

MEMORANDUM

To: PSI Members
From: PSI Majority Staff
Date: February 21, 2024
Re: February 27, 2024 Hearing on “The U.S. Technology Fueling Russia’s War in Ukraine: How and Why”

I. HEARING OVERVIEW

On Tuesday, February 27, 2024, at 10:00 a.m., the Permanent Subcommittee on Investigations (“PSI” or “the Subcommittee”) will hold a hearing in SD-562 on the prevalence of American-manufactured semiconductors in Russian weapons systems, notwithstanding technology sanctions implemented since Russia’s invasion of Ukraine in February 2022. The hearing will examine how American-manufactured semiconductors continue to enter Russia notwithstanding U.S. export controls, the tools currently available to American manufacturers to combat this flow, and industry adoption of these tools and other best practices. Experts from groups whose work involves tracking the continued flow of U.S. semiconductors into Russia and analyzing the implications of these apparent export control violations will testify at the hearing.

This hearing is part of an ongoing PSI inquiry into compliance by U.S.-manufacturers with technology sanctions imposed against Russia since its invasion of Ukraine in 2022. PSI launched this inquiry in September 2023 and has sought documents and information from four of the largest producers of semiconductors in the United States, Advanced Micro Devices Inc. (“AMD”), Analog Devices Inc. (“Analog Devices”), Intel Corporation (“Intel”), and Texas Instruments Incorporated (“Texas Instruments”). These four companies were selected due to public reports regarding the repeated appearance of their products in Russian military equipment and/or evidence that their products continue to flow to Russia despite export controls.¹ Preliminary information obtained by PSI (and attached to this memorandum as Appendix A) shows significant increases since 2021 in exports to countries that are not subject to targeted restrictions and have been identified as

¹ See, e.g., Olena Bilousova et al., *Challenges of Export Controls Enforcement: How Russia Continues to Import Components for its Military Production*, KSE Institute (Jan. 2024), <https://kse.ua/wp-content/uploads/2024/01/Challenges-of-Export-Controls-Enforcement.pdf>; Olena Bilousova et al., *Russia’s Military Capacity and the Role of Imported Components*, KSE Institute (June 19, 2023), <https://kse.ua/wp-content/uploads/2023/06/Russian-import-of-critical-components.pdf>; James Byrne et al., *Silicon Lifeline: Western Electronics at the Heart of Russia’s War Machine*, Royal United Services Institute (Aug. 2022), <https://rusi.org/explore-our-research/publications/special-resources/silicon-lifeline-western-electronics-heart-russias-war-machine>; Nathaniel Taplin, *How Russia Supplies Its War Machine*, WALL STREET JOURNAL (Mar. 10, 2023), <https://www.wsj.com/articles/russia-ukraine-tech-chips-exports-china-f28b60ca>; Georgi Kantchev et al., *How Sanctioned Western Goods Are Still Flowing Into Russia*, WALL STREET JOURNAL (May 14, 2023), <https://www.wsj.com/articles/how-sanctioned-western-goods-are-still-flowing-into-russia-916db262>; Natalia Drozdiak, *EU Backs More Sanctions on Belarus Over Aiding Russia’s War*, BLOOMBERG (Aug. 3, 2023), <https://www.bloomberg.com/news/articles/2023-08-03/eu-backs-more-sanctions-on-belarus-over-aiding-russia-s-war>; Gaya Gupta, *U.S. Aims New Sanctions at Russian Military Supply Chains*, N.Y. TIMES (Sept. 14, 2023), <https://www.nytimes.com/2023/09/14/world/europe/us-sanctions-russia.html>.

potentially being used by Russia to evade U.S. export controls, including Armenia, Finland, Georgia, Kazakhstan, and Turkey.² The stark increases for these four companies include exports to Kazakhstan going up almost 1,000 times from 2021 to 2022. For the same period, exports to Georgia increased over 34 times, exports to Armenia were over 28 times greater, exports to Turkey more than doubled, and exports to Finland were roughly 1.5 times greater. This data raises additional questions about export control and compliance programs at these American semiconductor manufacturers.

