

TURING MICRO

INVESTING IN THE CHIP-TECH WORLD

Chips don't just make computers work, they make the whole modern world possible.

Devices That Use Chips:

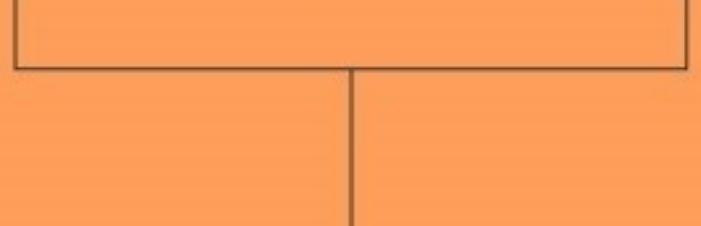


The underlying technology that creates these chips, also known as semiconductor devices, is part of a massive and sophisticated global supply chain with many different business models.

Fabless companies

Companies that design and sell chips while outsourcing manufacturing to foundries.

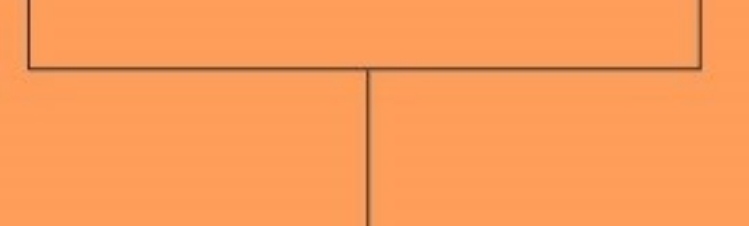
Examples:



Foundries

Companies that manufacture chips for fabless companies.

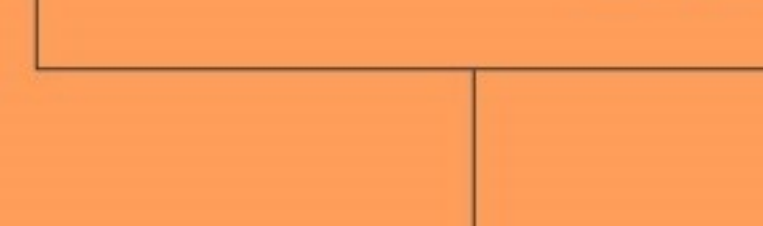
Examples:



OSATs (Outsourced Semiconductor Assembly and Test)

Companies that assemble, test, and package chips (for fabless companies) and devices (for electronics companies)

Examples:



Integrated Device Manufacturers

Companies that design, manufacture, and sell their own chips.

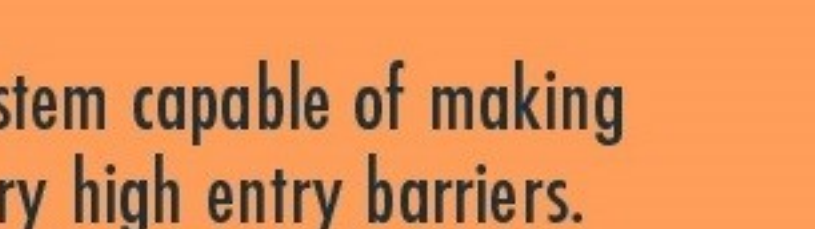
Examples:



Suppliers

Companies that supply equipment, services and software for the manufacture of semiconductors.

Examples:



The result? An extremely robust manufacturing system capable of making minuscule devices en masse in an industry with very high entry barriers.

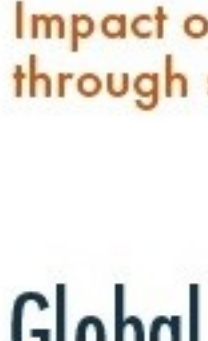


How Small Are Chips?

TSMC 2020 Chip
173.1 million transistors per mm²



These small chips are powering more of the global economy each day.



Induced Impact
Impact on other industries through supplies, earnings.



Indirect Impact
Contribution from supply chain supporting the semiconductor industry.

