

ISSUE: [January 2024](#)

As Foundry Business Grows, Semiconductor M&A Activity Slows

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Seven years ago, I wrote an article^[1] discussing the merger mania occurring in the semiconductor industry. As I noted at that time, merger and acquisition (M&A) activity in the semiconductor business reached a record level in 2015, exceeding \$120 billion U.S, as reported by Research and Markets, a marketing research firm.^[2] My purpose in writing about this activity was to describe how companies in the semiconductor industry take on different identities with regard to M&As. Factors such as corporate size, product and technology offerings, and management philosophies determine how a company is positioned in the market as a buyer, seller or one that is potentially neither.

At the time I wrote my previous article, I saw companies in the semiconductor industry falling into five categories, which I described in detail:

1. Acquirers or hunters
2. Acquirees or targets
3. Zombies
4. Apple dumplings
5. Super-specialized technologists.

In writing about these categories my goal was to help engineers understand how these corporate identities influence how the companies develop products and interact with their engineering customers, as well as how they may view or treat the engineers within their companies or even how they treat customers (for example, do they play favorites when filling orders?).

The earlier article only looked at M&As involving the silicon semiconductor business. But since the wide-bandgap (WBG) semiconductor segment has experienced significant growth in the past several years, I'll also include the GaN and SiC companies in this discussion. Most of the WBG companies are looking to be acquired by other, hunter companies to either augment or achieve a WBG strategy at the acquiring company.

Big Changes In The Marketplace

A lot has happened in the semiconductor business since 2015. We have had Covid, supply chain shortages, and the war in Europe and proximate and pending conflicts globally. So, some very important conditions in the marketplace have changed. Nevertheless, the M&As have continued with major industry players acknowledging the trend. For example, Pat Gelsinger, the CEO of Intel, who after some musical chairs finally resulted in a technology person at the helm, recently made the company's intentions clear. He stated, "there will be consolidation in the industry" and Intel wants to be one of the hunters.^[2]

What is driving the consolidation with the hunters hunting the other categories we defined back in 2016? It's still efficiencies and economies of scale taking on the management and expense of R&D, manufacturing, and other tasks. It's also demand for the high-growth markets in automotive (EV and other), 5G, IoT, computing, communications and more. Supply chain security and customers dealing with fewer partners are another factor.

However, there are a number of market-related factors that influence whether M&As happen, and most of these factors are tending to discourage further acquisitions at this time.

Regulatory Scrutiny

Antitrust regulations and increased scrutiny from regulatory bodies can deter companies from engaging in M&A activities. The global instability in Europe, the Middle East and Asia all at one time have reduced M&A activity considerably. Concerns about monopolistic practices or market dominance could limit the number and scope of potential mergers. It also seems that everyone gets a vote these days so almost any objection to a merger or acquisition will stop a deal in its tracks.

Market Volatility

The semiconductor industry has wild fluctuations in supply versus demand, technological advancements, and geopolitical tensions. Uncertainty in the market can make companies hesitant to pursue M&A deals. Also, if it's a publicly traded company, there are questions such as "what will Wall Street think?" and "what will it do to the stock price?" If the timing isn't right in the cycle or Wall Street or the analysts don't like it, then a deal won't go through. Such considerations will reduce the M&A activity.

Valuation Issues

Valuation discrepancies and differences in valuation expectations between potential buyers and sellers can stall or deter M&A activity. If there's a significant disparity in how each party values a company, it can be challenging to reach a mutually beneficial agreement. Sometimes we see crazy dollar amounts versus the actual sales of the target company. This is also related to the previously mentioned issue of "what will Wall Street think?"

Focus On Internal Development

Some companies may choose to prioritize internal research, development, and innovation over external acquisitions. They might opt to invest heavily in their own R&D to maintain a competitive edge rather than seeking external growth through acquisitions. This also depends greatly on who is running things at a semiconductor company. If the CEO has a finance or operations background, they don't know a WBG or silicon device from a watermelon. So sometimes the "make versus buy" decision is emotional. On the other hand, if the CEO actually knows about technology and the probability of success internally versus buying a company or merging, then the decision will make sense. Egos come into play in this area as well.

Global Economic Conditions

Economic downturns or uncertainties, such as recessions or trade tensions, will impact M&A activity across industries, including semiconductors. Companies might delay acquisitions due to concerns about economic stability. Additionally, what can be done with money at that moment in time will influence M&A decisions. Will the hunter company make more money buying or merging with another company or will that money be better spent investing in the market or (as discussed above) innovating internally versus acquiring?

