

Mark Noble:

Welcome to the latest episode of Generation ETFs, I'm Mark Noble, Executive Vice President of ETF strategy at Horizons ETFs.

On today's episode, we discuss arguably one of the most important but misunderstood developments in global macroeconomics, which is a continued supply chain shortage of semiconductors.

Now we often refer to data as the new oil at Horizons ETFs, since data is the lifeblood that powers this massive digital transformation that's currently taking place across the globe. And powering the usage of this data's applications are semiconductors, which is a broad catchall category of chip sets and transistors that are used to allow for the broad uses of data integration of electronics. Semiconductors literally power everything today, from mobile phones and electrical vehicles to more benign household items such as fridges and children's toys.

Now, this has gone not unnoticed by the world's global economic superpowers, particularly the United States and China, who are currently undertaking aggressive policy shifts to stay ahead of supply chain challenges with semiconductors in an attempt to ensure they maintain control over their usage and production since it is, as we highlighted, the key technology building block for most economic expansion as it relates to technology.

With us to give a better understanding of this is Angelo Katsoras, Geopolitical Analyst at National Bank, who has been closely monitoring the geopolitical impact of semiconductor supply chain and how the sector might be transforming the U.S. and China to potentially reorient their economies.

This is bigger than one sector. There is a larger economic story here about who controls the technological development in the next century or the next decades ahead. And a lot of it has to do with who controls the supply chain and development of semiconductors.

Now at Horizons ETFs we offered Canada's first and only semiconductor ETF, the Horizon's Global Semiconductor ETF, which trades on the Toronto stock Exchange under the ticker symbol CHPS, or more easily said, "Chips," but I want to make it clear here Angelo is not affiliated with our promotion of this ETF, and really today we're trying to deep dive into the broader macroeconomic implications of the sector and what it potentially means for geopolitical developments for the next decade. Welcome Angelo, it's a pleasure to have you here today.

Angelo Katsoras:

Thank you very much for having me.

Mark Noble:

I think we'll just hit it right off the bat Angelo, in terms of the semiconductor shortage, a lot of people might have heard of it, but I don't think they know exactly what we're talking about or what we're referring to. So why don't we start there? What are semiconductors, and really why do they matter in terms of a broader geopolitical landscape?

Angelo Katsoras:

I think in the most simple terms, semiconductors are basically components where you can process data, you can store data, you can transmit, you can move data elsewhere. And given that all the goods that we're producing now have more and more electronic components of it, as you mentioned earlier, semiconductors are going to be used for everything, and they're becoming more powerful, and they're becoming more small, you can put thousands of little components on the size of a chip that's only millimeters large.

But everything that we are producing now, even some of the most benign items, as you mentioned, like a fridge, is more and more becoming connected to the internet, and more and more becoming technologically sophisticated, hence more chips, more brains behind every product if you want to look at it that way.

Mark Noble:

And in terms of the economic impact, why have we run into an issue with supply chain and where this has actually become a central geopolitical issue for both the Biden administration and the administration in China?

Angelo Katsoras:

Well, I guess in the very beginning, the most common response was that we always said that everyone was working from home, so they had to have demand for the computers, the car companies thought that things were going to collapse, so they canceled a lot of their chip orders, and all the semiconductors moved it elsewhere to higher profit items.

But then there's also the geopolitics that really made a bad situation worse, where for example, even before the pandemic, Huawei knew that they were going to be hit with sanctions, so they were starting to stockpile semiconductors. So all their competitors realized they were doing that, so they did the same thing.

Also there was many Western companies that were buying lower-end chips from Chinese semiconductor companies, and once they got hit by sanctions, they had to go somewhere else. But those companies already had a full order book.

And then you also had to have the fact where, when we look at just-in-time, just-in-time works under conditions of what I would call high trust or perfect conditions, where you want to have the most efficient supply chain as possible. The problem with just-in-time is that what

eventually happens is that you whittle it down to a couple suppliers because it's winner take all almost. So you go from 2000 where there was 25 manufacturers of semiconductors, and now there's two or three manufacturers of the most advanced semiconductor chips in terms of manufacturing them.

