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The US tightens its grip on semiconductors

China's access to advanced chips and manufacturing equipment is further restricted

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FLASH NOTE

SUMMARY

- On 7 October, the US Department of Commerce announced new export controls on advanced computing and semiconductor manufacturing items to China.
- The restrictions are wide-ranging and rest on three main pillars:
  - Pillar I: export controls on advanced chips and semiconductor manufacturing equipment, particularly if used or installed in China
  - Pillar II: restrictions on US persons' (individuals and firms) ability to support the development or production of certain integrated circuits in China
  - Pillar III: additions to the Unverified Users List and the Entity List, which aim to restrict specific entities' access to dual-use items
- The measures also illustrate a change of tack by the US, which is no longer seeking a 'relative' advantage in key technologies, but rather an absolute one.
- From consumers to manufacturers of advanced chips and manufacturing equipment, the whole semiconductor universe could feel the effects of these new export controls.
- We do not expect any immediate response from China, but Beijing will most likely step up its own efforts to achieve technological autonomy.
- The US government's technology restrictions are part of a broader "strategic competition" with China. The partial de-coupling this represents between the US and China does not bode well for the world economy or world peace.

THE US HAMPERS CHINA'S ABILITY TO PURCHASE AND MANUFACTURE HIGH-END CHIPS

On 7 October, the US Department of Commerce announced new export controls on advanced computing and semiconductor manufacturing items to the People's Republic of China (PRC).

The US justified this move by noting that *"these items and capabilities are used by the PRC to produce advanced military systems including weapons of mass destruction; improve the speed and accuracy of its military decision making, planning and logistics, as well as of its autonomous military systems; and commit human rights abuses."*

The new measures make extensive use of existing legal frameworks that enable the US to restrict trade links with foreign entities, typically on national security grounds. They notably leverage both Export Administration Regulations (EAR) and a large set of 'lists' designating counterparties to which specific trade restrictions apply.

As a reminder, the EAR, which apply to both physical objects and intellectual property, aim to regulate the export and re-export of dual-use items (i.e. those with both civil and military uses). The EAR also reach beyond entities located in the US, covering transactions involving items produced abroad but using US technology, as well as the activities of US persons (i.e. people and companies) worldwide.

The new restrictions announced by the Department of Commerce essentially rest on three pillars:

- **Pillar I: export controls on advanced chips and semiconductor manufacturing equipment**, particularly if they are to be used or installed in the PRC. For instance, chips destined for use in supercomputers in the PRC are now subject to licence requirements. A licence will also be required for the sale of any semiconductor production equipment destined for a facility located in the PRC. Facilities owned by PRC entities (as opposed to multinationals) should expect any licence request to be treated with a 'presumption of denial'.
- **Pillar II: restrictions on US persons' ability to support the development or production of integrated circuits** at certain PRC-located semiconductor fabrication facilities without a licence. The notion of support is voluntarily vague, but notably includes shipping, transmitting or facilitating the in-country transfer of any item contributing to the production of a wide range of integrated circuits.
- **Pillar III: modifications to the Unverified Users List (UVL) and the Entity List (EL).** While the former is a 'red flag' list that simply triggers additional due diligence and reporting, the latter essentially prohibits listed entities from receiving items subject to the EAR without a hard-to-obtain export licence. Not only were several Chinese entities added to the two lists, the procedure to be designated in any of them was also clarified and accelerated.

Beyond the evident objective to slow down China's progress on semiconductor technology, it is increasingly clear that the US approach has shifted from a 'sliding scale' one – whereby it would ensure it remains a couple of generations ahead, to a more 'absolute' one, where the objective is to maintain "*as large a lead as possible*".

The technological thresholds beyond which many of the new restrictions were set (16/14 nanometres or less for logic chips, 128-layers or more for NAND memory chips and 18 nm half-pitch or less for DRAM memory chips) are indeed set in absolute terms and several generations behind the leading-edge capabilities.

Depending on what licences are granted and to whom, the new US export controls are likely to be an additional thorn in the side for the semiconductor industry, in particular for, but not limited to, China. Chinese firms consume 40% of all chips made globally, with a large share used as an input to China's massive electronic exports. These firms, especially those with government or military links, will now find it more difficult to source leading-edge products. Manufacturers of advanced chips (integrated, fabless and foundries alike) or production equipment will face additional hurdles to sell to, or manufacture in, the PRC.

At a global level, however, one should note that China itself is not a major producer of semiconductors (~8% of total global sales in 2019), and what is not produced in China can be sourced elsewhere.

LITTLE REACTION FROM CHINA SO FAR

Although it has significant production capacity, China's domestic chipmakers are still relatively weak. Foreign companies account for most of the added value in the China-based semiconductor industry, especially for high-end chips. In addition, Chinese chipmakers rely heavily on foreign suppliers for equipment, software and materials. While domestic suppliers have made progress in certain areas (such as packaging and testing, etching and developing photoresist processes), the overall technology gap with leading players worldwide remains wide (particularly in software and photolithography). The prospect of closing that gap in the short term is slim, especially in light of the new US export controls.

In our view, there isn't much that the Chinese government can do to counter the latest moves by the US. Some speculate that China could retaliate by restricting US companies' operations in China or by resorting to export restrictions of its own on some strategic materials such as rare-earth metals. In our view, neither is likely, at least in the near term. This is because other than being an expression of anger, such moves would be unlikely to reverse the US government's decisions and serve no strategic purpose. On the contrary, the Chinese government will likely continue to encourage foreign companies (including US companies) to invest in China. At least in theory, foreign companies with strong vested interests could help lobby against further restrictions on Chinese industries. This is exactly what the Chinese government has done since the US-China trade war started in 2018.

In the meantime, of course, Beijing will likely continue to invest heavily in R&D in the semiconductor sector in the hope of achieving technological autonomy. The latest restrictions will obviously make this effort more difficult, but there is no other way. In a speech delivered during the Chinese Communist Party's 20th Congress, Xi Jinping put great emphasis on science and technology, vowing that China " will focus on national strategic needs, gather strength to carry out indigenous and leading scientific and technological research, and resolutely win the battle in key core technologies.".

SEMICONDUCTORS ONLY ONE BATTLEFIELD IN A LARGER CONFRONTATION

Since Donald Trump started the US-China trade war in 2018, the relations between the world's two largest economies have been deteriorating, and by now arguably have reached their lowest point since the two established diplomatic relations in 1979. In its latest *National Security Strategy* (October 2022), the Biden administration labelled China as "the only competitor with both the intent to reshape the international order and, increasingly, the economic, diplomatic, military, and technological power to do it".

Hence, the recent escalation in the US government's technology restrictions against China is only part of the broad "strategic competition" between the two countries. The latest move by the US won't be the last or the only one. In other words, the relations between China and the US (and possibly its allies) could see even more challenges ahead, with profound implications for the world economy.

First, a partial decoupling between the US and China looks inevitable now. Both countries have the intent and are also taking actions to reduce their mutual reliance in strategic areas such as high-tech. Such moves not only tend to slow down innovation, but are also destructive to trust building between the two major powers and may lead to higher probability of a conflict in the long term.

Second, the partial decoupling between the world's two largest economies adds to the current trend of deglobalisation, which could lead to lower growth and higher inflation globally in the long run.

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