

Too Good to Lose

America's Stake in Intel

By Sujai Shivakumar, Charles Wessner, and Thomas Howell

In 2022, Congress enacted the bipartisan **CHIPS and Science Act** (CHIPS Act), a pivotal initiative which seeks to ensure U.S. leadership in semiconductor technology—the backbone of everything from cars to household appliances to defense systems. The CHIPS Act represents a national effort to reverse recent trends, driven by major industrial policies of other countries, that have led to the loss of U.S. leadership in the technology needed to manufacture the most advanced semiconductors. The United States has also seen an erosion of onshore chipmaking, which now accounts for only about 10 percent of global capacity. The urgency of the situation was **brought** into sharp relief by highly disruptive chip shortages during the Covid-19 pandemic. Meanwhile, China—the United States' most formidable strategic competitor—is making **rapid** strides in semiconductor technology, particularly in defense-related areas.

In its plan for implementing the CHIPS Act, the U.S. government has earmarked substantial federal assistance for the world's three most advanced chipmakers, among others, to construct leading-edge manufacturing facilities and grow U.S. regional semiconductor ecosystems. Two of these firms, the Taiwan Semiconductor Manufacturing Corporation (TSMC) and Samsung, are slated to receive substantial funding to support major investments in such ecosystems, which bring manifold opportunities for local growth and employment. Both firms are headquartered outside the United States and have, in the past, kept the lion's share of their research and development (R&D) and technology development in their respective home countries.

The third leading-edge firm is the storied Intel Corporation, the largest and most advanced U.S.-headquartered manufacturer. Intel has an unmatched history of breakthrough semiconductor innovations—including the first programmable microprocessor and the x86 architecture—which have together **made** an “indelible impact on the world of computing . . . [that] continues to shape the digital landscape of the modern world.”

While Intel is at present trailing TSMC and Samsung in chip process technology, it is the only U.S.-headquartered firm within striking distance of regaining U.S. capabilities at advanced process nodes. The company has made massive commitments to invest heavily—more than **\$100 billion** over the next five years—in new chipmaking capability and capacity on domestic soil, aiming to develop and manufacture chips at the most advanced process nodes of 2 nanometers (nm) and below. Recognizing the importance of this, the U.S. government has announced plans to award Intel the largest share of federal support under the CHIPS Act. Successful implementation, and the resultant national security benefits, will depend on Intel.

Unfortunately, at this juncture, Intel is experiencing financial and operational turbulence, in no small part due to its ambitious investments pursuant to the CHIPS Act's objectives. Now, with a recently announced strategic recovery plan, the company appears to be seeking additional investment. Given Intel's importance to the CHIPS Act's economic and strategic goals, it is vital that the company remains viable and capable of carrying out its commitments—with even more public support, if necessary, than it has already been given.

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Intel's Turnaround Strategy

Intel's operational and financial difficulties received extensive media coverage in 2024, some of which exaggerated the severity of its challenges and perhaps adversely affected the company's stock price. Shortly after Intel's CEO, Pat Gelsinger, took charge in 2021, he announced an ambitious "IDM 2.0" strategy, which included plans for the company to become a major global player in the contract-manufacturing ("foundry") market. The initial plan called for the establishment of a new business unit, Intel Foundry Services (later rebranded as Intel Foundry), as well as tens of billions of dollars for the construction of new manufacturing facilities to service surging demand. Intel Foundry, when announced, represented a significant expansion beyond Intel's integrated device manufacturer (IDM) business model, in which the company's manufacturing capacity was reserved for Intel-designed chips. Intel Foundry, however, allows for the manufacturing of chips designed by other firms, which puts Intel in direct competition with other large foundry providers such as TSMC.

In 2024, Gelsinger unveiled the next phase of the firm's strategy, announcing that it will further separate its design business from Intel Foundry, which will be an independent subsidiary with substantial autonomy, complete with its own board of directors, bylaws, and operating structure. This action is intended to provide foundry services for chip design firms with stronger protection of intellectual property.

Some progress on this front has already been made. In a multibillion-dollar arrangement, Intel Foundry will leverage new process technology to manufacture chips for Amazon's cloud computing

wing beginning in 2025, including customized server devices. *Forbes* **observed** that “[T]his can only be looked at as a positive—a strategic, long-term deal that Intel didn’t have before. If you can get the number-one cloud provider to do not just one but two highly custom chips with you, one in the foundry and one in a custom server chip, that portends a very good future.”