II. BACKGROUND

a. The U.S. Semiconductor Industry and Russia's Military Technology

Semiconductors are conductive materials or compounds that are used to make electronic components.³ In practice and within the industry, the terms microchip, electronic integrated circuit, and semiconductor are generally used interchangeably to refer to electronic components made using semiconductors.⁴ These materials are essential components of electronic devices, ranging from computers and smartphones to household appliances and medical equipment.

U.S. companies dominate the global semiconductor manufacturing industry, holding nearly half the global market share.⁵ U.S. semiconductor companies also have a leading position in research and development, design, and semiconductor process technology.⁶ Both before and since the beginning of the war in Ukraine, U.S.-manufactured semiconductors have been found in a

² See, e.g., Olena Bilousova et al., *Challenges of Export Controls Enforcement: How Russia Continues to Import Components for its Military Production*, KSE Institute (Jan. 2024), <https://kse.ua/wp-content/uploads/2024/01/Challenges-of-Export-Controls-Enforcement.pdf>; Olena Bilousova et al., *Russia's Military Capacity and the Role of Imported Components*, KSE Institute (June 2023), <https://kse.ua/wp-content/uploads/2023/06/Russian-import-of-critical-components.pdf>; James Byrne et al., *Silicon Lifeline: Western Electronics at the Heart of Russia's War Machine*, Royal United Services Institute (Aug. 2022), <https://rusi.org/explore-our-research/publications/special-resources/silicon-lifeline-western-electronics-heart-russias-war-machine>; Nathaniel Taplin, *How Russia Supplies Its War Machine*, WALL STREET JOURNAL (Mar. 10, 2023), <https://www.wsj.com/articles/russia-ukraine-tech-chips-exports-china-f28b60ca>; Georgi Kantchev et al., *How Sanctioned Western Goods Are Still Flowing Into Russia*, WALL STREET JOURNAL (May 14, 2023), <https://www.wsj.com/articles/how-sanctioned-western-goods-are-still-flowing-into-russia-916db262>; Natalia Drozdiak, *EU Backs More Sanctions on Belarus Over Aiding Russia's War*, BLOOMBERG (Aug. 3, 2023), <https://www.bloomberg.com/news/articles/2023-08-03/eu-backs-more-sanctions-on-belarus-over-aiding-russia-s-war>; Gaya Gupta, *U.S. Aims New Sanctions at Russian Military Supply Chains*, N.Y. TIMES (Sept. 14, 2023), <https://www.nytimes.com/2023/09/14/world/europe/us-sanctions-russia.html>.

³ The Editors of Encyclopaedia Britannica, *semiconductor*, BRITANNICA <https://www.britannica.com/science/semiconductor>.

⁴ See, e.g., *What is a Semiconductor?*, SEMICONDUCTOR INDUS. ASS'N, <https://www.semiconductors.org/semiconductors-101/what-is-a-semiconductor/> (“Semiconductors, sometimes referred to as integrated circuits (ICs) or microchips. . .”).

⁵ SEMICONDUCTOR INDUS. ASS'N, *2023 Factbook*, 3, https://www.semiconductors.org/wp-content/uploads/2023/05/SIA-2023-Factbook_1.pdf.

