

The Weakest Links in the Global Supply Chain: Part III

Disruptive Forces in Investing

February 15, 2022

- Anu Rajakumar:** The global supply-chain disruption has affected all sectors, particularly because of a reliance on semiconductors, an essential component of electronic devices using countless applications across industries, including the phone or computer that you're probably using right now. In today's episode, which is the third and final part of a series about global supply chains, we dig into the cause and effect of this particular shortage and how companies are adapting as a result. My name is Anu Rajakumar, and to help me navigate this topic, I've been joined by Daniel Flax, Senior Research Analyst for the technology sector at Neuberger Berman, to share his perspectives on this key piece of the complex supply-chain puzzle. Dan, thanks so much for joining me today, and for returning to the show.
- Daniel Flax:** Great to be with you. Thanks Anu.
- Anu:** For those listeners who aren't aware, Dan was on one of our very first episodes of the show when he was discussing 5G and technology for the future, so, almost two years past that episode, Dan's back on; really to talk about, semiconductor shortages. So Dan, you know, of course headlines have been talking about these shortage for a long time; but just in case our listeners have missed out on any of those key developments, can you give us a quick rundown of what's been going on with semiconductors over the last couple of years? And what are you seeing today?
- Dan:** Throughout COVID, Anu, what we've seen is that different industries have responded to the crisis, the pandemic, the recession, differently. So for example, if you look at the automobile industry, when COVID and the recession hit, those companies cut back on their production. And so that rippled through the supply chain, and they didn't have, uh, the need for as many semiconductors, or so they thought; whereas if you look at other industries, for example the technology industry itself; laptops, tablets, all the devices, the video, the audio, everything that we now are using, even more than we used prior to COVID; the demand for that has been extraordinary. And so you've had a mismatch in terms of supply and demand across industries, and the result is that the supply chain has been working around the clock, uh, to be able to, to make adjustments. And ultimately we expect all these supply challenges to get worked out over the next couple of years; but it's going to, it's going to be a very dynamic period while we continue to work through everything.
- Anu:** Thanks so much, Dan. So you know, exponential demand and probably a similar amount of supply as before, and potential shortages. So with that in mind, Dan, tell us about how companies adapted to those shortages; and what's the end in sight for consumers here?
- Dan:** I think for consumers, we're in a place where the technology, the power, the magic of the devices and the services, has never been greater. And as we think about the world ahead, we can see augmented, virtual reality, uh, the Metaverse, becoming more and more important to what we do. But as businesses, there's severe dislocations. There're, in some cases, very specific components, that are not made in sufficient quantities. And so an entire product could be a car, in some cases, that is being held up as a result of that. So what we're seeing is that some companies are redesigning or making changes to the products and what components they use in order to be able to get the product out to market; even though they don't have everything that they would have used in the past. So you're seeing a level of redesign. You're seeing companies use this opportunity, given the disruption everywhere to rethink how they, approach products for both businesses and consumers. And so a lot of change; I think what resonates, and what we find with discussions with all of our companies; is this notion of flexibility, creativity, really thinking about things very, very differently than we have in the past.
- Anu:** Sure, and on that note, um, you know Dan, you mentioned redesigning, adapting, new product, creativity. Is there a company that you particularly have admired, in terms of how it may have evolved over the last couple of years?
- Dan:** If you look at some of what the technology companies have done – and I'll use Apple, which many of the listeners will know what they make. But the fact that they've been able to design, test; bring products and services, but products in particular, out to market; in the face of extreme challenges to their supply chain – which is global, for a company like Apple – that's been extraordinary in many respects. And I think this ability to innovate, to collaborate, internally in terms of their teams, around

the world working together with their suppliers, with really the whole supply chain to bring new products to market in an environment where, of course, all of us need new technology; that's been extraordinary. They're certainly not the only ones, but I mention them because of their size, of their scale, and the importance in many of the products that a lot of use every day.

Anu: Perfect. Thanks very much. Now Dan, I want to pivot a little bit to talk about the infrastructure component of this supply-chain crisis. I'm using the term infrastructure quite broadly here, but tell us about what technology companies are doing to really bolster their corporate infrastructure, in addition to their digital infrastructure?

Dan: Anu, one of the most interesting things about this period is that a lot of the companies – and certainly we'll focus on the technology companies – they haven't really missed a beat in terms of how they operate. Now, clearly a lot of it has moved to the digital world; but if we look in the physical world, there has been investments announced and underway in the tens, really the hundreds, of billions of dollars. So you look at a company like Intel, for example, announcing, big multiyear investments, in the state of Arizona, more recently in Ohio. You look at Taiwan Semiconductor. You look at Samsung. You look at these, these innovative companies that, are looking to expand their footprints, their manufacturing presence in the United States, in Europe, really globally; because when we think about how the world looks on the other side of all of this, it's clear that technology will have a more and more important role to play. And so sure, we're going to have cycles. But the ability to add capacity and bring semiconductors, in this case, to all of these other industries that really need them for that next wave of innovation, that's what's going on, on the ground. And I think, when we do our podcasts in three or four years from now, that will still be underway, because this is a multiyear journey.

