

Upping the ante: Venture capital investment in chip companies reaches new highs

As VCs push gigadollars to fabless semiconductor startups, the innovation ecosystem is the sure winner

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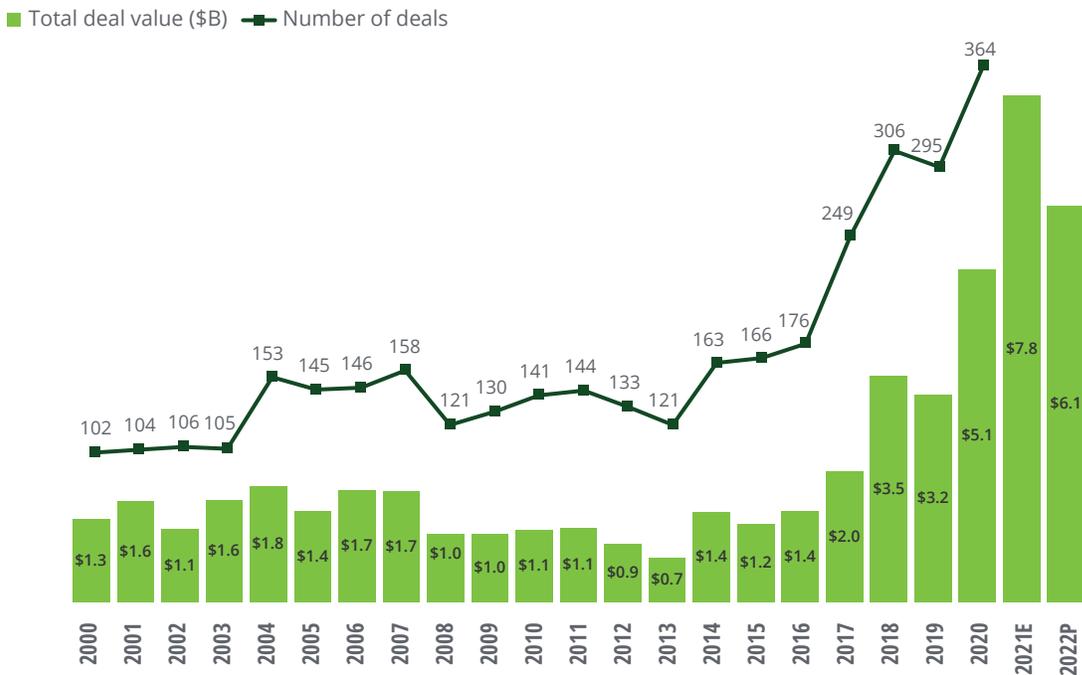
VENTURE CAPITAL INVESTMENT in semiconductors is taking off in earnest. Deloitte Global predicts that venture capital (VC) firms globally will invest more than US\$6 billion in semiconductor companies in 2022. That may only be 2% of the US\$300 billion-plus of overall VC investment expected for 2022 ... but it would be second only to the remarkable 2021 figure of an estimated US\$8 billion, and more than three times larger than it was every year between 2000 and 2016 (figure 1).

Much of this investment will likely go toward companies in China, if recent trends are any sign. Investments in Chinese semiconductor companies tripled from 2019 to 2020. And in the first half of 2021 alone, VCs from both inside and outside China invested US\$3.85 billion in Chinese chip companies, equal to or larger than the amount of global investment in the entire industry in 19 of the last 20 years.¹

FIGURE 1

Global VC investment in semiconductors is on the rise

Number of semiconductor VC deals per year and total annual deal value (US\$ billion), 2000–2022



Source: Data for 2000 to Q2 2021 based on PitchBook; 2021E and 2022P values are based on Deloitte's estimate based on partial data for 2021, and our prediction for 2022.

Small investments could pay off big, VCs hope

To be clear, VCs are not investing this money to build new chip fabricating plants. Many new chip plants (“foundries”) will be built in 2022 and 2023, but each new foundry costs billions of dollars, and they are being funded by governments and the chipmakers themselves. Instead, most VC investments will go toward what are called “fabless” semiconductor companies. These companies receive tens or hundreds of millions of dollars from VCs over several rounds, as well as occasional infusions of cash from larger chip companies that view fabless chips as a strategic investment.