And so when something goes wrong, whether it's geopolitical tensions, or whether it's the COVID, it doesn't take one more just for one site to go under for us to have these backlogs. So we're very efficient, but very fragile.

And also when it comes to just-in-time, is that I think all the leaders in this industry realized that if they all stockpile chips, or even other components related to them, we're all going to be worse off. But since no one trusts anybody that their competitors are not going to stockpile, they're all stockpiling.

And I think one of the perfect examples of how just-in-time doesn't work when you have low confidence is an industry not related to semiconductors, I don't know if you can remember going back to the shutdown of the Colonial Oil Pipeline-

Mark Noble:

Correct, yeah.

Angelo Katsoras:

... due to a cyber attack, well, when that thing shut down, it had what was considered to be 27 days supply of gasoline. Everyone panicked, started buying as much gasoline as they could, and within two days there were shortages. So the pipeline was off for five days, so what was 27 days became two. So the just-in-time model where you keep minimum reserves of products does not work in a low trust environment, and that's what we're in right now.

Mark Noble:

Or in the case here where we have the combination too of the pandemic and high demand. If we look at like motor vehicles, for example, I believe I read that the car companies are happy with sales, but they expect to miss out on an extra trillion dollars in sales over the next couple of years, simply because they have thousands of cars sitting on parking lots waiting for semiconductor integration into their circuit boards.

Angelo Katsoras:

Yeah, And the problem too was that the chips that they canceled at the very beginning of the pandemic when they thought there wasn't going to be demand, they're lower end. So the semiconductor companies where, you automatically [inaudible] to the most advanced chips are what you're getting more profits for, where what's going to have to happen is that, and what is happening, is that the margin on these, what is considered lower end items, the prices are going to go up.

And even if you agree to build more, it'll take a few years at best, even to build some of the more simple for the lower versions of chips that are using some of these cars, not the most sophisticated, it takes a few years to build these up. And then once again, once you've been burned as an automobile company, you're going to stockpile all the time now.

You're going to say, "Just in case, just in case," and it'll take a long time for that fear to kind of wear down. So going back to just-in-time will be very difficult. Even Toyota, Toyota is one of the companies that dealt with it the best, and it's ironic because Toyota, who started just-in-time, when they got hit by an earthquake they actually diluted their just-in-time to stockpile certain components, which gave them a bit of a jump or an advantage vis-a-vis some of their competitors in North America, which were using pure just-in-time models.

Mark Noble:

And again, hitting the just-in-time model, over the last 40 years as we've seen globalization expand, and we've moved to just-in-time modeling to a global supply chain, we also end up with regional hubs. And in the case of semiconductors, that regional hub has really Taiwan and China in terms of being the key area for development.

And I think you've highlighted, this has become a flash point now for the U.S. because the United States is developing a lot of the intellectual property around the development of particularly the GPUs, so like AMD and Intel and Nvidia are large U.S. multinationals, but they export this, or license this IP to producers in Taiwan and China where there's not quite the same political control that the U.S. has, so really at the mercy of the East Asian influence of economic influence to get these chips back into North America.

Angelo Katsoras:

And that is also where the United States have woken up after, when you've had the increasing tension with China, now the pandemic, they've realized that perhaps it's not safe to have most of the production of the chips, the manufacturing, be done there. You never know what will happen with Chinese-Taiwanese tensions, for example, and so they're now saying for reasons of national security, "We want to bring some of this production to the United States." And the Europe is saying the same thing, China is the saying the same thing.

But if you were to look at this purely from an efficiency perspective, you would just add to the existing supply chain, because that's the way to do it as quickly. But what we're seeing these countries, the United States doing, is that they're moving supply chains to the United States for reasons of national security. Japan is following suit, China is doing the same.

So you're going to have smaller locations, less economies of scale, sometimes redundant supply chains. So what you gain in national security eventually after a few years, because it takes time, you lose in economies of scale. So you're going to pay more.