Additionally, backed by a \$3 billion federal grant, Intel will develop chip manufacturing infrastructure for the U.S. defense industry. The federal award **represents** “another win for Intel Foundry, and even more so for the highly secure supply chain that Gelsinger has been intent on building for Intel over the past few years.”

Despite this progress, profitability will take time, as the high capital costs and lengthy timelines required to bring new fabs online limits near-term revenues. In 2023, for example, the company’s foundry unit brought in \$18.9 billion but **reported** an operating loss of around \$7 billion, as well as other operational problems. Intel does not expect the new fabs to generate “meaningful” revenue until 2027.

ISSUES WITH PROCESS TECHNOLOGY AND PRODUCTS

According to a September 2024 Reuters **report**, Intel faces difficulties in its upcoming 18A process technology, which is slated for high-volume production in 2025. Reuters indicated that Broadcom, a major fabless firm, had concluded after tests that Intel’s process was not yet ready for such production. Yet the report, even if accurate, may not be indicative of a significant problem, as Intel’s timeline anticipates the 18A technology to be ready for high-volume production in mid-2025, rather than mid- or even late 2024. Moreover, Intel **reports that** it already has a dozen customers using its 18A tool kit.

Intel’s 13th- and 14th-generation Intel Core processors are also reportedly **encountering** problems, which have potentially arisen from manufacturing defects. The company also reported in September 2024 that it would no longer use its Intel 20A process technology in Arrow Lake processors and instead outsource Arrow Lake production to Taiwan’s TSMC, **stating that** “because of our early success on Intel 18A . . . [we are able] to shift engineering resources from Intel 20A earlier than expected as we near completion of our five-nodes-in-four-years plan.” While some may see this move as a setback, it may reflect a strategic shift to concentrate on the 18A process. Other observers have **pointed out** that “Intel 20A was always a bridge to the more refined Intel 18A.”

SHIFTS IN DEMAND

Traditionally, Intel’s main revenue sources have been chips for personal computers and for data centers, which in 2023 accounted for 80 percent of the company’s revenues. The market for these kinds of chips, however, is being affected by a shift in consumer demand toward graphics processing units (GPUs) and central processing units (CPUs) that support applications of artificial intelligence (AI)—a market in which Intel’s presence is relatively limited—plus increasing competition from rivals AMD and Nvidia. As a result of these shifts, the company’s revenues declined from \$79 billion in 2021 to \$54 billion in 2023. As of mid-August 2024, Intel’s shares **were** trading below the company’s book value for the first time since 1981.

Gelsinger’s response has been decisive. In August 2024, in order to cut costs, he **announced** that Intel would reduce its workforce by 15,000 by November, suspend its shareholder dividend, and reduce or eliminate many employee perks. While the company’s stock price **declined** by roughly two-thirds

between February 2021 and September 2024, recent turnaround strategy announcements have led to a modest rebound.

NATIONAL SECURITY IMPLICATIONS

While recent accounts of Intel’s difficulties have mostly been confined to the business pages, the company’s future has broad national and global significance far beyond its employees and shareholders. Intel is a critical player in the U.S. government’s efforts to reduce dependency on chips manufactured abroad—notably the significant concentration of production in Taiwan—and regain leadership in semiconductor manufacturing technology. Both capability and capacity are needed to provide an alternative source for the most advanced chips and a more resilient supply chain for foundational chips essential to the automotive, telecommunications, and medical sectors. If Intel’s restructuring efforts fail, larger U.S. efforts are unlikely to achieve their objectives, with significant ramifications for U.S. national security and economic future. Indeed, as Geoff Colvin recently **argued** in *Fortune*, “Intel is no longer a conventional company and can no longer be evaluated as one. . . . it’s now a corporate actor on the geopolitical stage.” Policymakers must recognize Intel’s national security importance within this decade’s dramatically changed geopolitical environment.