⁶ *Id.*

range of military equipment—including weapons and other military support technology—used by the Russian military.⁷ This includes drones, radios, missiles, and armored vehicles.⁸ It also includes some of Russia’s most modern military systems, including cruise missiles, communications systems, and electronic warfare complexes.⁹

There are few ready substitutes for the U.S.-manufactured semiconductors used in Russian military technology.¹⁰ As detailed further below, the United States and a host of partner nations have imposed export controls meant to restrict the flow of semiconductors used in Russian military technology.¹¹ Reports indicate that Russia may be attempting to evade these controls rather than seeking to use alternative technology, a decision that likely stems from a lack of domestic production capacity and the inadequacy of alternative chips.¹²

b. Semiconductor Export Controls as a Tool of National Security

Since the start of Russia’s invasion of Ukraine, the United States and its allies have imposed a series of increasingly strict export controls on technology and other products used by Russia’s military. The U.S. government’s efforts at export control promulgation and enforcement are principally housed in the U.S. Department of Commerce’s Bureau of Industry and Security (“BIS”), whose mission is to “[a]dvance U.S. national security, foreign policy, and economic objectives by ensuring an effective export control and treaty compliance system and promoting continued U.S. strategic technology leadership.”¹³ On February 24, 2022—the day of Russia’s invasion of Ukraine—BIS announced the first export control measures against Russia in response to the invasion, which were designed to “severely restrict Russia’s access to technologies and other items that it needs to sustain its aggressive military capabilities.”¹⁴ These export controls have expanded over the nearly two years since Russia’s invasion and include, among others:

⁷ See, e.g., Kristina Partsinevelos, *The chip industry’s open secret: Adversaries’ military tech relies on U.S. components*, CNBC (Apr. 17, 2023), <https://www.cnbc.com/2023/04/17/us-components-found-in-russian-iranian-military-tech.html>.

⁸ Karen Gilchrist, *How U.S. microchips are fueling Russia’s military — despite sanctions*, CNBC (Aug. 7, 2023), <https://www.cnbc.com/2023/08/07/how-us-microchips-are-fueling-russias-military-despite-sanctions.html>.

⁹ *Id.*

¹⁰ See, e.g., Pavel Urusov, *Vital Microchip Sanctions Will Hit Russian Computing Power Hard*, CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE (July 25, 2023), <https://carnegieendowment.org/politika/90250>.

¹¹ See *infra* Section II.b.

¹² See, e.g., Alena Popova, *Russia can’t replace Western chips — so it gets them illegally*, THE HILL (Jan. 27, 2023), <https://thehill.com/opinion/technology/3833248-russia-cant-replace-western-chips-so-it-gets-them-illegally/>.

¹³ *About BIS*, BUREAU OF INDUS. AND SEC., U.S. DEP’T OF COMMERCE, <https://www.bis.doc.gov/index.php/about-bis>.

¹⁴ Press Release, U.S. Dep’t of Commerce, *Commerce Implements Sweeping Restrictions on Exports to Russia in Response to Further Invasion of Ukraine* (Feb. 24, 2022), <https://www.commerce.gov/news/press-releases/2022/02/commerce-implements-sweeping-restrictions-exports-russia-response>.

- (1) the addition of numerous individuals and companies believed to be connected to Russian military activity to the Entity List—a list maintained by BIS to identify “persons reasonably believed to be involved, or to pose a significant risk of being or becoming involved, in activities contrary to the national security or foreign policy interests of the United States”;¹⁵
- (2) two Foreign Direct Product Rules (“FDPR”)—rules which place export controls on products made *outside* of the United States but with U.S. developed technology— “[t]o restrict Russia and Belarus’ abilities to acquire certain foreign-produced items;”¹⁶ and
- (3) efforts to foster global cooperation on export controls aimed at Russia through the Global Export Control Coalition (which includes the U.S., UK, EU, and Japan) and the Export Enforcement 5 (which includes the U.S., Australia, Canada, New Zealand, and the UK).¹⁷

Recognizing the importance of semiconductors to Russia’s war effort, controls on the export of semiconductors have been a focus of these efforts. For example, the Global Export Control Coalition worked together to identify high priority items that help “fuel Russia’s war machine,” and in so doing identified electronic integrated circuits as Tier 1— “[i]tems of the highest concern due to their critical role in the production of advanced Russian precision-guided weapons systems, Russia’s lack of domestic production, and limited global manufacturers.”¹⁸ Similarly, in December 2023, BIS announced the addition of 42 entities to the Entity List, many of whom were added for helping Russian military users acquire semiconductors in contravention of export control restrictions.¹⁹