And so we talked about how with just-in-time, and what you are producing in the world, if you only have one or two suppliers and something goes under, well now you're building backup, but those backups have costs, they have costs. And so the costs are going to go up.

And you're also seeing some of these car companies, I think, where they're going to start to analyze and say, "Should we do vertical integration? Should we buy participation in chip companies for the chips we need so that we're never going to be on the hook again?"

So we go kind of in trends in society, where for a couple of years we're pressuring all the companies to unload all these things, because it's so they can focus on what they do best. And then all of a sudden, now where the pendulum is turning to we're saying, "Maybe you should be buying downwards in your production cycle to make sure you have access."

Mark Noble:

You have 2000 pounds of steel at the mercy of a millimeter chip, right?

Angelo Katsoras:

And there's also one more thing you mentioned too, when you talked about how America has intellectual property. Because right now America, as you know, is big in producing the software needed and equipment needed to produce these items, and then they're manufacturing mostly in Taiwan in the high end, but America has come to the conclusion recently, where if you just focus on the software design and you let someone else focus on the building of it, eventually the person who's building it will develop capacities elsewhere, which will threaten your dominance in other related sectors.

And so now they're saying, "Well if you really want to maintain your capacity, maybe you should also have the full cycle of the production within your country." So this way you're building the software, you're dealing with the manufacturing, you have the synergies between the two. And that's a big change from a few years back when investors were encouraging, or governments were encouraging companies to focus on software design and outsource the manufacturing somewhere else. So that's a big change as well.

Mark Noble:

If we do move towards reorienting the global supply chain for semiconductors, which seems to be on the schedule, as you've highlighted Biden looks to be looking to re-shore some of the manufacturing of the actual components, what's the actual impact to consumers in your view?

Angelo Katsoras:

I think that it will be higher costs, we mentioned all these smaller supply chains. And also we'll just throw in another example, where we look at TSMC, the Taiwanese Semiconductor Manufacturing Company, well they're kind of being pressured, every which way they look they're being pressured.

And so if you're selling to the top tech companies in China, you're selling to the top tech companies in the U.S., so if you want to maintain market access to both, you might have to have a supply chain for China with no U.S. components and the supply chain for the U.S. with no Chinese components.

Now, if you succeed in doing this, and it's a big if, this involves a lot more costs, like you're not building the supply chains out with efficiency as your first thought, you're doing it to try to keep your major clients happy in the state of geopolitical wars.

And in the case of the United States and Europe, you're doing it for national security. You're not doing it to... You're willing to pay subsidies and have higher cost production within your jurisdiction to have some of this production there. So I think we have to look at it that the side effect of building supply chains for national security, which we could argue as being right or wrong, but it does mean higher costs.

Because that pure efficiency, the most efficient supply chain possible, it's not being done anymore. It's now being done with a national security tint to it. And that means redundant supply chains, where you'll pay for these extra supply chains.

Mark Noble:

Do you see parallels with this with the sort of view of oil in the sixties, seventies and 1980s in terms of that being a huge catalyst for geopolitical tension? Could you see something similar occurring here globally?

Angelo Katsoras:

Well, you know what, there's a similarity because in the seventies and eighties especially, there was always this view that we were dependent on others for our oil, we were trying to develop our own reserves, and then be more efficient with gasoline.

And so now a lot of countries have woken up to the fact that they're dependent, not just America is dependent, China has realized that they're vulnerable to sanctions, and so they're saying for reasons of national security, similar to the oil question, we have to bring as much of this back as possible. And it's become a competition, so both sides are going to throw a lot of money into building a supply chain and throw a lot of money into R&D to try to beat the other.

And there is a silver lining. The silver lining is when you compare it to the cold war between the United States and the Soviet Union, is that a lot of things that America at the time invented were based on this cold war competition, whether it was the drone, the mouse for your computer, the GPS, all these things were originally based on military applications in the cold war that eventually had civilian uses.