Intel and the CHIPS Act

The Covid-19 pandemic led to disruptions across the U.S. semiconductor supply chain—most notably in the automotive industry—as well as volatility in other industries and supply chains involving PCs and data centers. While the causes of the shortage are complex, it highlighted the fact that when foreign supply is limited, the United States no longer has the domestic chipmaking capacity to manufacture the most advanced semiconductors which many products demand. Recognizing the national security and economic implications of this vulnerability, Congress enacted the CHIPS Act in 2022, which seeks to support U.S. chipmakers’ efforts to recapture technological leadership and to encourage the expansion of semiconductor manufacturing capacity in the United States. The CHIPS Act **deploys a combination** of federal grants, loans, and tax incentives for investments in U.S. semiconductor manufacturing, as well as support for R&D and related workforce initiatives.

Beginning in late 2023, the Department of Commerce proposed a series of federal funding awards for companies undertaking capital investments in chipmaking. Intel is the provisional recipient of the largest single federal award package, reflecting both its centrality in the U.S. semiconductor ecosystem and the scale of its investments in chipmaking. The Department of Commerce’s Preliminary Memorandum of Terms (PMT) with Intel, announced in March 2024, included grants of up to \$8.5 billion to help finance the construction, expansion, and modernization of wafer fabrication, advanced packaging, and development facilities in Ohio, Arizona, New Mexico, and Oregon. Additionally, the PMT provides up to \$11 billion in federal loans to support Intel’s investments. The company also **indicated** that it would take advantage of the Department of the Treasury’s Investment Tax Credit for fab construction, which is expected cover up to 25 percent of qualifying capital expenditures undertaken by the end of 2026. Furthermore, Intel will **receive** \$3 billion in additional CHIPS Act grants for a Secure Enclave program, which would ensure a protected supply of leading-edge chips for the U.S. government.

A CENTRAL ROLE IN GROWING U.S. TECHNOLOGICAL CAPACITY

It would be difficult to overstate Intel’s role in the success or failure of the CHIPS Act. Intel has been **described** as “the only U.S.-based company with leading-edge semiconductor fabs” capable of

developing and manufacturing cutting-edge chips that are necessary to support advanced applications of AI at the 2 nm node and below. While Intel's 3-nm production and below may be a year or more behind that of global leaders TSMC and Samsung (indeed, Samsung is apparently struggling with technical challenges itself), no other U.S.-owned semiconductor maker is in a position to reignite U.S. semiconductor manufacturing process leadership.

Despite the near-term cash flow concerns, Intel **remains** committed to its over \$100 billion investment in new U.S. chipmaking capability and capacity over the next five years. No other large chip manufacturer is investing anywhere close to the scale of Intel's projects in the United States over the same time frame. These plans necessarily require very high levels of capital expenditure, with payoffs only coming in the medium-to-long term. In early 2024, to raise the necessary capital, Intel **sold** a 49 percent share in its Ireland-based fab to Apollo Global Management for a sum of \$11 billion. In addition, Intel has **concluded** a deal with Brookfield Asset Management, a major investment firm, to funnel \$30 billion into two new chipmaking facilities in Arizona. Notwithstanding Intel's internal layoffs and other setbacks, Gelsinger affirmed in August 2024 that the company **remains** committed to domestic manufacturing, stating that "Intel is prioritizing our core investments that are laying the groundwork for our future, and . . . our existing U.S. projects in Arizona, New Mexico, Ohio and Oregon."

Intel's ambitious manufacturing objectives rest on exceptional technological capabilities. Intel remains at the cutting edge of chip manufacturing innovation: its next process technology, Intel 18A, operates at the 1.8 nm node and is **expected** to compete directly with TSMC's 2 nm "N2" process. Intel 18A combines multiple process innovations, from 3D hybrid bonding to nanosheet transistors to back-side power delivery. Intel **plans** to use 18A process technology in its own new server processor, Clearwater Forest.

STILL A FIRST MOVER

Despite its recent setbacks, Intel continues to be a first-mover on leveraging technologies that would bring it back to leading-edge manufacturing process leadership. Recently, Intel finalized a deal with the Dutch lithography equipment maker ASML to receive ASML's first 2024 run of new state-of-the-art High-Numerical Aperture Extreme Ultraviolet (High-NA EUV) lithography machines. High-NA EUV lithography further shortens the wavelength of the ultraviolet light used to etch nanoscale circuits, a crucial process for the next generation of lower-nanometer chipmaking. According to **IBM**, the ASML machines "can perform a new technique that could pave the way to developing and producing chips at nodes even smaller than 2 nm." It is important to note these are not just plans. Intel **received** the world's first High-NA EUV machine in December 2023, which was installed and calibrated in the spring of 2024 at the company's technology development fab in Oregon. Moreover, Intel is slated to receive a second machine in late 2024 and, according to reports, has **committed** to buying ASML's entire 2024 run of High-NA EUV tools, giving it a head start on deploying this new technology.