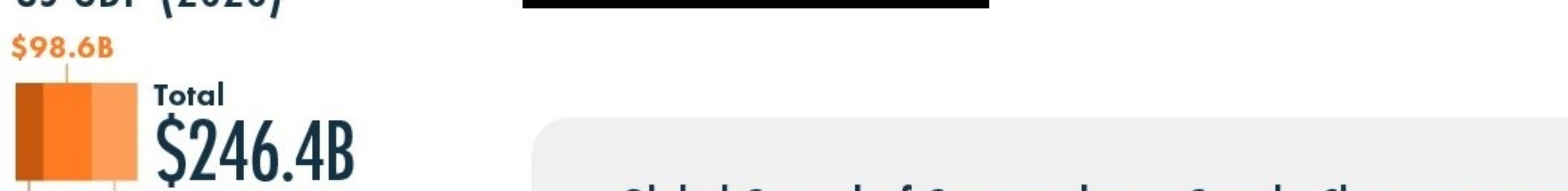


Direct Impact
Immediate contribution from semiconductor industry.



Downstream
Value-add attributed to semiconductors once integrated into end products.

Global GDP

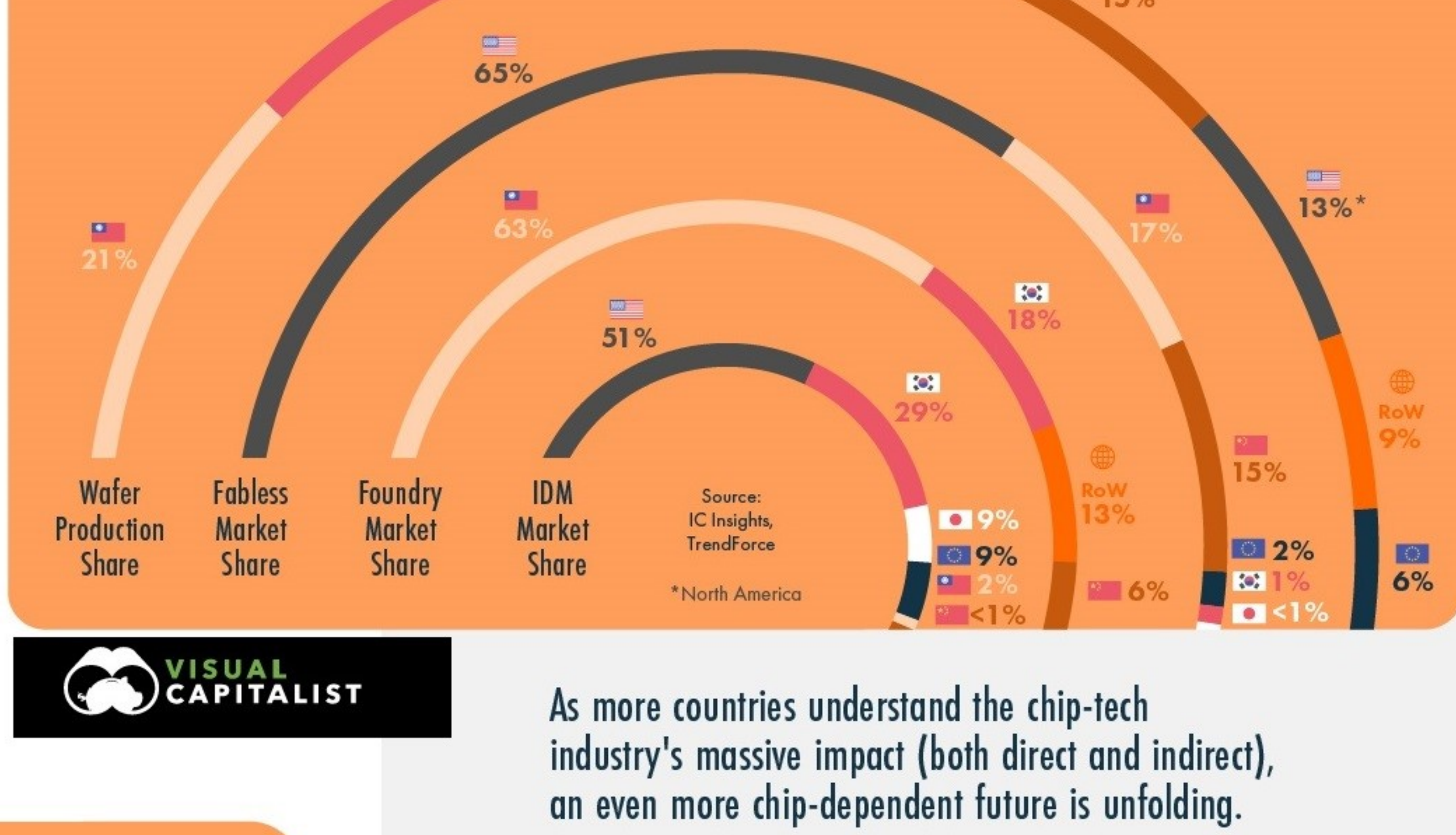


US GDP (2020)



Source: GSA, SIA/Oxford

Global Spread of Semiconductor Supply Chain (2019-2020)



As more countries understand the chip-tech industry's massive impact (both direct and indirect), an even more chip-dependent future is unfolding.