Anu: Sure, and it sounds like expansion has been the name of the game, more so than, you know, nearshoring or onshoring. Is that true? What are you seeing?

Dan: It's a combination. These companies are all global, and many of them have operated in, in multiple regions for decades. I think, clearly, there's an element of nearshoring in some cases. So for example, here in the United States, the percentage of, semiconductor manufacturing has gone down as it has grown in Asia. And I think certainly, the United States Congress and the companies are looking to increase the semiconductor manufacturing here. And that's because their customers, are looking to have more of that local supply. We've seen some of the challenges with logistics, with trade. And so many companies here in the United States, certainly in Europe as well, are appreciating that the need to have more local supply is important. I would underscore, though, these companies remain global in nature. They're drawing on talent all over the world; but certainly a lot more local manufacturing, I think, in the decades ahead.

Anu: Yep, that's great. And you know, I did want to ask, just to expand on those comments, just, about geopolitics within technology. This was something that we talked a little bit about with, Marco Spinar in the second episode of this series. Marco covers the emerging markets, but wanted to ask you: What are some of the key geopolitical issues that have come up over the last couple of years, and how do you see those evolving going forward?

Dan: The trade tension with China, which has been underway for several years, remains a dynamic that all companies are navigating. We've seen that, certainly, with 5G in terms of, the bifurcation of supply chains in certain respects; and that, likely to be a factor, over the coming years. I think, though, a lot of what China and some economies, in the West –are looking to do is really ensure that a lot of, intellectual property, a lot of talent, a lot of resource, is in their geography or close by, so they can access it. Because everyone is appreciating 5G or the next generation of connectivity, among other things, is really foundational to the whole wave of innovation that lies ahead. And as we're also seeing, there are implications in terms of the economies; but societies, more broadly, are being impacted, by technology; how it's used, how communication takes place; how people transact; how healthcare services are being delivered. And so really it's touching all aspects of our lives. And that trend is likely to only accelerate in the next several years.

Anu: Excellent. Thank you. Dan, I wanted you to see if you could speak a little bit about you know, as we move from the pandemic, becoming an endemic, what are the other key risks that you see on the horizon for the technology sector? And then if you could follow that, I would also like to hear about where you think the biggest opportunities are, particularly coming out of the supply chain; so risks, as well as opportunities, if you don't mind.

Dan: The risks are numerous, Anu, and I'd highlight a few. So first, the technology risk around many of these companies –I'll give you some examples –is extraordinary. Most of these companies, have not been able to make it through from one cycle to the next. I'll, mention Microsoft. We talked about Intel. These two companies are ones that have been able to grow and transform themselves over decades.

But that's been very hard to do. And so the technology risk itself remains high. Another big challenge that the industry has been facing has been the issues around trade and the bifurcation of supply chains. And so I do think that's one that the companies, the industries, and frankly even the governments, are going to be able to sort out over the next several years; but that does remain a risk from day to day, as companies struggle to find the right components.

If I step back and think about the opportunities; I'll start with the cloud and this buildout of the digital infrastructure, which of course requires physical investments as we've talked about in terms of, manufacturing plants, servers, chips; this software, of course, that is so important in making sure things work properly. And so this buildout of the cloud, think about Amazon Web Services. Think about Microsoft Azure. Think about the Google Cloud platform. As big as those companies are becoming, in many ways, this buildout of the cloud, is still in the very early innings. Another important development that we see is that artificial intelligence, or AI – which in some respects has been with us for quite some time – we're now entering an era where there is virtually unlimited compute and analytics horsepower that can be applied. Think about using AI for drug discovery. Think about using it for fraud detection. Think about using it for modeling for climate change. And so trends like artificial intelligence, which have been with us for some time, are really entering a new era because of the enormous, capabilities and solutions from companies like an Nvidia, that they're able to bring to market.

I'll also mention the Metaverse, which gets a lot of attention. We've been focused on augmented and virtual reality and the infusion of digital content into the physical world, for some time. And what we're beginning to see from a device perspective – and it remains early – is that you really can come up with experiences on a Smartphone, I'm sure, with better and better glasses or visors over time that people use, that really are able to transform the experience. And that's transformational. We've talked about 5G, but what I would, suggest is that, when we think about how the automobile industry, all of these industries that might touch it; for example, robotics, drones; all things that move around or fly around; the ability to infuse it with intelligence, with semiconductor content, with software, and really transform how those platforms evolve. That's pretty significant. And I'll round it out with, as we think about this world ahead, you have new business models as well. And so we spent a lot of time trying to think through how these business models are going to be evolving, where the disruption is; how companies can embrace change. They're going to cannibalize themselves, or someone else is going to do it for them; so a, a lot that we're excited about.