While Intel's principal competitors, TSMC and Samsung, are also making investments in U.S. chipmaking under the CHIPS Act, their new fabs will only represent a small portion of each company's capacity. TSMC and Samsung remain the national champions for Taiwan and South Korea, respectively, retaining essential know-how and R&D facilities in their home countries, whose governments have well-honed incentive strategies to nurture and sustain leading-edge chipmaking at home. They are responsive, first and foremost, to their own national ecosystems and the needs of their governments.

Intel's decision to pause new chipmaking investments in Europe underscores the limits foreign-owned chipmakers may set on their U.S. manufacturing operations and investments as markets, company strategies, and geopolitical concerns evolve.

If Intel were to bow out of CHIPS Act initiatives—whether by its own decision, a change in U.S. government policy, or the acquisition of the company's foundry business by a third party not bound to the CHIPS Act—the act's successful and timely implementation would be seriously jeopardized. The stakes are high, including for national defense; as writer Mackenzie Hawkins recently pointed out in [Bloomberg](#), “Intel's woes may . . . jeopardize the government's ability to reach its policy goals, which include establishing a secure supply of cutting-edge chips for the Pentagon and making a fifth of the world's advanced processors by 2030.” [Finding](#) a U.S.-headquartered replacement to maintain domestic ownership of Intel's higher-end fabs or to preserve its technological know-how would be nearly impossible.

As veteran chip industry analyst Dan Hutcheson succinctly [put it](#), “The purpose of the Chips Act was partly to make sure we kept Intel as an American company supported by the American government.” The Biden administration appears to recognize this: The *Financial Times* [reported](#) in September 2024 that Intel and the U.S. government were on track to finalize negotiations on the \$8.5 billion grant contract by the end of the year, which “would amount to a vote of confidence in Intel by the U.S. government.”

In parallel with Intel's negotiations with the Commerce Department, reports have surfaced that Samsung, Apple, and the fabless design firm Qualcomm are [considering](#) taking a stake in Intel or acquiring the company outright. It is not clear that these or other similar reports have much substance. In September 2024, Intel [reportedly rebuffed](#) an overture from UK-based, SoftBank-owned Arm Holdings to acquire its product division.

Moreover, an acquisition of Intel, or pieces of it, by another major chip firm would unquestionably face antitrust scrutiny in the United States and possibly elsewhere, as well as a likely challenge by the Committee on Foreign Investment in the United States (CFIUS) if the investor were foreign. At the very least, takeover of any part of Intel's business could [disrupt](#) the delicate negotiations between the company and the government.

Given the stakes in this global contest, it is unfortunate that the negotiations over Intel's CHIPS Act funding continue to become more complex, with the CHIPS Program Office reportedly requiring commitments beyond those outlined in the act, and which some suggest are more akin to those required for private equity investments than for a congressionally mandated grant program. Overly stringent government requirements, though designed to ensure CHIPS Act funding meets the program's goals, could paradoxically compromise Intel's ability to utilize the grants. For example, *Politico* recently [cited](#) concerns from a number of CHIPS Act recipients that government negotiations are both slow and expansive with conditions on the CHIPS Act awards that have little to do with ensuring the success of the projects. While recognizing the obligation to meet statutory requirements, more than two years after passage of the CHIPS Act, the Commerce Department has yet to distribute major funding.

Ensuring Intel's Continued U.S. Manufacturing Presence

As noted, having Intel continue as an innovative, internationally competitive U.S. semiconductor manufacturer is a matter not only of economic interest, but of national security. The release of near-term CHIPS Act funding is becoming more important, especially given the scale of Intel's investments and its ongoing financial difficulties. In response to potential further delay—attributed to the slow disbursement of federal aid—in Intel's \$28 billion Ohio project, Governor Mike DeWine **has requested** that the Biden administration expedite the necessary funding to Intel. However, the new fabs funded by these grants will not generate significant revenues until 2027, exposing the company to cash-flow challenges in the interim. One recent industry analysis **commented** that “Intel's continued struggle begs the question: will the U.S. government need to do more?”