Supply Chain Challenges

Disruptions in the global supply chain, like those experienced during the COVID-19 pandemic, can influence M&A decisions. Companies may focus on stabilizing their existing operations rather than expanding through acquisitions. Also, during uncertain times when supply chains are disrupted M&A activity might be too risky, perhaps because of the instability in the market. Or supply chain difficulties may simply create too many internal distractions for companies to focus on M&As.

Strategic Shifts

Companies might be reassessing their long-term strategies, leading to a temporary slowdown in M&A activities. They could be reevaluating their priorities, market focus, or investment strategies. During times that companies are sold out, all they can deal with is trying to keep up with demand. When the market is down most semiconductor companies go completely internally focused with reports and numbers and trying to find a way to increase orders. That usually means no time or money to think about M&A activities.

Product Complexity And Sophistication

While the above issues may tend to discourage M&As, there are other concerns that can push companies either toward or away from M&As. Product complexity also plays a role in whether and how companies may participate in M&As.

Semiconductor devices are not all standalone products. Rather they are frequently part of a complex ecosystem that includes software or cloud—SaaS (software as a service) aspects involving knowledge of the overall application in the customers' end product. As semiconductors become more complex ecology must be there in sophisticated system-on-a-chip products.

Some chip companies are not set up for this but will have to become adept at providing more system-level solutions if they want to be at the high end of the market. Purchasing other companies with the desired expertise is one way to achieve these capabilities. Nevertheless, most of the silicon-based companies that are

worth buying seem to have already been bought or attempted to be bought. We see more semiconductor companies buying software companies with software that runs on their ICs, for example, to create compelling solutions.

And finally, a growing demand for differentiated sophisticated technologies and access to foundry services changes the way OEMs view chipmakers. Instead of viewing semiconductor suppliers as any old vendors, equipment manufacturers understand that chip manufacturers are critical links in the supply chain. Consequently, OEMs are investing in long-term partnerships, joint ventures, and collaboration with the top semiconductor companies in the industry. So, if you are a chipmaker that's not a top company, you should think about becoming one. Acquiring other companies or being acquired are two ways to do this.

Bringing Back Industry

We have seen the genius business leaders of our time such as the disciples from GE who thought that making significant things like locomotives or medical instrumentation was not a very good idea. You make money on money, they said. This was one factor pushing semiconductor production out of North America. As this has been happening over the past 30 years, we also heard that it made sense because "designing and manufacturing semiconductors is not our core competency".

We here in the U.S. went from producing 37% of global semiconductor supply in 1990 to 12% of global supply in 2021. Now we have seen that the U.S. is vulnerable to supply chain disruption that would undercut its technical and military advantages. Likewise, Europe's share of global microchip supply has fallen from 44% in 1990 to just 9% in 2021.^[3] (Authors here have been writing and talking about this to no avail for decades.)

But in the wake of the pandemic, and the trade war with China, we have decided that moving chip manufacturing abroad was a bad idea. Someone or some group realized "wow, not everyone on earth loves the United States after all." And after almost hollowing out the semiconductor industry here, we have decided it's strategic—integral to our national security. Moreover, we want to use U.S. taxpayer money to bring it all back in a quarter or two. Brilliant!

So, everyone has now been incentivized by the U.S. and European governments, through the Chips Act and the Chips for Europe Initiative, respectively and our semiconductor industry "leaders" who have just been "professional financial managers," to bring the chip manufacturing industry back.

In the years when the industry was being moved out, we old engineers who questioned it all were told "you technical guys just do not get the big picture here." Yeah. I guess we did not there *sparky* but apparently you did and got a big payday. And you probably don't care now that the U.S. taxpayers have to fund the process to fix it. Whoopsies—semiconductors and technology are "our core competency" after all.

But in terms of its impact on semiconductor M&As, the new focus on bringing industry back to the U.S. and Europe may simply have created another distraction for semiconductor companies that might otherwise be pursuing such deals. This is not to say that chip companies will be successful in rebuilding the semiconductor industry. Unfortunately, we still lack the visionary industry leadership needed to guide us back out of the mess that was made by moving much of the industry offshore. With regard to semiconductor manufacturing in the U.S., what was broken over 30 years' time, cannot be fixed in a quarter or two.

Moreover, the currently high interest rates make it expensive to borrow money, which tends to throw a wet blanket on M&A activities. In this environment, reshoring activities may seem like an easier way to make money and executives in the semiconductor companies may be putting more of their energies into pursuing Chips Act money than thinking about M&A activities. So this may be another reason for the recent slowdown in M&As.