The types of restrictions implemented against Russia show the increasing importance of export controls as a tool of U.S. national security. Recently, these efforts have been furthered by using FDPRs to assert jurisdiction over all microchips made using U.S. technology, which

¹⁵ 15 CFR § 744.16, <https://www.ecfr.gov/current/title-15/section-744.16>.

¹⁶ Press Release, U.S. Dep’t of Commerce, U.S. Department of Commerce & Bureau of Industry and Security Russia and Belarus Fact Sheet (Feb. 22, 2022), <https://www.commerce.gov/news/fact-sheets/2022/02/us-department-commerce-bureau-industry-and-security-russia-and-belarus#:~:text=To%20restrict%20Russia%20and%20Belarus,certain%20plants%20or%20major%20components>.

¹⁷ See, e.g., Press Release, Bureau of Indus. and Sec., U.S. Dep’t of Commerce, Commerce, International Partners Continue Cooperation in Response to Russia’s Illegal Invasion of Ukraine (Sept. 19, 2023), <https://www.bis.doc.gov/index.php/documents/about-bis/newsroom/press-releases/3332-2023-09-14-bis-press-release-quad-meeting-hs-code-update-final/file>; Press Release, Bureau of Indus. and Sec., U.S. Dep’t of Commerce, United States-Australia-Canada-New Zealand-United Kingdom Release Joint Guidance on Countering Russia Evasion (Sept. 26, 2023), <https://www.bis.doc.gov/index.php/documents/about-bis/newsroom/press-releases/3337-final-2023-09-22-bis-press-release-quint-seal-ee-ocpa-clean-ajb-osb/file>.

¹⁸ *Common High Priority Items List*, BUREAU OF INDUS. AND SEC., U.S. DEP’T OF COMMERCE, <https://www.bis.doc.gov/index.php/2011-09-14-14-10-06/russia-export-controls>.

¹⁹ Press Release, Bureau of Indus. and Sec., U.S. Dep’t of Commerce, Commerce Adds 42 Entities to the Entity List for Supporting Russia’s Military, Including Co-Production of Drones with Iran, <https://www.bis.doc.gov/index.php/documents/about-bis/newsroom/press-releases/3390-press-release-12-5-entity-list-package-hans-de-geetere/file>.

functionally reaches “almost every chip factory in the world, because almost every one contains hard-to-replace American tools.”²⁰ In 2010, FDPRs were part of an effort to restrict the export of products made with American technology from anywhere in the world to China if they were to be used for military purposes or to build satellites.²¹ In 2020, FDPRs were used to target the Chinese telecommunications company Huawei given its threats to U.S. national security, economic integrity, and supply chain security.²² And, since the implementation of FDPRs against Russia, BIS has similarly announced new FDPRs meant to restrict China’s ability to obtain advanced artificial intelligence capabilities.²³

c. The Continued Flow of U.S.-manufactured Semiconductor’s into Russia Despite U.S. Export Controls

Despite robust export control efforts, numerous reports since Russia’s invasion of Ukraine have highlighted both Russia’s continued ability to acquire U.S.-manufactured semiconductors and the appearance of these semiconductors in Russian military supplies recovered on the battlefield. These include, among others:

- Royal United Services Institute, *Silicon Lifeline: Western Electronics at the Heart of Russia’s War Machine* (August 2022): The Royal United Services Institute, a defense and security think tank headquartered in London, released this report examining the components and functioning of 27 of Russia’s most modern military systems lost or expended since the February 2022 invasion of Ukraine, finding that a majority of the components identified came from U.S. manufacturers.²⁴
- Conflict Armament Research, *Field Report* (April 2023): Conflict Armament Research, a UK-based investigative organization that tracks the supply of conventional weapons, ammunition, and related military material into conflict-affected areas, issued this report which analyzed components of Russian weapons

²⁰ *Chains of control: The history and limits of America’s favourite new economic weapon*, THE ECONOMIST (Feb. 8, 2023), <https://www.economist.com/united-states/2023/02/08/the-history-and-limits-of-americas-favourite-new-economic-weapon>.