Should the government concur with the assessment that Intel is not too big to fail but too good to lose, there are major recent precedents for federal policy measures to shore up companies whose collapse would bring unacceptable national costs. For example, the 2008 financial crisis posed an existential threat to large U.S. financial and manufacturing companies; confronting the prospect of imminent calamity, the Bush administration implemented the Troubled Assets Relief Program (TARP), providing \$426 billion in federal support to stabilize financial and manufacturing institutions, including failing U.S. automakers, that were considered “too big to fail.” TARP was not designed to subsidize or nationalize struggling companies, but rather to give them an interim financial bridge, allowing them to remain solvent while working toward profitability and continuing to serve as pillars of the U.S. economy.

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Importantly, TARP was executed at scale in several affected industries. In December 2008, the Bush administration announced a \$17.4 billion rescue loan for U.S. automakers. President Bush later **recalled** that he “didn't want history to look back and say, ‘Bush could have done something but chose not to do it.’” Incoming President Barack Obama **defended** Bush's action as a “necessary step to avoid a collapse in our auto industry that would have devastating consequences for our economy and our workers.” Obama augmented the Bush administration's financial support for U.S. auto firms with federal outlays eventually totaling about \$80 billion. Washington subsequently **recovered** most of these funds, with the net cost to taxpayers amounting to about \$10 billion. No major U.S. automaker disappeared during the crisis, and the Big Three auto manufacturers remain a key element in today's domestic manufacturing economy.

Similar measures were extended to ailing financial institutions under the Treasury Department's 2008 Capital Purchase Program (CPP), which **exchanged** financial assistance for preferred stock in the companies, along with debt securities and warrants to purchase common and preferred stock. Under the CPP, the Treasury Department acquired \$205 billion worth of shares to shore up troubled financial services firms over the short term, of which \$200 billion was eventually redeemed by those same

institutions. The purpose of the CPP was to enable financial firms to continue supplying essential levels of liquidity to the U.S. economy.

AVOIDING DISASTER

The objective of TARP was to avert a second Great Depression, which could have been triggered by the collapse of the U.S. financial and manufacturing sectors. It not only succeeded but did so at what proved to be a bearable cost to the government. A 2022 Congressional Budget Office study **observed** that “the U.S. financial system was in a precarious position when the TARP was created, and the transactions envisioned and ultimately undertaken entailed substantial financial risk for the federal government. Nevertheless, the TARP’s net realized costs have proved to be near the low end of the range of possible outcomes anticipated at the program’s outset.”

Although the specifics of TARP and the CPP fortunately do not align perfectly with Intel’s current challenges, Intel’s current operational problems have important parallels with the crisis of 2008:

- Intel is *the* central player in the government’s implementation of the CHIPS Act, which is critical for national security and economic well-being. The company could benefit a great deal from federal support to surmount a cash flow pinch in 2025-26, when its new fabs begin to generate revenue in 2027 and beyond. The goal of such a cash flow would be to provide financing to enable Intel to keep the construction and investments on track while signaling a commitment to the company’s success.
- Semiconductor manufacturing is not a waning industrial sector. The demand for advanced chips is robust, due in no small part to the AI boom. The question is not whether the sector is viable, but who will lead its production and reap the rewards, including the revenue necessary to fund the next round of innovation.
- Without Intel’s continued participation, achieving the CHIPS Act’s main goals—reestablishing American technological leadership in high-end chip manufacturing and reducing reliance on foreign chipmakers—will be exceedingly difficult, if not impossible.

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HOW COULD IT BE DONE?

Additional federal support for Intel should be envisaged on both national security grounds and to favor domestic R&D investment. This support could come in various forms: an extension of the CHIPS Advanced Manufacturing Investment Credit; the extension of additional loans and loan guarantees; targeted tax measures; and other similar measures taken under TARP and CPP. If the Big Three automakers and major U.S. financial institutions were deemed “too big to fail” in 2008, Intel can be similarly considered “too important to fail” in today’s increasingly perilous geopolitical environment.

While the CHIPS Act has been instrumental in laying the groundwork for increased U.S. manufacturing capacity, the existence of new facilities does not guarantee their effective utilization. The U.S. government should thus consider how it can build on the foundational work of the CHIPS Act by focusing on strengthening the domestic supply chain. For example, targeted tax measures that provide incentives for the consumption of U.S.-produced wafers could not only help ensure the best possible return on new manufacturing facilities, but also encourage the building of additional capacity once the CHIPS Act incentives run out. Policies to help onshore the semiconductor supply chain will help to ensure that U.S. development and production of advanced chips is prioritized, thus encouraging periodic technological upgrades and even enabling the co-location of technology developments that are critical to national security.