M&A Activity Since 2016

Since I wrote my previous article,^[1] what has happened in the semiconductor marketplace? As it turns out, my categorizations and predictions proved to be accurate. Semiconductor companies continued to behave as defined in the five categories (acquirers or hunters, acquirees or targets, zombies, apple dumplings and super-specialized technologists), and the hunters continued to acquire targets, though from a continually shrinking pool.

The highest M&A year ever recorded in the history of the semiconductor industry occurred in 2020 at 117.9 billion dollars, followed by a rapid drop in M&A activity since then (see the figure). Why has this slowed down? Mainly, it's because money is expensive and frankly there are fewer attractive companies available to buy, though the various market conditions discussed above have also been factors.

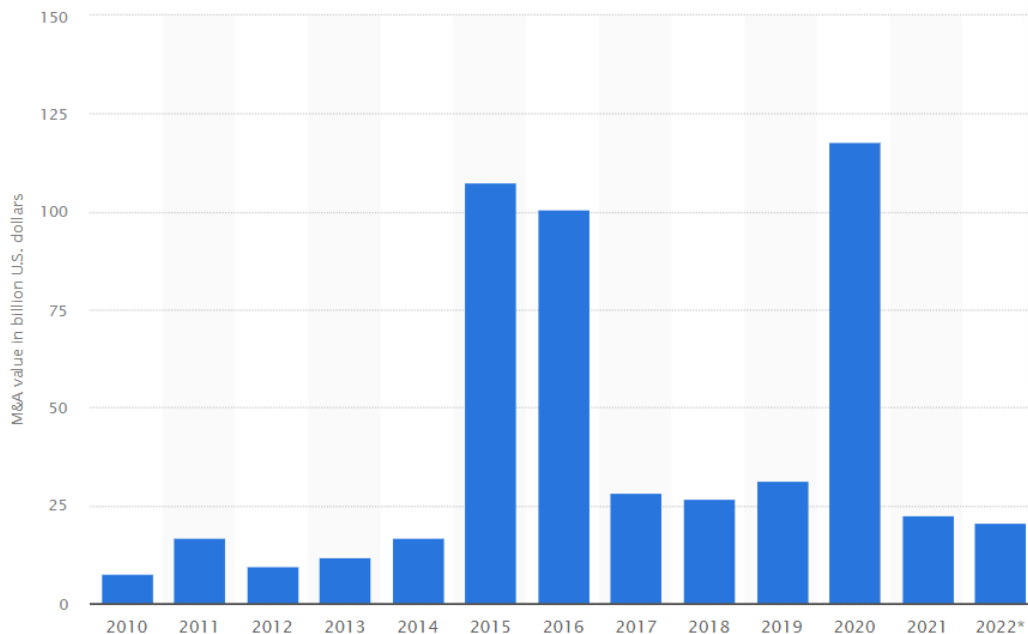


Figure. The semiconductor industry saw a peak in mergers and acquisitions in 2020. (Source: "Semiconductor industry merger and acquisition (M&A) agreements value worldwide from 2010 to 2022"⁽⁴⁾)

However, looking back at 2020, what happened to contribute to the spike in buying and selling?

Here are some highlights of 2020:

- Marvell Technology Group combined with Inphi Corporation, a leader in high-speed data, creating a \$40B company to position Marvell for opportunities in cloud and 5G.
- Analog Devices (ADI) acquired Maxim Integrated Products for \$21B, aiming to increase market share in automotive and 5G chipmaking. (Note that ADI had purchased Linear Technology just a few years earlier in 2017.)
- Infineon Technologies acquired Cypress Semiconductor, a provider of memory, microcontrollers, and other devices. "With this transaction, we will be able to offer our customers the most comprehensive portfolio for linking the real with the digital world," said Infineon.
- AMD acquired Xilinx for \$38.5 billion, to create the industry's high-performance and adaptive computing leader.
- Intel agreed to sell its NAND wafer and SSD business to SK Hynix for \$9B.

Despite the dropoff in M&As, there were additional M&As in 2021 to 2023. The following are some highlights from these years.

2021:

- Qualcomm, a leader in 5G cellular technology, acquired NUVIA, a maker of CPUs and systems on a chip, for \$1.4B, to position the company to meet demands for next-generation 5G computing.
- Renesas Electronics, a supplier of advanced semiconductor solutions, acquired Dialog Semiconductor, a provider of provider of battery and power management, Wi-Fi, Bluetooth low energy and industrial edge computing solutions, extending the company's ability to deliver embedded solutions for the IoT, industrial, and automotive markets.

- Qorvo, a provider of RF solutions and programmable power management products, acquired United Silicon Carbide (UnitedSiC), a manufacturer of SiC power semiconductors, to expand Qorvo's reach into the markets for EVs, industrial power, circuit protection, renewables, and data center power.