²¹ *Id.*

²² *Id.*

²³ Press Release, Bureau of Indus. and Sec., U.S. Dep’t of Commerce, Commerce Strengthens Restrictions on Advanced Computing Semiconductors, Semiconductor Manufacturing Equipment, and Supercomputing Items to Countries of Concern (Oct. 17, 2023), <https://www.bis.doc.gov/index.php/documents/about-bis/newsroom/press-releases/3355-2023-10-17-bis-press-release-ac-s-and-sme-rules-final-js/file>.

²⁴ James Bryne et al., *Silicon Lifeline: Western Electronics at the Heart of Russia’s War Machine*, ROYAL UNITED SERVICES INSTITUTE (Aug. 2022), <https://rusi.org/explore-our-research/publications/special-resources/silicon-lifeline-western-electronics-heart-russias-war-machine>.

recovered from Ukraine to find that components manufactured by a U.S. company after Russia's invasion of Ukraine had appeared in Russian weapons.²⁵

- KSE Institute, *Russia's Military Capacity and the Role of Imported Components* (June 2023): The KSE Institute, an analytical center at the Kyiv School of Economics, released this report examining Russia's overall military capability in terms of key weapons systems and the extent of its continued reliance on imported components, relying on independent investigations of both specific foreign components found in Russian equipment in Ukraine and a comprehensive dataset on Russian international trade.²⁶ The report concludes, among other things, that by the end of 2022, imports of "critical components" for Russian military operations had fully recovered and, in fact, risen above pre-sanctions levels for semiconductors.²⁷ It notes in particular Russia's ability to acquire U.S. semiconductors through third countries.²⁸
- Atlantic Council, *Russia Sanctions Database* (December 2023): A database that "tracks the restrictive economic measures Western allies have placed on Russia and evaluates whether these measures are successful in achieving the stated objectives."²⁹ The database notes that "Western export controls have a limited effect on Russia's imports of sophisticated battlefield technology," because "[w]hile export controls effectively reduced dual-use technology exports to Russia in the months following the invasion, the impact gradually diminished as Russia began sourcing technology components from third countries."³⁰
- Royal United Services Institute, *In Plain Sight: Operations of a Russian Microelectronics Dynasty* (December 2023): This investigative report details how one of Russia's leading microelectronic distributors, Compel JSC, has imported massive volumes of Western microelectronics through Germany and Hong Kong since the February 2022 invasion of Ukraine.³¹

²⁵ Conflict Armament Research, *Identifying Post-Invasion Components in Russian Weapons* (Apr. 2023), <https://storymaps.arcgis.com/stories/00594bef40bc4148b16dc7267172d033>.

²⁶ Olena Bilousova et al., *Russia's Military Capacity and the Role of Imported Components*, KSE Institute (June 2023), <https://kse.ua/wp-content/uploads/2023/06/Russian-import-of-critical-components.pdf>.

