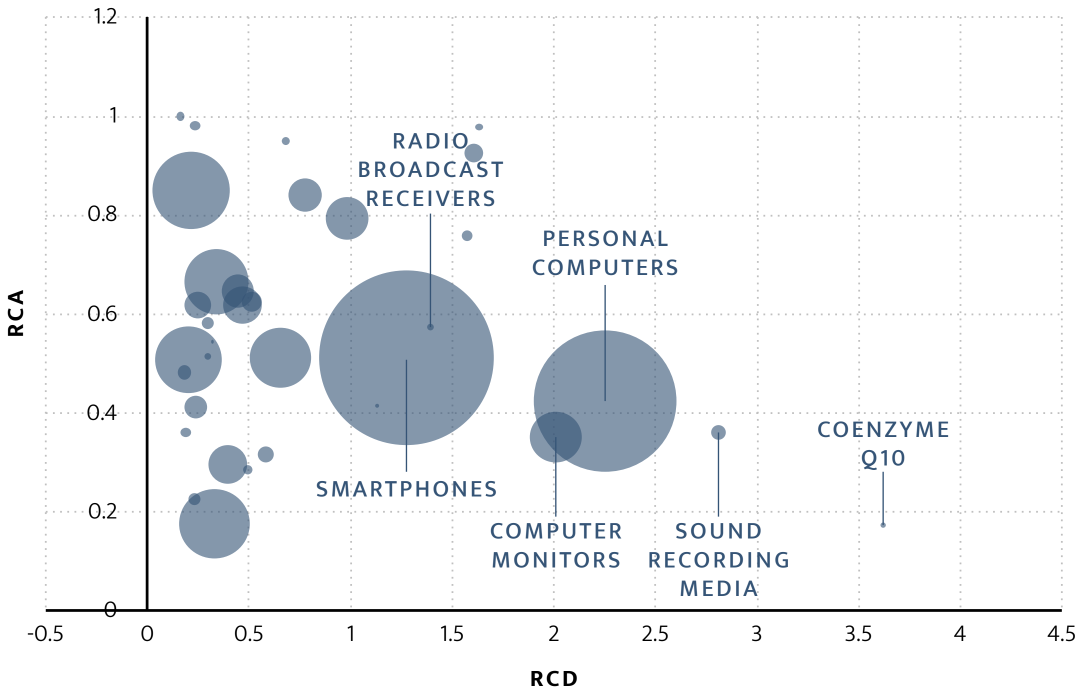
TABLE 1. U.S. VULNERABILITIES BY SELECTED FIELD OF TECHNOLOGY

FIELD	PERCENTAGE OF ATPS BY VULNERABILITY IN 2021 (IN 2011)			
	HIGH	LOW	MANAGEABLE	RELIANCE ON OTHERS
Aerospace	0% (0%)	55% (42%)	0% (5%)	45% (53%)
Flexible Manufacturing	9% (10%)	19% (30%)	13% (10%)	58% (50%)
Life Sciences	19% (11%)	54% (61%)	19% (22%)	8% (6%)
Information & Communications	37% (40%)	18% (6%)	18% (43%)	26% (11%)

Figure 5 is a bubble chart showing just those 34 ATP categories that represent high vulnerability, i.e., where U.S. dependence on China (RCD > 0.15) coincides with a lack of U.S. manufacturing capability (RCA < 1).

Despite the fact that every product on the chart represents high vulnerability, some may be more worthy of the attention of policymakers than others. For example, products where RCA is close to 1 may not require any governmental intervention to exceed the RCA > 1 value; market forces may allow this to happen on their own. It is not unusual for RCA values to cross the 1.0 threshold from one year to the next. Similarly, products where RCD is close to 0.15 may slip above or below this threshold in any given year. In either case, useful information will arise from examining multiyear trends.

FIGURE 5. SMARTPHONES AND LAPTOP COMPUTERS ARE AMONG THE ADVANCED TECHNOLOGY PRODUCTS (ATPS) FOR WHICH THE UNITED STATES IS MOST DEPENDENT ON CHINESE MANUFACTURING. PRODUCTS WHERE RCA (Y AXIS) IS CLOSE TO 1.0 OR RCD (X AXIS) CLOSE TO 0.15 MAY NOT WARRANT IMMEDIATE ATTENTION FROM POLICYMAKERS BECAUSE MARKETS MAY ADDRESS THE ISSUE ON THEIR OWN.