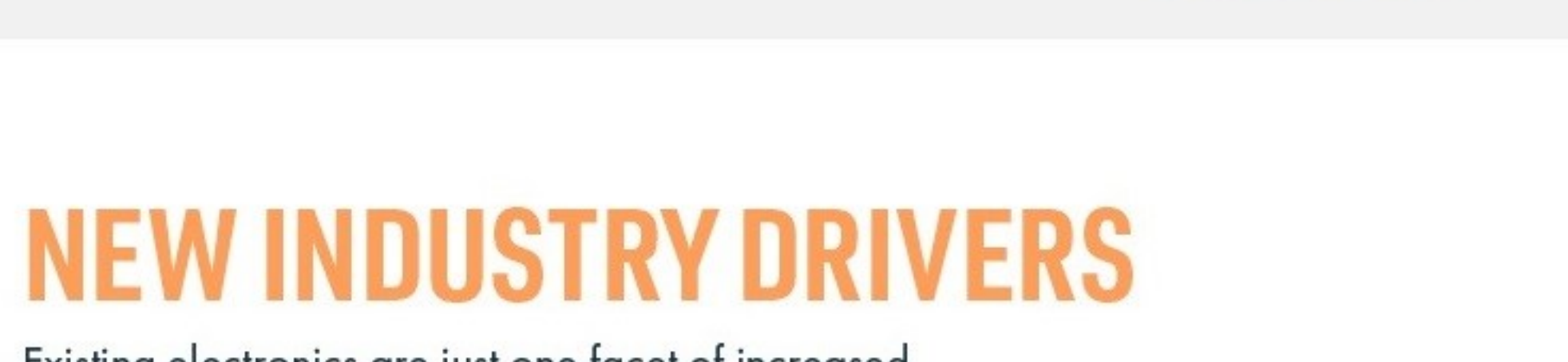
The Chip-Tech Future

The biggest throughlines, drivers, and transformations affecting the semiconductor market.

1

CHIP MARKET BOOM

Increasing device consumption is driving a massive demand boom for chips in the coming decade.



Source: Capital Group

2

NEW INDUSTRY DRIVERS

Existing electronics are just one facet of increased demand, as increased digitisation is creating more industry drivers and amplifying demand.

