

December 16, 2021

Gina M. Raimondo  
Secretary of Commerce  
Department of Commerce  
1401 Constitution Ave NW  
Washington, DC 20230

Dear Secretary Raimondo:

I am writing regarding my concerns about inadequate supply-chain resiliency and the lack of domestic investment in semiconductors, and the adverse impact these problems have on manufacturers, workers, and consumers. Last week, I chaired a Senate Finance Subcommittee on Fiscal Responsibility and Economic Growth hearing on “Promoting Competition, Growth, and Privacy Protection in the Technology Sector.”<sup>1</sup> At that hearing, we heard in detail about rising prices and other problems caused by industry consolidation and a lack of competition. One witness at the hearing described the semiconductor industry as the “single best illustration of the far-reaching nature of the threats posed by today’s extreme concentration of industrial capacity,” noting that “In the case of our production systems, the concentration of manufacturing capacity for key inputs and final products has repeatedly resulted in the breakdown of the ability to ensure that we have what we need, when we need it.”<sup>2</sup> It is imperative that both Congress and the Administration act to address these problems.

The semiconductor industry has undergone significant consolidation in the last decade: the number of large semiconductor companies worldwide declined from 160 in 2010 to 97 in 2020.<sup>3</sup> Concentration in semiconductor manufacturing is even greater, with just five companies controlling 54% of global wafer capacity.<sup>4</sup> This ongoing industry consolidation has provided

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<sup>1</sup> Hearing before the Senate Finance Committee, Subcommittee on Fiscal Responsibility and Economic Growth, “Promoting Competition, Growth, and Privacy Protection in the Technology Sector,” December 7, 2021, <https://www.finance.senate.gov/hearings/promoting-competition-growth-and-privacy-protection-in-the-technology-sector>.

<sup>2</sup> Testimony of Barry Lynn, Open Markets Institute, before the Senate Finance Committee, Subcommittee on Fiscal Responsibility and Economic Growth, December 7, 2021, <https://www.finance.senate.gov/imo/media/doc/Lynn%20-%20Testimony%20-%20Tech%20Supply%20Chain%20.pdf>.

<sup>3</sup> Accenture, “Semiconductor M&A: Are rising valuations worth it?,” Gregg Albert, November 19, 2020, <https://www.accenture.com/us-en/blogs/high-tech/semiconductor-valuation>; Accenture, “We keep trending: consolidations and expansions,” Syed Alam, February 25, 2021, <https://www.accenture.com/us-en/blogs/high-tech/semiconductor-consolidation-expansion>.

<sup>4</sup> IC Insights, “Top Five Wafer Capacity Leaders Raise Share of Global Capacity to 54%,” February 12, 2021, <https://www.icinsights.com/news/bulletins/Top-Five-Wafer-Capacity-Leaders-Raise-Share-Of-Global-Capacity-To-54/>.

immense market power to the biggest players, who are becoming more and more profitable,<sup>5</sup> while “hollowing out” the market and eliminating most mid-size manufacturers.<sup>6</sup> This market concentration has reduced competition, allowing giant corporations to deliver massive returns for shareholders.<sup>7</sup> But it has harmed consumers by enabling these dominant companies to increase prices and underinvest in key capabilities, which has the effect of also reducing product innovation and product quality.<sup>8</sup> For example, Taiwan Semiconductor Manufacturing Co. Ltd. (TSMC) is the largest and most advanced semiconductor foundry in the world, and many semiconductor design companies from Apple to AMD and Nvidia rely on TSMC to manufacture their chips, and TSMC is not able to keep up with the demand.<sup>9</sup> But, due to lack of competition, TSMC has enjoyed “strong pricing power,”<sup>10</sup> raising prices by 10 to 20%<sup>11</sup> and expects revenue increases of 10 to 15% through 2025.<sup>12</sup> Further up the supply chain, ASML is the only company that makes the machines necessary for cutting-edge chip-making, and cannot keep up with demand.<sup>13</sup> The bottlenecks extend to less advanced chips too, with semiconductor companies chasing the biggest profits in the cutting-edge chips and underinvesting in the older, more commonly-used chips.<sup>14</sup> So while dominant semiconductor companies like TSMC and ASML

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<sup>5</sup> McKinsey & Company, “Value creation: How can the semiconductor industry keep outperforming?,” Ondrej Burkacky, Marc de Jong, Ankit Mittal, and Nakul Verma, October 15, 2021, <https://www.mckinsey.com/industries/semiconductors/our-insights/value-creation-how-can-the-semiconductor-industry-keep-outperforming>.

<sup>6</sup> Accenture, “Semiconductor M&A: Are rising valuations worth it?,” Gregg Albert, November 19, 2020, <https://www.accenture.com/us-en/blogs/high-tech/semiconductor-valuation>.