So I think that what we're going to see is that we're going to see a lot of innovations develop between the competition between these two countries, when semiconductors and elsewhere, the difference being it won't just be the United States coming up with the innovations, I think it will be shared between China and the United States much more.

Mark Noble:

That's definitely a silver lining. Do you think though that at a certain point you could end up with a demand though for some of the rare earth metals, or some of the other components that come into the semiconductors.

I mean, the one thing about semiconductors, is at least they're pretty benign in that I could manufacture that in Toledo, Ohio, or I can manufacture that in Taiwan, or I can manufacture in Sub-Saharan Africa, I can build a manufacturing plant anywhere, but are you concerned at all about the components that go into any of these? The same idea, right? So we have lithium for battery technology, or any of the rare earth components that might be used in the production of some of these?

Angelo Katsoras:

Well, when you look at rare earth, for example, I think as we're familiar that about 70%, or 60% to 70% of the production is in China, but even more importantly, all of the rare earth, even if you produce it somewhere else, or you mine it somewhere else, all of the refining takes place in China.

So the United States is reliant on China to refine the materials needed for its warships and semiconductors. And the problem with rare earth minerals that it's a very intense process. So for example, if you look at gold, I think one civil servant from Ottawa was quoted as saying, "When you mine for gold it's the equivalent of pulling a chocolate chip from a cookie, when you mine for rare earth minerals it's the equivalent pulling a grain of sugar from that cookie."

Mark Noble:

Oh wow.

Angelo Katsoras:

And it's a lot more intense, and that's probably one of the reasons why it was in China in the first place, bringing it back will be a challenge. A lot of stuff that was opened up in the States was already approved, it takes like 10 years to get a mine approved. So we'll see how the environmentalists react to rare earth mineral mines.

Another example is that most of the refining takes place, all the refining takes place in China, except for one place, and that's in Malaysia where there's a refinery. And even they didn't want it. And so they allowed the Australian rare earth mining company to maintain the refinery for three more years on the condition they move it because they considered it to be too dirty.

So bringing some of this stuff back, which is once again a national security imperative, will be a challenge. And if you do that, you'll have higher standards, you're going to have to deal with the extra costs. So once again, for reasons of national security, they're going to have to do that, because if you don't, try to make it to mine more lithium, refine more lithium, as opposed to having it all refined in China, you'll be repeating it. Similar to how we were dependent on the Middle East in the seventies, we'll be dependent on China for the refining of these things.

But to build your own supply chains, the same thing with the semiconductors, building out your own supply chains for this mining, and more importantly the refining, will mean more costs. So for reasons of national security, which I agree with as a geopolitical analyst, but there will be more costs involved in the system doing this.

Mark Noble:

Do you think this leads to, if we go back to the, I'll reframe it, if we go back to the seventies and eighties, you had sort of import substitution and economic nationalist policies across the world. And I personally believe that was a key reason you had hyperinflation was simply because you had all of this stimulus pushing production growth, but no real competition, a lot of goods that didn't go anywhere, industries that were subsidized by governments.

Are you worried about sort of similar inflationary pressures here if you try to re-shore some of these industries? I mean, the whole point that they've moved to just-in-time is for cost efficiency. If you re-shore, that's an extremely expensive and long undertaking, would this have a more knock-on effect globally where costs could just go up as you move these supply chains to more local regions?

Angelo Katsoras:

Well I just think it's something which is going to be coming regardless, because you're seeing that. And I think you're right to think that this will be inflationary, but from reasons of national security, if you don't do this, you will be totally reliant on your number one geopolitical adversary to mine the lithium, mine the rare earth minerals, build the main components for the batteries. And then you'll find yourself in a difficult position.

But by building up the supply chains from scratch, you're going to raise costs. Because once again, similar to semiconductors, if you decided to just use it to build up supply chain just from a pure efficiency perspective, you would add to existing supply chains, which China dominates.

And so for me, I think it is coming. And if Europe goes ahead, for example, with the carbon border tax, because when you raise costs on a lot of products and you can't compete, and so you put in place a carbon border tax to kind of level the playing field with imports from countries that have less environmental restrictions, that's also inflationary.