While some will point out—correctly—that government support is inconsistent with traditional laissez-faire principles, historical precedent shows that national security concerns have overridden such principles during major crises such as World Wars I and II, the Cold War, and the 2008 financial crisis. Indeed, Washington has consistently taken steps to invest in and nurture key industries relevant to defense and health (including major investments in vaccine manufacturing during the Covid-19 pandemic).

Similar fears regarding the semiconductor industry’s competitiveness **prompted** significant federal investment and trade measures in the 1980s, when the U.S. chip industry was at risk of losing technological leadership. Major government investment, matched by the private sector, helped form the successful Sematech research and manufacturing consortium, which enabled the U.S. chip industry to regain competitiveness. Now, the future of Intel—the linchpin of the CHIPS Act—cannot be left to the vagaries of the market, especially one shaped and conditioned by other countries’ industrial policies.

Perspectives from Abroad: Policies of Allies and Competitors

The cyclical nature of the semiconductor industry means it must make substantial investments to maintain and improve production capacity during economic downturns for the eventual recovery in demand. Semiconductor companies require significant capital to maintain their production capacity. To address these industry characteristics, leading manufacturers abroad often receive both direct and indirect government support, frequently on a massive scale.

This is not new. The world’s leading semiconductor foundries, TSMC and United Microelectronics Corporation (UMC), were both established with the support of the Taiwanese government when they spun off from the Industrial Technology Research Institute (ITRI). Since 1991, as the foundry concept gained traction, TSMC **has experienced** rapid growth as the world’s leading semiconductor foundry, acquiring unparalleled expertise and capabilities.

Similarly, SK Hynix, one of the leading South Korean companies in advanced memory semiconductor manufacturing, is now a successful company despite sustaining major losses in the past following sharp declines in DRAM semiconductor prices that began in the mid-1990s. Pressured by the South Korean government, Hyundai Electronics Industries **acquired** LG Semicon, and their semiconductor division **spun off** as SK Hynix in 2001. After the spin-off, Hynix **faced** severe financial pressures from a heavy debt load and low DRAM prices. To restore the firm’s viability, a consortium of private and national financial institutions **implemented** a comprehensive support program, including debt forgiveness,

equity conversion, credit limit expansion, debt maturity extension, and interest rate reductions. Hynix is now a profitable and competitive company.

This policy approach remains relevant today. The Japanese government recently allocated \$1.3 billion to Kioxia Holdings, Japan's leading memory semiconductor company, which **experienced** very significant losses in 2023 primarily due to a cyclical downturn in demand for memory chips. Continuing to address the firm's financial challenge, the Japanese government has recently **allocated** \$1.3 billion in support of the company. This funding could stabilize Kioxia with the broader goal of ensuring Japan maintains its technological leadership in NAND flash memory, supporting a robust supply network to meet future market demand.

As these examples suggest, government policies have often played, and continue to play, major roles in shaping the industrial landscape in semiconductors. Today, many of the world's leading countries are actively promoting domestic production. Like the United States, these nations are backing their domestic chipmakers with public support for investments in R&D and manufacturing capacity. What is clear, however, is that these governments will not allow these key national enterprises to fail.

In fact, reflecting both the China challenge and new efforts of countries such as the United States, policies to support semiconductor manufacturing within national borders have increased in scale and frequency. This list of recent government investments in key domestic manufacturing companies illustrates the scale of financial support for firms in this strategic industry.