<sup>7</sup> McKinsey & Company, “Value creation: How can the semiconductor industry keep outperforming?,” Ondrej Burkacky, Marc de Jong, Ankit Mittal, and Nakul Verma, October 15, 2021, <https://www.mckinsey.com/industries/semiconductors/our-insights/value-creation-how-can-the-semiconductor-industry-keep-outperforming>.

<sup>8</sup> Washington Monthly, “To Fix the Supply Chain Mess, Take on Wall Street,” Garphil Julien, December 1, 2021, <https://washingtonmonthly.com/2021/12/01/to-fix-the-supply-chain-mess-take-on-wall-street/>.

<sup>9</sup> The Wall Street Journal, “The World Relies on One Chip Maker in Taiwan, Leaving Everyone Vulnerable,” Yang Jie, Stephanie Yang, and Asa Fitch, June 19, 2021, <https://www.wsj.com/articles/the-world-relies-on-one-chip-maker-in-taiwan-leaving-everyone-vulnerable-11624075400>.

<sup>10</sup> The Wall Street Journal, “World’s Largest Chip Maker to Raise Prices, Threatening Costlier Electronics,” Yang Jie, Stephanie Yang and Yoko Kubota. August 26, 2021, <https://www.wsj.com/articles/worlds-largest-chip-maker-to-raise-prices-threatening-costlier-electronics-11629978308>.

<sup>11</sup> Forbes, “TSMC’s Price Hike Is A Big Deal For Servers, But Not So Much For Car Buyers,” Linley Gwennap, August 30, 2021, <https://www.forbes.com/sites/linleygwennap/2021/08/30/tsmc-chip-price-hike-a-big-deal-for-some-customers/?sh=42f4478012ee>.

<sup>12</sup> Fitch Ratings, “Global Chip Shortage to Boost Semiconductors’ 2021 Performance,” March 4, 2021, <https://www.fitchratings.com/research/corporate-finance/global-chip-shortage-to-boost-semiconductors-2021-performance-04-03-2021>.

<sup>13</sup> Wired, “Why the Chip Shortage Drags On and On ... and On,” Will Knight, November 12, 2021, <https://www.wired.com/story/why-chip-shortage-drags-on/>.

<sup>14</sup> The Wall Street Journal, “The World Relies on One Chip Maker in Taiwan, Leaving Everyone Vulnerable,” Yang Jie, Stephanie Yang, and Asa Fitch, June 19, 2021, <https://www.wsj.com/articles/the-world-relies-on-one-chip-maker-in-taiwan-leaving-everyone-vulnerable-11624075400>.

post massive profits and reward shareholders,<sup>15</sup> consumers are harmed by shortages and higher prices.<sup>16</sup>

The global chip shortage and its consequences are ultimately resulting in significant price increases for American families and contributing to the recent increases in inflation. Faced with rising costs, CEOs are protecting corporate profits by passing on increased costs to consumers.<sup>17</sup> Due to the semiconductor shortage and cost increases, HP raised printer prices by more than 20%,<sup>18</sup> used car prices have increased by over 24%,<sup>19</sup> and prices for some TV models have jumped around 30%.<sup>20</sup>

While consumers have suffered from shortages and increased prices, workers have also been harmed. The largest automakers in the country have sporadically shut down plants since late 2020 due to semiconductor shortages.<sup>21</sup> Although automakers have seen increased demand for cars, the semiconductor bottleneck has forced them to halt production, lay off employees, and lose a projected \$200+ billion in sales.<sup>22</sup> Ford, for example, had to slash its production by 50%<sup>23</sup>, and thousands of autoworkers have found themselves laid off for months relying on unemployment benefits that only provide a fraction of their salary.<sup>24</sup> These layoffs follow years of offshoring of American semiconductor manufacturing and lost jobs<sup>25</sup>, which coincided with industry consolidation. As United Auto Workers (UAW) President Ray Curry described at a recent roundtable event that you attended, “this is both a challenge and an opportunity... to

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<sup>15</sup> Bloomberg, “TSMC Posts Record Sales as Auto, iPhone Demand Fuel Orders,” Debby Wu, October 8, 2021, <https://www.bloomberg.com/news/articles/2021-10-08/tsmc-post-record-sales-as-auto-chip-iphone-demand-drive-orders>; Reuters, “ASML's order book fills as chip makers race to boost capacity,” Bart H. Meijer, July 21, 2021, <https://www.reuters.com/technology/asml-q2-net-profit-jumps-38-strong-demand-computer-chips-2021-07-21/>.

<sup>16</sup> The Wall Street Journal, “World’s Largest Chip Maker to Raise Prices, Threatening Costlier Electronics,” Yang Jie, Stephanie Yang, and Yoko Kubota, August 26, 2021, <https://www.wsj.com/articles/worlds-largest-chip-maker-to-raise-prices-threatening-costlier-electronics-11629978308>.