Fabless chip companies make nothing physical (hence the name). Their business consists of hiring

engineers and other key staff, buying chip design and verification tools, and producing an electronic design for a proposed chip. They then send their design to a third-party foundry that turns the design into an actual chip to be processed, tested, and, if it works, packaged. Sometimes the chip works well; other times it needs to be redone.

For VCs, not only is the price of admission lower—millions, not billions—but the returns can be much better. VCs invest in a portfolio of chip startups, following the rule of thumb that some portion will provide a lucrative exit through going public, merging with a special-purpose acquisition company (SPAC), or being acquired by another chip company. These events have been growing in both frequency and valuation over the past few years, increasing semiconductors’ allure for VCs.²

The chip industry saw high levels of investment from corporate VCs (US\$4.3 billion in 148 deals) and private equity firms (also US\$4.3 billion in 30 deals, not included in the 2020 column from figure 1) in 2020. Combined, corporate VCs and private equity firms have invested US\$5.2 billion as of 1H21, on track to surpass the 2020 level.³ We expect corporate VCs in particular to stay active: Semiconductor mega-mergers are creating new companies that have even greater appetite for these kinds of deals.

And we will almost certainly see many more home-run chips in the next few years than we have in the last 20 years. Partly, it's because the number of semiconductor deals per year has been increasing along with their total value. VCs made just under 150 deals per year, on average, between 2004 and 2016; in 2020 and 2021, that number jumped to about 380 per year. Mostly, though, it's because more money is being invested in each company.

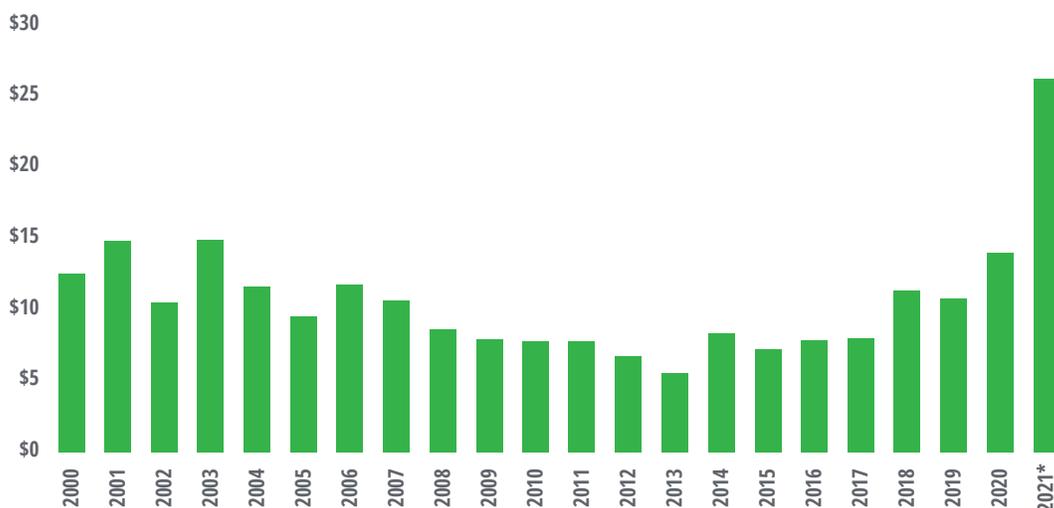
Between 2004 and 2016, the average investment per deal was just under US\$9 million. In 2020, that figure rose to US\$14 million, and rose again to US\$26 million in the first half of 2021 (figure 2). With 2021's per-deal average being roughly triple the average for most of the rest of this century, chip startups are better funded, with more money to spend on innovation and to tide them over stumbles.