- **France:** In June 2023, France **announced** that it would allocate \$3.1 billion in public funding to its most advanced semiconductor manufacturer, STMicroelectronics, to build a semiconductor manufacturing plant in Crolles, in partnership with U.S.-based GlobalFoundries. STMicro, regarded as one of the most innovative firms in Europe, has **benefitted** from extensive state support since its formation under government auspices in 1968.
- **Japan:** After taking a largely laissez-faire approach, the Japanese government concluded it could not be economically secure without production of advanced semiconductors, particularly those used by its auto industry. Since 2022, in a major national initiative, the Japanese government has allocated \$6 billion to Rapidus, **aiming** to establish this government- and privately-owned company as the flagship of Japan's "ambition to catch up in semiconductor manufacturing." Additionally, the company is expected to receive additional **private bank loans** and **subsidies** in its ambitious bid to produce cutting-edge chips.
- **South Korea:** Samsung and SK Hynix **are engaged** in discussions with the Korea Development Bank (KDB) about utilizing a low-interest loan program, valued at \$12.3 billion, which is aimed at bolstering the semiconductor industry. SK Hynix will again seek government support, **reportedly** applying for a loan amounting to \$2.1 billion. More broadly, South Korea **recently enacted** the "K-Chips Act," a major program with significant incentives to promote national high-tech industries, notably semiconductors. The architect of the "K-Chips Act," a former Samsung executive, sees the stakes as fundamentally shaping national trajectories, **emphasizing** that "the winner of the global chip battle will control the economic security order, while the loser will end up becoming a technological colony."

- **China:** China offers perhaps the leading case of government support for the industry. At the end of 2022, the Chinese government was reportedly planning to spend \$143 billion over the next five years to support its semiconductor industry. In 2022, the Semiconductor Manufacturing International Corporation (SMIC) **received** \$282.1 million. This **continues** the China Integrated Circuit Industry Investment Fund (the “Big Fund”) to support investments in China’s semiconductor value chain, including production capacity, equipment, materials, and advanced packaging. In May 2024, China **launched** its third semiconductor “Big Fund,” a \$45.7 billion investment vehicle to support the country’s domestic semiconductor industry. This figure is roughly on par with the CHIPS Act but more narrowly focused in that these resources will likely primarily benefit Huawei’s chip design and SMIC’s chip manufacturing. These new measures **augment** China’s already-massive government support for the country’s chip sector, including direct subsidies, preferential loans from government banks, and equity infusions, as well as subsidies from regional and municipal governments involving land, electrical power, and infrastructure. The ability to domestically develop and produce advanced chips is a top priority for China’s leadership, and this comprehensive strategy reflects that commitment. The collective effort of these programs dwarfs the support offered by other countries.
- **Taiwan:** Even in Taiwan, arguably the leading center of semiconductor manufacturing today, the government has recently stepped in to provide support. In January 2023, Taiwan **enacted** its own version of the CHIPS Act that “offers investment tax credits of 25% on R&D and 5% on equipment.” This **introduced** the country’s largest-ever tax deduction for R&D expenses and related capital investments in semiconductors, **designed** to benefit eligible semiconductor companies such as TSMC that meet specific criteria. These incentives **complement** the special benefits that Taiwan grants for research and manufacturing organizations located in science and industrial parks, which include, according to a Boston Consulting Group **report**, “relatively low-cost access to land, water, electricity, and infrastructure, as well as the possibility of expedited approvals and the elimination of import and export duties.” These multifaceted measures reflect the long-term commitment of the government to ensuring the continued success of its leading firms and the country’s central position in this global industry.

Conclusion

The United States and its allies confront an unparalleled strategic challenge from China that has the potential to escalate. In any such confrontation, leadership in and access to advanced semiconductor technology—and the AI systems these innovations enable—will play a central role and could even be decisive. Numerous recent analyses conclude that China is investing heavily in the sector and is rapidly gaining on the United States in strategic areas of microelectronic production, a dynamic that raises major national security concerns.

Successful and timely implementation of the CHIPS Act is a critical step to addressing that challenge and deterring conflict—and that cannot happen without Intel.

Successful and timely implementation of the CHIPS Act is a critical step to addressing that challenge and deterring conflict—and that cannot happen without Intel. Accordingly, the U.S. government needs to be proactive, make CHIPS Act resources available as soon as possible, and accept that while there will always be risks, speed and compromise are crucial to achieve the CHIPS Act’s central goals. More broadly, the Departments of Commerce and Defense need to begin using existing tools, contracting mechanisms, and authorities—such as OTA—to support Intel through its current transition and not wait until Intel’s financial position slows its progress and further erodes the country’s competitive position. Prompt and strategic action must be taken to bring the objectives of the CHIPS Act closer to reality. Implementing an array of supportive measures beyond the CHIPS Act would also be a powerful way to underscore that the government wants Intel, and the semiconductor industry, to thrive and grow for decades to come. ■

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