NEW TECHNOLOGIES DRIVING GROWTH

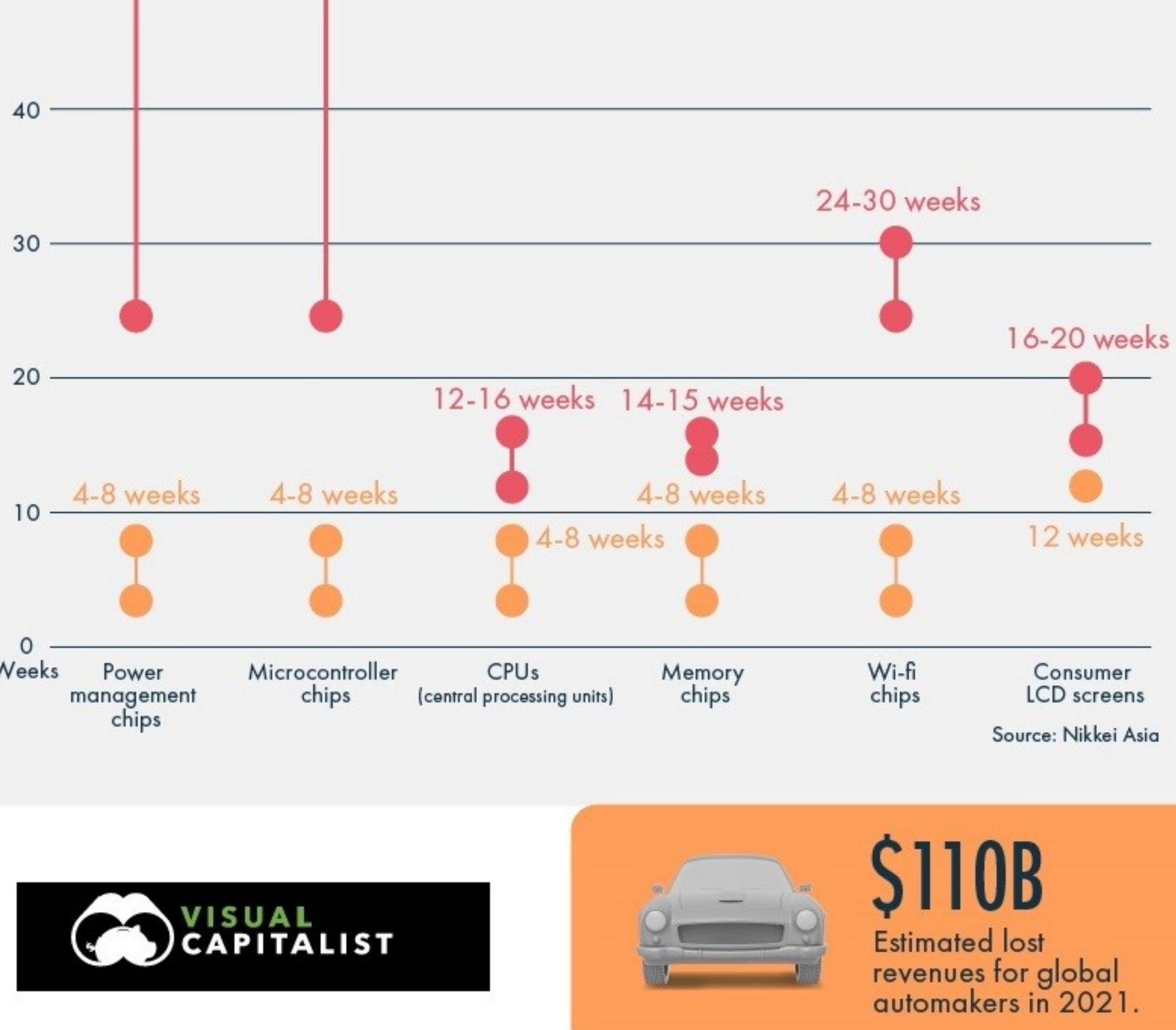


3

SUPPLY CHAIN DIFFICULTIES

The COVID-19 pandemic led to an unexpected global shortage of chips, affecting massive industries and exposing an investment shortfall.

WAIT TIME FOR DEVICE COMPONENTS (LEAD TIME)



Source: Nikkei Asia



\$110B

Estimated lost revenues for global automakers in 2021.