Just as an example, high-performance AI chipmaker Cerebras Systems has raised over US\$100 million, and that money has helped it develop the largest chip ever built. The only wafer-scale processor ever produced, Cerebras's chip contains 2.6 trillion transistors, 850,000 AI-optimized cores, and 40 gigabytes of high-performance on-wafer memory, all aimed at accelerating AI processing.⁴ That's 56 times larger than the largest GPU, with 123 times more cores and 1,000 times more memory.

FIGURE 2

Semiconductor deal size shot up in the first half of 2021

Average dollar value per VC semi investment, 2000–2021 (US\$ million)



Note: *2021 figure is year to date as of Q2 2021 (period ended June 30, 2021).

Source: Deloitte analysis of PitchBook data.

THE BOTTOM LINE

Vcs are not likely to pull the plug anytime soon. We expect VC investments in semiconductors to remain high beyond 2020–2021 for four main reasons:

High demand for new chips, chip designs, and architectures. New kinds of chips for high-performance computing and machine learning, the main type of artificial intelligence, are attracting investment because of strong end-market demand.⁵ Companies that make specialized chips for other growing markets, such as privacy-enhancing technologies, automotive applications, and cryptomining, are also seeing demand rise.⁶ The capabilities that these applications need demand fundamental changes at the hardware level that can't be addressed by the software layer alone.

High valuations. Overall tech valuations have skyrocketed, especially for semiconductor companies. Since 2016, the S&P 500 is up 121%, the NASDAQ is up 198%, and the Philadelphia Semiconductor Index is up 418%. And tech behemoths and even SPACs are starting to eye silicon, giving Vcs additional exit options.

Increased government investment. Governments worldwide are directing substantial investments toward the semiconductor industry. The United States has allocated US\$52 billion for investment in the semiconductor industry as part of the CHIPS for America Act.⁷ The European Union has set a goal of doubling its share of global chipmaking to 20% by 2030 and has introduced its own Chips Act.⁸ Billions of dollars of EU government money will flow to fabless chip startups directly or via VC funds. And China has created a US\$50 billion fund of its own for investing in domestic semiconductor companies.⁹ The country is hoping to boost chip production capacity and expand indigenous fabrication capabilities, in part to avoid US technology embargoes. (That said, China has been trying to grow its domestic chip business for years—and has been struggling, in part due to China lacking access to cutting-edge critical manufacturing technologies.)¹⁰

Growing fab capacity and expansion plans for capital and R&D. The chip industry is massively increasing its fabricating capacity. Twenty-nine new fabs have started or will start construction in 2021 and 2022: eight in each of China and Taiwan; six in the Americas; three in Europe, the Middle East, and Africa; and a pair each in Japan and South Korea.¹¹ As a result, global manufacturing capacity is expected to grow by 36% from 2020 to the end of 2022, from 22 million 200 mm-equivalent wspm (wafer starts per month—a measure of aggregate global chipmaking capacity) to 30 million wspm.¹² Existing chip companies will use some of this capacity, but the startups that Vcs are funding will also use a fair amount.

In more detail, which kinds of new chips, and therefore which industries and customers, are likely to receive most of the VC money and drive innovation? As mentioned in the companion prediction on RISC-V, we see lots of growth and investment in the RISC-V architecture, but many other areas are attracting investment too. AI and machine learning (especially edge AI), data center and high-performance computing, 5G, and Internet of Things chips all seem poised to show above-industry growth rates for years to come. In general, foundries are also looking to enhance their chip development environments to promote faster, easier chip development for startups and other smaller players.

Pretty much everyone should care about increased VC investment in semiconductors. At a high level, more VC deals equal more money, which in turn equal more new kinds of innovative chips. Innovations in chips power innovations in computing capabilities—and we all want and need the things that those innovations drive. Think of VC investments in semiconductors as a garden: They are planting more seeds and fertilizing them better. It will be fascinating to see what grows!

“Digital transformation is built on silicon and broadens the drivers for semiconductor innovation. Demand for semiconductors is no longer about one or two killer applications, but rather an expansive, structural shift in the economy toward digitization and automation.”

— Gary Dickerson, president and CEO of Applied Materials, “Q3 2021 earnings call,” August 19, 2021.¹³

Endnotes

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