And also if we're going to do mining in North America, I'm sure the regulations and the environmental standards would be much higher than they would be in certain parts of world where we're importing it from presently. So I think, and rightly so, but I think these will all also be a challenge.

And so I think you're right, it's not just the semiconductors, it's all the things behind it. It's all the production, and the same thing for electric vehicles, everything behind it. And I think we don't produce a lot of that. And even if we do mine it, like we do mine some rare earth minerals, we don't refine anything.

Mark Noble:

Yeah, it's an incredible reversal of economic policy from the last 40 years where it was about globalization.

Angelo Katsoras:

They've realized that there's a view now that they've become too dependent on other countries. And during a crisis moment they would find themselves in a very, very difficult situation. And both China views it this way, "Look, we're getting hit by sanctions. We got to do everything we can to not be vulnerable to American sanctions again."

The United States is saying, "Look, we got to make sure that we're not vulnerable to China for medicines or components related to semiconductors." So they've both had kind of this wake up moment from their own perspectives.

And then Europe will say, "Well, you know what, since the great powers are doing it, we want to develop our own supply chains."

And Japan is saying, "We'd like to do our own." And recently the Taiwanese Semiconductor Manufacturing Company said that they're going to build a plant in Japan as well.

Mark Noble:

Interesting.

Angelo Katsoras:

And so for example, Intel's going to build a lot of plants in Europe, well Europe has some of the highest electricity costs in the world. Europe has some of the highest energy costs in the world. And since we're more and more automated, electricity is the new labor, you have to assume that these plants will be heavily subsidized, otherwise they won't be economical from [inaudible] perspective.

Mark Noble:

Well then you have a strain on the grid as well, so more cost increases globally.

Angelo Katsoras:

Yeah, and basically the semiconductor industry has basically told the United States, "Okay, you want us to build here, you want us to deny products to China on the upper end, well we're going to need subsidies."

And that \$250 billion bill to subsidize more the cutting edge sectors in the United States, including semiconductors, which passed in the Senate overwhelmingly will probably eventually be passed in the Congress overwhelmingly. And so you'll see that.

And one thing, in the United States they don't agree on anything, but when it comes to competing with China or sanctioning China, they seem to be able to pass things in the Congress unanimously, including money for subsidizing R&D with regard to semiconductors.

Mark Noble:

This is all incredibly fascinating, and I think it really provides a deep level education for our investor base that are always looking at this space. Is there anything else you want to highlight? Maybe something we've missed in terms of any other key pieces here? I think we've covered most of the growth.

Angelo Katsoras:

I think the one thing I would say is that when it comes to analyzing sectors or companies now, in addition to analyzing the quality of a product or service, you're going to have to analyze whether the geopolitical objectives of the country align with the company in question. And if they don't, it doesn't matter whether you have the best product or service.

You could argue Huawei had a better product or service, but many Western European countries and United States chose something else. You could argue the U.S. has better semiconductor technology, but China has been able to buy it for geopolitical reasons.

And I think you're starting to see where if you're an IT company in certain sectors that you're going to have to have to make a Hobbesian choice, if you focus on the U.S. market, you might have to neglect the Chinese market. If you focus in the Chinese market, you might have to neglect the U.S. market. It will be difficult in certain strategic sectors to have access to both. So I think there's a bit of a geopolitical lens to analyzing some of these sectors going forward.

Mark Noble:

Yeah, it's an incredible period of time where not necessarily having the best technology is going to be the best investment. Huawei is a perfect example, where huge lead in 5G technology, but no market outside of Asia because of sanctions.

Thank you so much Angelo, this was fantastic. I hope we can have you back sometime latter end of this year or early next year to chat a bit more about some of these geopolitical risks and trends. I think it's a fascinating way to look at the markets. So thank you again for bringing your expertise to our program.

Angelo Katsoras:

It would be more than my pleasure, thank you very much.

Mark Noble:

Thank you.



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