2022:

- Intel acquired Tower Semiconductor for \$5.4B, as part of its plan to become a provider of foundry services for other chipmakers.
- Navitas, a GaN power IC specialist acquired GeneSiC, a company with expertise in SiC power device design and process.

2023:

- Infineon Technologies bought GaN Systems for \$830 million, expanding its portfolio of GaN power semiconductor products and its in-house staff of GaN experts.
- MACOM, a supplier of RF, microwave, analog and mixed-signal and optical semiconductor products, acquired OMMIC, a semiconductor manufacturer with expertise in wafer fabrication, epitaxial growth, and monolithic microwave integrated circuit ("MMIC") processing and design. There was also the announcement of Wolfspeed's sale of its RF business to MACOM.
- Broadcom, a company that designs, develops, and supplies semiconductor and infrastructure software solutions, acquired VMware, which offers VMware Cloud Foundation, "a software stack that serves as the foundation of private and hybrid clouds." (It's interesting to see that semiconductor companies are now buying software companies—that's a new trend for the leading hunter companies)

Looking back, there were also some major deals during the period from 2016 to 2020. These included the acquisition of Fairchild Semiconductor by ON Semiconductor (now onsemi) in 2016, Microchip's acquisition of Microsemi (2016), and Renesas' purchase of IDT (2019) to name a few. There were probably other noise-level acquisitions since 2016, but the ones listed above were most (if not all) of the top ones.

In the above examples, as could be predicted, the acquirees were consumed by the hunters. But notice that the super-specialized technologists have all the money because they do crazy things like design and sell innovative parts that serve customer needs and solve real problems. They also follow up with great technical marketing, applications support, NPI processes and product lifecycle management. Also, currently you cannot make as much money as before investing in the market so some companies might want to invest in their own businesses instead.

New Corporate Identities Emerge

As noted above, in my previous article I saw semiconductors falling into five categories with respect to mergers and acquisitions:

1. Acquirers or hunters
2. Acquirees or targets
3. Zombies
4. Apple dumplings
5. Super-specialized technologists

These five categories still apply, but today I see two more:

6. Foundries
7. End customers with vertical integration.

In my previous article I described the characteristics of the top five categories at length. I won't repeat those definitions here except to note some of the recent developments in them. For example, in describing the acquirers, it was noted that the Chinese semiconductor companies had been on a tear to buy all things American-semiconductor-related.

Since the previous article, it appears that we have woken up to the fact that we gave away so much technology to China and perhaps we won't allow this to continue. Oddly, enough China blocked some M&A activity over the last few years. I am not sure who decided to let them vote but someone should take that button away. Perhaps

we won't keep selling them the stick to beat us with anymore, but you cannot underestimate the lack of awareness by our elected officials and heads of organizations, which leads them to do the wrong things.

In the discussion on acquirers, it was also noted that these hunters can offload businesses that no longer interest them, or which don't satisfy Wall Street's goals for profitability. As an example, I observed that NXP was trying to sell off their low-margin standard products. That did in fact happen as NXP sold off its discrete business, which is now Nexperia.

Another example in the intervening years was Intel selling off some of its memory business. This trend is continuing with companies selling off low margin or uninteresting product lines. Or in cases where they can't find a buyer, they sometimes just discontinue the products.

In the zombie category (chip companies that have nothing worth buying), there are not as many of these companies today. In the years since 2016 the market has forced them to transition into one of the other categories. Sustaining a zombie in a fast-changing technology market is challenging. With the pace of technology and the emergence of foundry strategies by the OEMs, the zombies often get used until they are no longer needed and then designed out. It's riskier than ever being a zombie and that is why you see fewer of them. You either stand in front of the train, get on the train, or watch the train go by, but the train is coming regardless.

The situation is similar for apple dumplings—semiconductor companies that have a disproportionate amount of business with one OEM. As with the zombies, it is getting harder to sustain an apple dumpling because of the availability of foundries and OEMs only wanting to use apple dumplings when they need them and then discard them when no longer do.

Ultimately, OEMs prefer to discard the dumpling for a foundry strategy to take out the middleman mark up and dysfunctional product lifecycle management. The only thing they will buy from an apple dumpling is something they cannot (or don't want to) make on their own. But this is often a temporary situation as they have the resources to design whatever they want.

So, it's riskier than ever to be so disproportionately focused on one or very few OEM customers. If your big OEM gets a cold, you might just die. The OEMs have more options than ever before and the shortages during Covid taught them a hard expensive lesson—bypass semiconductor companies if you can and go direct to the foundry.