According to this Figure 5, ATPs showing a high dependence on China include those associated with smartphones, laptop computers, and computer monitors — products with a substantial world trade value. Some of the other products shown in the chart (e.g., coenzyme Q10, radio broadcast receivers) have a relatively small world trade value.

One might wonder about the share of world trade controlled by China for these high vulnerability products. After all, the larger China's share of world trade, the greater its market power. Table 2 shows China's share of world trade for those ATPs labeled in Figure 5. In every case, China controls more than 50% of the global market, well above its 15% share of aggregate world trade. With this amount of global market share, China wields considerable soft power.

TABLE 2. ATPS WITH THE HIGHEST U.S. VULNERABILITIES, 2021

HTS CODE	PRODUCT DESCRIPTION	RCA	RCD	CHINA SHARE OF WORLD TRADE
291462	Coenzyme Q10, a dietary supplement	0.17	3.62	**83%**
847130	Personal computers	0.42	2.25	**88%**
851981	Sound recording media (compact discs, etc.)	0.36	2.81	**70%**
852852	Computer monitors	0.35	2.01	**72%**
852799	Radio broadcast receivers	0.57	1.39	**50%**
851712	Smartphones	0.51	1.27	**73%**

Going back to Figure 5, we can contemplate how policymakers might react. Government intervention could move products vertically or horizontally. For example, tariffs on Chinese imports (additional to those imposed by the Trump Administration) are likely to move products horizontally to the left. If steep enough, such tariffs might move products out of the high vulnerability quadrant and into the reliance on others quadrant. This would address some of the vulnerabilities listed previously: China would no longer take market share away from the USA, the risk of a future China-centered supply disruption would be lower, and China would have less soft power to wield.

However, such tariffs may do nothing to increase U.S. capabilities, which would reduce each of the listed vulnerabilities and increase the soft power of the United States. Policies such as greater incentives for foreign direct investment (FDI) offer the promise of vertical movement, which reflect an expansion of a nation's frontier of manufacturing know-how.

Although the analysis presented here can inform policymakers, it does not provide a road map to help policymakers choose one policy option over another. To do this, policymakers should engage industry experts to better understand how U.S. capabilities can be enhanced. RCD and RCA are not sufficient to elucidate why a product lies within a particular quadrant of vulnerability. Only after gathering such industry intelligence might a picture emerge of the barriers constraining the U.S. frontier of know-how. At this point, policy actions could be identified for consideration. For example, if U.S. capabilities to make Product X are constrained primarily by significant barriers in permitting that discourage capital investment, it would be unproductive to identify and pursue a policy option that doesn't include permitting reform.

IMPLICATIONS FOR BIDEN'S INDUSTRIAL POLICY

The Biden Administration's evolving industrial policy (self-labeled as a "modern industrial strategy") is centered around three foundational technologies (computing-related technologies, biotechnology/ biomanufacturing, and clean energy) and includes a set of actions to facilitate the expansion of domestic capabilities (his so-called "promote" agenda) and a set of actions to slow the expansion of China's capabilities (his so-called "protect" agenda) (Bade 2022). The protect agenda is "narrowly focused" on choke points. The goal of the policy is to expand U.S. technological leadership over China in these foundational technologies while also expanding American manufacturing.[11]

Under his promote agenda, Biden's actions include major investments in innovation and infrastructure (e.g., via the Infrastructure Investment and Jobs Act, Inflation Reduction Act, and the CHIPS and Science Act, and Biden's National Biotechnology and Biomanufacturing Initiative), expansion of "Buy America" procurement regulations (in terms of scope and by limiting exceptions), and acquiring and nurturing top STEM talent (e.g., investments in STEM education for underrepresented groups, eliminating a long-standing visa requirement to have a sponsoring U.S. employer for highly accomplished individuals with an advanced degree in a STEM field critical to U.S. national security).