Anu: Great. Thanks very much, Dan. It sounds like there's a lot to be very excited about. As we wrap up our conversation today, would love you to talk about three takeaways that you'd like our listeners to walk away with.

Dan: The first one is that a lot of what we're discussing, Anu, is really in the very early innings. If we think about the transformation as one example of the industrial landscape, think about the intelligence on the factory floor, in manufacturing plants, the world around us, having smarter devices, smarter autonomous systems, being able to help, uh, improve productivity. It's very, very early; and we, we would expect to be talking about this 10 years from now and beyond.

The second one, the supply-chain challenges are real; but I think, given the focus and the investment from companies, from governments, really in terms of nurturing an environment where, uh, organizations are, are incented to, to make thoughtful investments over the longer term; I do think a lot of the problems are going to get solved. It will take time, but there, there's a lot that's being done globally, which is going to help solve it. And then the final piece around regulation, I think a big part of this is the ability to improve the level of transparency. The issues around data, privacy, security, they're incredibly important; and of course we all realize that different societies think about them in different ways. And so what I think the companies can do more of is to engage with governments, with regulators, with other bodies, to help think through what, what are the ways to educate users and ensure that people appreciate how data is being used, how, things can remain competitive and still deliver valuable products and services to people.

Anu: That's terrific, Dan. I think that's a good place to end today's comments. But I can't let you go before I ask a quick bonus question. So Dan, as someone who covers technology, I'd love to ask you: What is your favorite app, and why?

Dan: My favorite app remains YouTube, but it's because of my two daughters, who are three and five; or just about four, as my younger one will tell me, and five and a half, as my older one will tell me, because I can bring up entertainment at a moment's notice. But – and there's always a but – I need to be able to keep an eye on what they're doing. And so YouTube remains my favorite app because of the power of bringing up Peppa Pig or Daniel Tiger, with a – within a nanosecond, Anu.

Anu: [Laughs]

Dan: So that is, is the most important app.

Anu: [Laughs] It's very true. I was going to say, mine is probably Disney+, for the exact same reasons.

Dan, thank you so much for joining me on today's episode; uh, really appreciate your thoughts here. You know, there's a number of, of issues that impact all of us; and I think you, you've highlighted some of the key concerns and, you know, really, uh, helped to hear some of your – some of the innovations that you, that you've highlighted. We'll have to check back in in a few months or another year or so to see how some of those play out, but again, Dan, thanks so much for joining me today.

Dan: Thanks, Anu. Delighted to be with you.

Anu: And with that, we will conclude our three-part series on supply chains here on Disruptive Forces; encourage you to go back and listen to the, uh, previous episodes if you haven't already done so. And as always, if you've enjoyed this episode of Disruptive Forces, I encourage you to subscribe via Apple Podcast, Google Podcast, or Spotify; or you can visit our website, www.nb.com/disruptiveforces, where you can find previous episodes and more about our firm and offerings.

This podcast includes general market commentary, general investment education and general information about Neuberger Berman. It is provided for informational purposes only and nothing herein constitutes investment, legal, accounting or tax advice, or a recommendation to buy, sell or hold a security. This communication is not directed at any investor or category of investors and should not be regarded as investment advice or a suggestion to engage in or refrain from any investment-related course of action. Investment decisions should be made based on an investor's individual objectives and circumstances and in consultation with his or her advisors. Information is obtained from sources deemed reliable, but there is no representation or warranty as to its accuracy, completeness, or reliability. All information is current as of the date of recording and is subject to change without notice. Any views or opinions expressed may not reflect those of the firm as a whole. This material may include estimates, outlooks, projections and other "forward-looking statements." Due to a variety of factors, actual events or market behavior may differ significantly from any views expressed. Neuberger Berman products and services may not be available in all jurisdictions or to all client types. Diversification does not guarantee profit or protect against loss in declining markets. Investing entails risks including the possible loss of principal. Investments in hedge funds and private equity are speculative, involve a higher degree of risk than more traditional investments and are intended for sophisticated investors only. Indexes are unmanaged and are not available for direct investment. **Past performance is no guarantee of future results.**

Discussions of any specific sectors and companies are for informational purposes only. This material is not intended as a formal research report and should not be relied upon as a basis for making an investment decision. The firm, its employees and advisory accounts may hold positions of any companies discussed. Specific securities identified and described do not represent all of the securities purchased, sold or recommended for advisory clients. It should not be assumed that any investments in securities, companies, sectors or markets identified and described were or will be profitable. Any discussion of environmental, social and governance (ESG) factor and ratings are for informational purposes only and should not be relied upon as a basis for making an investment decision. ESG factors are one of many factors that may be considered when making investment decisions.

This material is being issued on a limited basis through various global subsidiaries and affiliates of Neuberger Berman Group LLC. Please visit <http://www.nb.com/disclosure-global-communications> for the specific entities and jurisdictional limitations and restrictions.

The "Neuberger Berman" name and logo are registered service marks of Neuberger Berman Group LLC.

© 2022 Neuberger Berman Group LLC. All rights reserved.