Over time, things have worked out well for both hunters and foundries. (More will be said on the foundries below.) But the super-specialized technology companies, the companies that are technology leaders, have also done well. We see that Analog Devices bought Linear Technology (2017) and then Maxim (2021) proving that when you are the lead dog in technology you have the funds to buy what you need to further your focus.

In the power electronics industry, I see the wide-bandgap (WBG) companies working on gallium nitride (GaN) and silicon carbide (SiC) as technology leaders. Also, those technologies are used in the RF world where they can make a difference too. The M&A future favors the WBG companies in my view. We will see more OEMs lock up agreements for WBG capacity with the WBG leaders.

Foundries And OEMs Play a Greater Role

Foundries are the companies that either never got out of the semiconductor manufacturing business or were founded to be just that. TSMC, UMC, Global Foundries, Intel, Samsung and more come to mind. Some are either pure-play foundries or are vertically integrated. Which was once a cool thing, then it became very uncool, and now it's *super* cool once more.

If you are a foundry or a company that has a foundry strategy as part of your organization and you have the needed technologies, and you have mapped into something a large OEM wants, then you are in good shape if you can keep up with the technology roadmaps. In fact, it seems the major OEMs and top companies who have IC design talent would prefer dealing with a foundry than convincing a semiconductor company to provide their needs. To get the semiconductor company to build the part, the chipmaker will want to make sure they have a "business case," hit their ROI targets, don't bother their "limited resources," and other excuses.

Then, what if the semiconductor company does agree to build the part, but at the last minute they decide not to? Or if they prefer some other customer, and give them the capacity? Finally, if the OEM buys from the semiconductor company, whatever chip the OEM uses will be available on the open market, usually to amortize

the costs to the semi company. So ultimately the technology giant OEM is better off doing their own IC design, working with a fab, and controlling their own destiny. (For more on this topic, see reference 5.)

In fact, I have often said the last few years what does “insert big company name here _____” need with a semiconductor company? If they take a foundry strategy, they cut out the middleman and they control their design and supply chain—not the merchant semiconductor company. This is the wave of the future it seems and now we see fabs being built in free countries on a large scale. Who would think that making semiconductors in Europe and North America would be cool again?

M&As Will Be More Difficult

Going forward, we will see that high-value strategic acquisitions will continue to be on the agenda for hunters and technology specialists. However, these large transactions will need to be navigated through a complex maze of multi-jurisdictional multi-regime, multinational regulatory review processes and approvals and/or roadblocks. These will not be limited to and increasingly will include actively enforced foreign investment criteria and national security concerns.

This can cause a problem now that something that makes sense for North America, Europe and the rest of the free world can be blocked by a communist regime in a far-off land. Meanwhile the EU and the USA are investing treasure in rebuilding our semiconductor industry that they let become dilapidated and shipped offshore on purpose.

Going forward, we will see mostly a steady flow of only small and medium M&A transactions every year including more acquisitions of wide-bandgap semiconductor startups. Further major acquisitions are less likely because anything worth having has already been bought.

Also, I think we will see more software acquisitions by semiconductor companies to attempt to gain a competitive advantage versus the OEM going with a foundry strategy. The new competition for semiconductor companies is not just other chipmakers but rather their end customers going to a foundry themselves to buy their semiconductor needs. So how do traditional semiconductor companies differentiate themselves from that? This may be the one of the most pressing issues that C-level executives will face as they navigate an ever-evolving semiconductor marketplace.

References

1. [“An Engineer’s Guide To Mergers & Acquisitions In The Semiconductor Business”](#) by Kevin Parmenter, How2Power Today, June 2016.
2. [“Intel CEO Calls Chip Maker ‘Willing Buyer’ as Semiconductor Industry Consolidates”](#) by Asa Fitch and Cara Lombardo, The Wall Street Journal, Updated Aug. 19, 2021 3:49 pm ET.
3. [“Why the CHIPS Act Is Unlikely to Reduce US Reliance on Asia,”](#) Goldman Sachs, October 26, 2022.
4. [“Semiconductor industry merger and acquisition \(M&A\) agreements value worldwide from 2010 to 2022,”](#) statista, accessed December 27, 2023.
5. [“Make Vs. Buy: OEMs Now Have A Choice For Semiconductors”](#) By Kevin Parmenter, How2Power Today, August 2023.
6. [“Semiconductor M&A activity challenged amid regulatory pressures”](#) by Stefan Modrich and Joseph Williams, S&P Global Market Intelligence, August 3, 2022.

About The Author



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