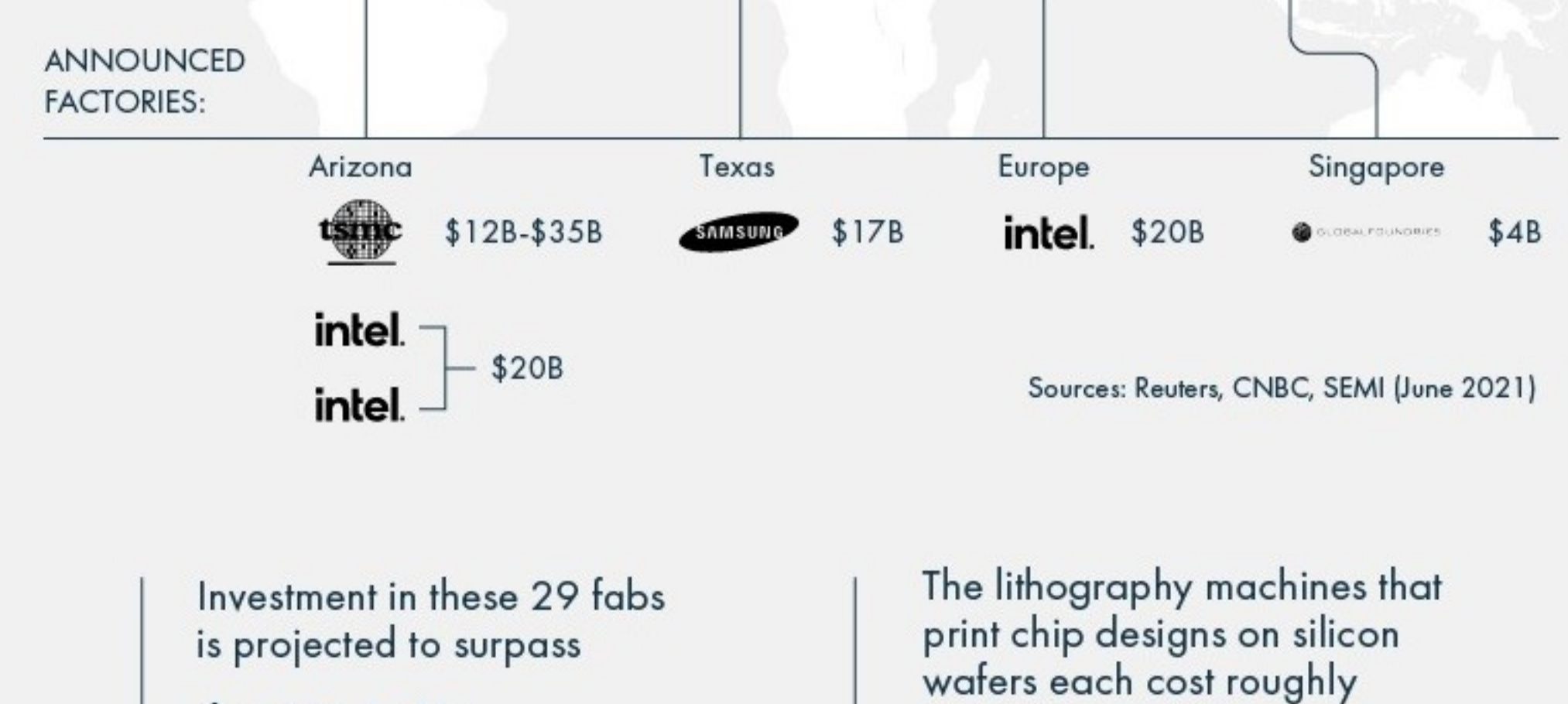
Source: AIAPartners

4

AN EXPENSIVE OPPORTUNITY

The semiconductor industry operates at massive scale, with a high floor for factory costs, and a high roof for investments and potential profits.

PROJECTED CONSTRUCTION OF FABRICATION FACTORIES (2021-2022)



Sources: Reuters, CNBC, SEMI (June 2021)

Investment in these 29 fabs is projected to surpass **\$140 billion.**

The lithography machines that print chip designs on silicon wafers each cost roughly **\$100 million.**

Source: Washington Post