²⁷ *Id.*

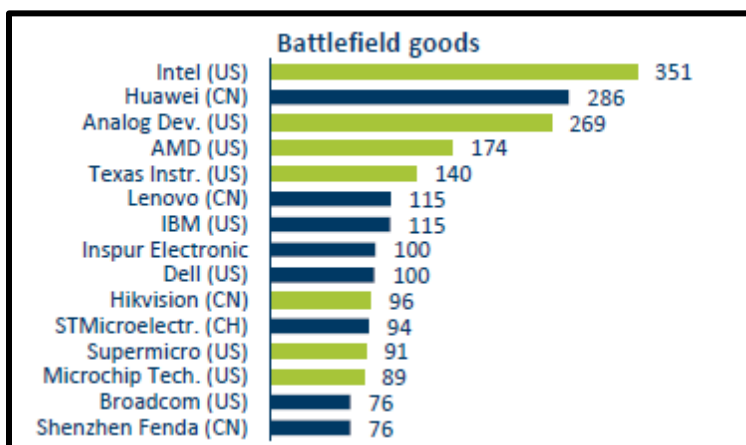
²⁸ *Id.*

²⁹ *Russian Sanctions Database*, ATLANTIC COUNCIL, <https://www.atlanticcouncil.org/blogs/econographics/russia-sanctions-database/>.

³⁰ *Id.*

³¹ James Byrne et al., *In Plain Sight: Operations of a Russian Microelectronics Dynasty* (Dec. 2023), Royal United Services Institute, <https://rusi.org/explore-our-research/publications/commentary/report-plain-sight-operations-russian-microelectronics-dynasty>.

- KSE Institute, *Challenges of Export Controls Enforcement* (January 2024): This report examines the effectiveness of export controls implemented since Russia’s invasion of Ukraine.³² It outlines numerous issues with export controls, including third-party intervention schemes, but focuses “on the role of producers from export controls coalition countries whose products are manufactured abroad and make their way to Russia due to insufficient compliance efforts by the private sector.”³³ Of particular note is its identification of U.S. companies as the top producers of battlefield goods which were imported to Russia from January to October 2023:



*Figures shown in \$ million. Green = companies whose components have been found on the battlefield
Source: KSE Institute, *Challenges of Export Controls Enforcement*³⁴

III. HEARING WITNESSES

Witnesses at the hearing will include:

- James Byrne, Director of the Open-Source Intelligence and Analysis Research Group at the Royal United Services Institute;
- Damien Spleeters, Deputy Director of Operations at Conflict Armament Research; and
- Elina Ribakova, Director of the International Affairs Program and Vice President for foreign policy at the Kyiv School of Economics.

Additional witnesses may be added.

³² Olena Bilousova et al., *Challenges of Export Controls Enforcement: How Russia Continues to Import Components for its Military Production*, KSE Institute (Jan. 2024), <https://kse.ua/wp-content/uploads/2024/01/Challenges-of-Export-Controls-Enforcement.pdf>.

³³ *Id.*

³⁴ *Id.*

APPENDIX A

In September 2023, the Permanent Subcommittee on Investigations (“PSI” or “the Subcommittee”) launched an inquiry into compliance by U.S.-based manufacturers with U.S. sanctions and export controls against Russia. PSI requested certain documents and information from Advanced Micro Devices Inc. (“AMD”), Analog Devices Inc. (“Analog Devices”), Intel Corporation (“Intel”), and Texas Instruments Incorporated (“Texas Instruments”) given repeated reports that their products have appeared in Russian military systems. The Subcommittee sought information regarding each company’s exports for the calendar years 2021, 2022, and 2023 to a number of countries that are not subject to targeted restrictions and have been publicly identified as having entities that have allegedly assisted Russia in acquiring semiconductors whose export to end users in Russia is currently restricted, including Armenia, Finland, Georgia, Kazakhstan, and Turkey.³⁵

To date, the Subcommittee has received data responding to this specific request from each of the four companies for the full calendar years of 2021 and 2022. It has received partial 2023-year data from three companies and full 2023-year data from one.