Under his protect agenda, Biden's actions include export controls (on selling to China machines/equipment used to fabricate advanced semiconductors), incoming and outbound investment screening (e.g., issuance of new guidance re: The Committee on Foreign Investment in the United States), and working with allies (e.g., creation of the Indo-Pacific Economic Framework, the U.S.-EU Trade and Technology Council, and AUKUS security pact). The Administration is reportedly working on a near real-time "common operating picture" of global supply chains for critical industries. The overall impression is that the vast majority of trade with China (outside of foundational technologies and those goods critical/essential to public health) is welcome and to be encouraged, with the important stipulation that international trade rules and norms of behavior are to be followed/enforced (including the recently enacted Uyghur Forced Labor Prevention Act).[12]

The Biden Administration could build on the approach presented here to increase the effectiveness of its evolving industrial policy and supply chain initiatives. We offer four recommendations:

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11. *The presumption is that the United States truly has a technological lead over China in these foundational technologies. But is this true? Most certainly, China has manufacturing capabilities that exceed that of the United States in many of the products that embody these foundational technologies: personal computers, smartphones, solar panels, etc. For ATPs, the largest U.S. vulnerabilities are in information and communication technologies.*
12. *This description of Biden's industrial strategy is derived primarily from two sources: Raimondo (2022) and Sullivan (2022).*

The Department of Commerce should, annually, identify and publicize high vulnerabilities by sifting through all 5,000+ traded goods with unique six-digit HTS codes by calculating both RCA and RCD. Publication of a list of high vulnerability goods will serve to educate (and nudge) the private sector in the management of global supply chains. Special attention could be paid to foundational technologies and critical goods — the focus of Biden's policy. It is likely that simply making a summary of this analysis public will spur action by the private sector to reduce vulnerabilities, even in the absence of direct federal action (mandates or subsidies).

This comprehensive analysis of traded goods should then inform federal implementation of the Inflation Reduction Act, the Infrastructure Investment and Jobs Act, and the CHIPS and Science Act — which together direct $1 trillion in support of U.S. supply chains. For example, the Administration could give greater weight to applications for federal subsidies that reduce high vulnerabilities, and lesser weight to applications aiming to reduce low vulnerabilities.

Biden should scale back the Trump 301 tariffs on the vast majority of Chinese goods. These tariffs, which are more congruent with complete decoupling than selective decoupling, too often impose a burden on U.S. manufacturing, undercutting the goal of Biden's industrial policy. Specifically, the scope of these tariffs should be narrowed to only finished goods and/or high vulnerability goods.

Finally, Biden should make it easier for the United States to attract and retain foreign workers possessing tacit know-how that is lacking domestically. (By definition, tacit know-how can only be acquired through extensive interaction with those who possess it.) To achieve such ends may require (1) a new federal program to incentivize FDI in the manufacture of high vulnerability goods and (2) immigration reform to attract the most skilled workers from abroad (Biden has taken steps here but could do more). In the former case, the federal government could supplement economic development incentives offered by states for projects that reduce the most significant vulnerabilities. In both cases, the federal government should attach strings to ensure that the beneficiaries transfer tacit know-how to American workers.

CONCLUSION

Supply chain vulnerabilities are a function of both domestic capabilities and foreign dependence. The highest vulnerabilities arise when domestic capabilities are lacking and foreign dependence is significant and concentrated. The lowest vulnerabilities arise when domestic capabilities are significant and foreign dependence is lacking or dispersed among many trading partners. A quadrant chart to categorize vulnerabilities can be developed based on the known metric of RCA (to measure domestic capabilities) and a new metric, RCD (to measure foreign dependence).

This kind of analysis yields insight into the vulnerability of U.S. supply chains to China for ATPs. We find that U.S. vulnerabilities, in the last decade, are driven more by a loss in domestic manufacturing know-how than by greater dependence on China. In some fields — like information & communications — U.S. vulnerabilities are relatively high while in others — like aerospace — U.S. vulnerabilities are relatively low.

In accordance with its stated industrial policy, the Biden Administration should seek selective decoupling where RCD is high, RCA is low, and China's share of world trade is large enough to give it significant market power. More generally, policymakers should add RCD to their toolbox of metrics for evaluating the resilience of global value chains. It is easily estimated using publicly available data, complementary to existing metrics, and helpful for identifying vulnerabilities. Because it is designed to inform public policy actions and not the actions of private sector firms, RCD is unique among supply chain metrics.

ABOUT THE AUTHOR

Keith B. Belton is Senior Director of Policy Analysis with the American Chemistry Council. His research and writings explore the intersection of public policy and private markets, with particular focus on economic development, regulation, and competitiveness.

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