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**Drexel GPS: Geopolitical Update:
Semiconductor Production: Fabless or Foundry?
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The significant amount of increased interest and discussion around advanced semiconductors is based on a variety of factors including global supply chain vulnerabilities exposed during the Covid-19 pandemic, the war in Ukraine, and increasingly aggressive behavior by China. This has incentivized many countries and companies alike to reevaluate their positioning as it pertains to the supply and manufacturing of semiconductors (chips). Adding fuel to that narrative is the critical role that these chips will play with regard to AI (Artificial Intelligence) and the global technology-fueled AI arms race that is now underway.

Evidence of this is on display across the geopolitical landscape. With heightened tensions regarding supply chain vulnerabilities, more nations are proactively seeking to strengthen their domestic semiconductor capabilities and export policies. Chip manufacturers are reevaluating and repositioning their manufacturing facilities globally.

- The United States is funneling billions into domestic chip production and research and development, aiming to decrease reliance on foreign sources. Simultaneously, China is making substantial investments in its semiconductor industry, with the goal of achieving self-sufficiency. These initiatives are poised to bring about significant transformations in the global semiconductor landscape.
- Against this backdrop, semiconductor companies will likely take center stage in a variety of geopolitical scenarios, and it is useful to understand the basic fundamental differences in fabless and foundry semiconductor companies. Drexel GPS outlines this why this matters in a simple breakdown below:

Fabless vs. Foundry. What is the difference?

Semiconductor companies with fabless capabilities and those with foundry capabilities play distinct roles in the industry.

Fabless semiconductor companies primarily focus on the design and development of semiconductor chips or integrated circuits but do not own their own fabrication facilities. Instead, they outsource the manufacturing of their chip designs to foundries. These “fabless” companies are responsible for the design, testing, and marketing of their products, while the foundries handle the actual manufacturing process. This business model allows fabless

companies to be more agile in adapting to market demands and technology advancements without the massive capital investment required for owning and operating fabs.

On the other hand, semiconductor manufacturers with foundry capabilities own and operate semiconductor fabrication facilities, commonly known as fabs. They provide manufacturing services to fabless companies and sometimes even integrated device manufacturers (IDMs) that design and produce their own chips. These foundries specialize in high-volume semiconductor manufacturing and offer advanced processes and technologies, making them essential partners for fabless companies looking to bring their designs to market.

- Foundry companies, like Taiwan Semiconductor Manufacturing Company and GlobalFoundries, invest heavily in research and development to stay at the forefront of semiconductor technology, which benefits both their in-house production and their fabless customers who rely on their manufacturing expertise. In summary, the key difference lies in ownership and operation: fabless companies focus on design and marketing, while foundries specialize in semiconductor manufacturing, allowing for a collaborative ecosystem within the industry.
- ARM Holdings, which launched its roadshow for a blockbuster IPO this week, is a fabless semiconductor company. ARM does not own or operate semiconductor fabrication facilities for manufacturing its own chips. Instead, ARM is primarily focused on designing and licensing intellectual property for various microprocessor and system-on-chip (SoC) designs. They develop CPU and GPU architectures, as well as other technology components, which are then licensed to other semiconductor manufacturers, such as Qualcomm and Samsung. These companies, known as ARM licensees, use ARM's IP to design and manufacture their own custom chips based on ARM's architectures.

By following a fabless business model, companies like ARM can concentrate on innovation and IP development without the substantial capital investment and operational complexities associated with semiconductor fabrication. While the cybersecurity threat remains prevalent, fabless companies have reduced exposure to any impact from geopolitical factors such as land-based warfare, that a Taiwan-based company may have, for example.

Drexel GPS Assessment:

- Foundry chip facilities will seek to diversify their facility locations to more secure areas of the globe and increase redundant production capabilities.
- Some level of domestic chip production design and manufacturing capabilities will increasingly become part of the national security strategy for coalition partners.

- Japan is adopting major new industrial policies with the objective of restoring the international competitiveness of its semiconductor industry. At the end of the 1980s, Japan accounted for over 50 percent of world semiconductor production, a figure that had fallen to 9 percent by 2022 (CSIS, 2023).
- The CHIPS Act which recently passed in the United States is evidence of a national security strategic repositioning policy in action.

Semiconductor Foundry



Drexel Hamilton will continue to monitor these situations as they develop.

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