These data show a near doubling in exports (recorded in individual product units) to five of the countries on the Subcommittee’s list from 2021 to 2022, with some countries showing particularly tremendous increases.³⁶

Figure 1: Number of Exports by Individual Product Units to Armenia, Finland, Georgia, Kazakhstan, and Turkey in 2021 and 2022

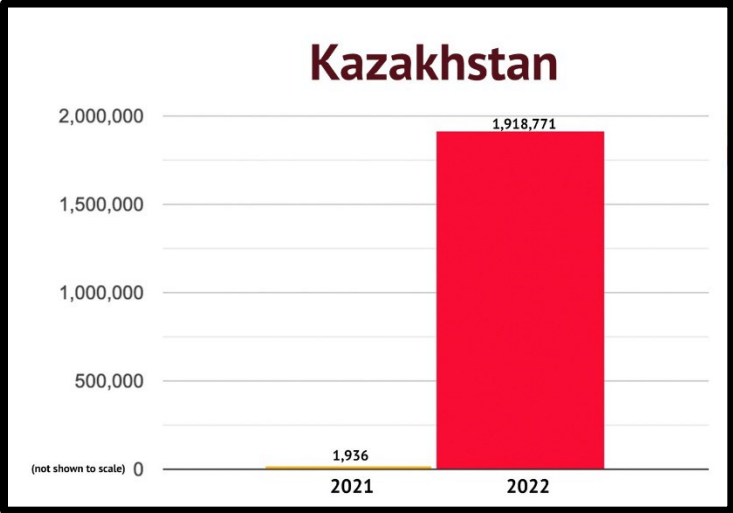
	<u>2021</u>	<u>2022</u>	<u>% Increase</u>
Armenia	13,259	372,414	2,709
Finland	86,435,802	140,633,056	63
Georgia	375	13,014	3,370
Kazakhstan	1,936	1,918,771	99,010
Turkey	14,523,007	31,574,164	117

³⁵ See, e.g., Nathaniel Taplin, *How Russia Supplies Its War Machine*, WALL STREET JOURNAL (Mar. 10, 2023), <https://www.wsj.com/articles/russia-ukraine-tech-chips-exports-china-f28b60ca>; Georgi Kantchev et al., *How Sanctioned Western Goods Are Still Flowing into Russia*, WALL STREET JOURNAL (May 14, 2023), <https://www.wsj.com/articles/how-sanctioned-western-goods-are-still-flowing-into-russia-916db262>; Natalia Drozdziak, *EU Backs More Sanctions on Belarus Over Aiding Russia’s War*, Bloomberg (Aug. 3, 2023), <https://www.bloomberg.com/news/articles/2023-08-03/eu-backs-more-sanctions-on-belarus-over-aiding-russia-s-war#xj4y7vzkg>; Gaya Gupta, *U.S. Aims New Sanctions at Russian Military Supply Chains*, N.Y. TIMES (Sept. 14, 2023), <https://www.nytimes.com/2023/09/14/world/europe/us-sanctions-russia.html>.

³⁶ These data have been aggregated based on information produced to PSI by the four U.S. companies subject to PSI’s investigation and do not reflect total exports to the countries in question or total exports by U.S. manufacturers during these years. These data should also not be read to suggest that each company distributed products to each country listed during the years in question, or that the increases detailed herein exist or are uniform across each of the four companies.

Exports to Kazakhstan from these four companies were almost 1,000 times greater from 2021 to 2022:

Figure 2: Number of Exports by Individual Product Units to Kazakhstan in 2021 and 2022



Exports to Georgia were over 34 times greater from 2021 to 2022, and exports to Armenia were more than 28 times greater:

Figure 3: Number of Exports by Individual Product Units to Georgia in 2021 and 2022

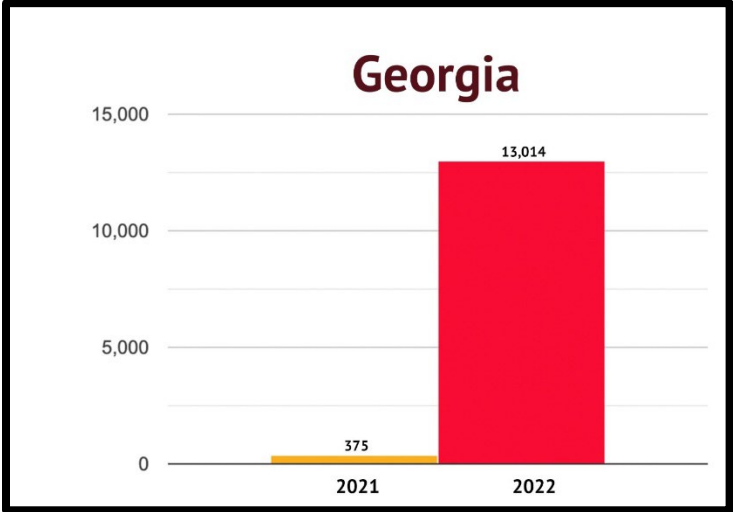
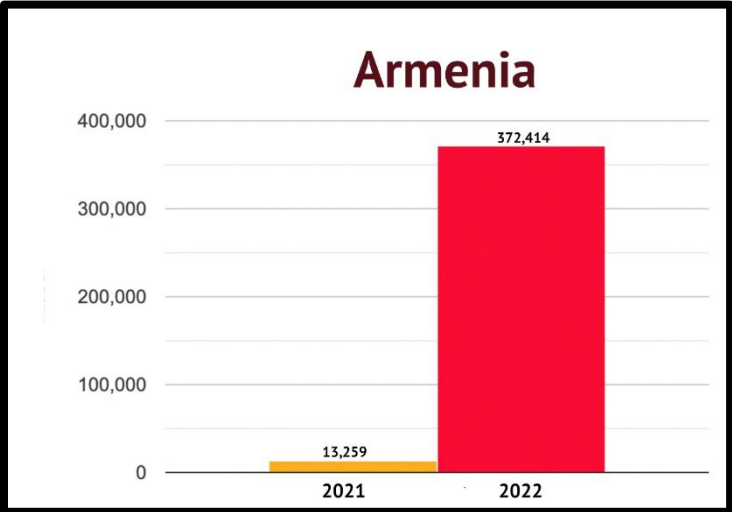


Figure 4: Number of Exports by Individual Product Units to Armenia in 2021 and 2022



Exports to Turkey more than doubled from 2021 to 2022 and exports to Finland were 1.5 greater, although in absolute numbers both countries received significantly more microchips than Armenia, Georgia, or Kazakhstan:

Figure 5: Number of Exports by Individual Product Units to Turkey in 2021 and 2022

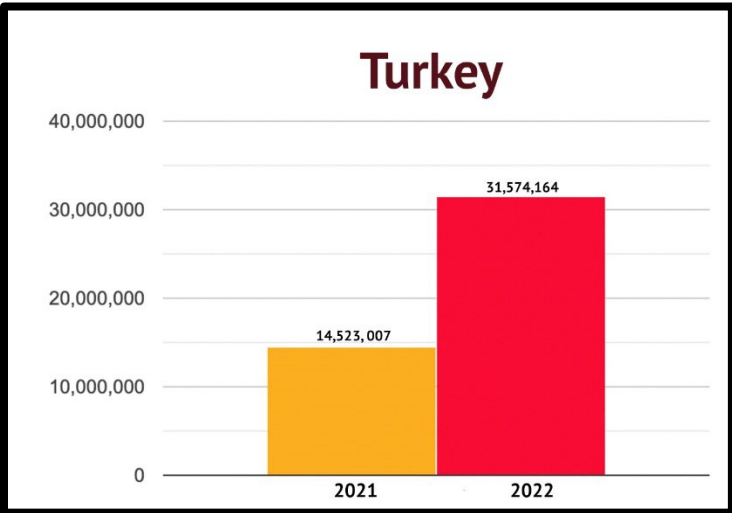


Figure 6: Number of Exports by Individual Product Units to Finland in 2021 and 2022