<sup>17</sup> The Wall Street Journal, “Chip Shortages Are Starting to Hit Consumers. Higher Prices Are Likely,” Asa Fitch, June 21, 2021, [https://www.wsj.com/articles/chip-shortages-are-starting-to-hit-consumers-higher-prices-are-likely-11624276801?mod=article\\_inline](https://www.wsj.com/articles/chip-shortages-are-starting-to-hit-consumers-higher-prices-are-likely-11624276801?mod=article_inline).

<sup>18</sup> *Id.*

<sup>19</sup> The Washington Post, “How crazy is the used car market? This auction sparked a bidding war over a two-year-old minivan,” Jeanne Whalen, October 28, 2021, <https://www.washingtonpost.com/us-policy/2021/10/28/used-car-prices-chip-shortage/>.

<sup>20</sup> Wired, “The Chip Shortage Is Driving Up Tech Prices—Starting With TVs,” Will Knight, May 13, 2021, <https://www.wired.com/story/chip-shortage-electronics-prices-tvs-displays/>.

<sup>21</sup> ABC News, “On Nov. 1, no GM plants will be closed due to chip shortage,” Tom Krisher, October 22, 2021, <https://abcnews.go.com/Technology/wireStory/nov-gm-plants-closed-due-chip-shortage-80734196>.

<sup>22</sup> NBC News, “Global chip shortage continues to wreak havoc for automakers,” Sam Shead, October 28, 2021, <https://www.nbcnews.com/business/autos/global-chip-shortage-continues-wreak-havoc-automakers-n1282621>; Fierce Electronics, “Out of chips, out of work: auto workers tell their stories,” Skye Witley, June 18, 2021, <https://www.fierceelectronics.com/electronics/out-chips-out-work-auto-workers-tell-their-stories>.

<sup>23</sup> The New York Times, “Ford Moves to Ensure Supply of Chips and Guide Their Design,” Neal E. Boudette and Don Clark, November 18, 2021, <https://www.nytimes.com/2021/11/18/business/ford-globalfoundries-chip-shortage.html>.

<sup>24</sup> *Id.*

<sup>25</sup> Detroit Free Press, “GM to idle 3 plants in North America due to semiconductor shortage,” Jamie LaReau, February 3, 2021, <https://www.freep.com/story/money/cars/general-motors/2021/02/03/gm-plants-north-america-semiconductor-shortage/4373284001/>; WILX News 10, “Semiconductor shortage having an impact on manufacturers, workers,” Kaylie Crowe, June 22, 2021, <https://www.wilx.com/2021/06/23/semiconductor-shortage-having-an-impact-manufacturers-workers/>.

develop trade and policy solutions that ensure that advanced technology that has been offshored is brought back and new technology stays right here in the United States produced by UAW workers.”<sup>26</sup>

At my hearing earlier this week, Barry Lynn, Executive Director of the Open Markets Institute, summarized costs of semiconductor industry consolidation:

Over the course of the 22 years since the earthquake in Taiwan first revealed the extreme concentration of the capacity to produce certain types of semiconductors, the problem has become only worse. As was true in 1999, the world today remains just as vulnerable to disruption by earthquake or other disaster, as there has been no effort whatsoever to distribute capacity or ownership. Worse, monopolistic manufacturers like Taiwan Semiconductor Manufacturing Corporation (TSMC) have become increasingly tempted to exploit their chokepoint for profit. The result, which has played out across the industrial world over the last 18 or so months, has been a slow but steady choking off of production in an ever widening range of industries.

In the United States, the failure by TSMC to invest sufficient funds to meet demand for its products has resulted in shortages of goods ranging from appliances to farm machinery to medical devices. The most far-reaching disruptions have taken place within the automobile industry, where the shortages of semiconductors has forced automakers around the world to radically cut production. ... In recent days, the problems appear to have spread into iPhone production. Such massive shortfalls in production, in turn, trigger a variety of other harms across the industrial system. These include fewer jobs and smaller paychecks at vehicle manufacturers; higher prices for new cars, used cars, and rental cars; less work for suppliers and dealers and their employees, and more pollution as individuals are unable to replace older cars.<sup>27</sup>

While their consolidation has contributed to fueled higher prices and job losses, the giant semiconductor companies are not throttling back their ongoing merger activity. Advanced Micro Devices’ (AMD) CEO, whose company has seen its stock rise more than 120% since the start of last year, recently said that “consolidation is inevitable,”<sup>28</sup> and in October 2020, AMD announced plans to acquire Xilinx, a semiconductor manufacturer, in a \$35 billion deal.<sup>29</sup> Intel’s

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<sup>26</sup> United States Department of Commerce, “Dingell, Peters, Raimondo Host Roundtable in Michigan About Semiconductor Chip Shortage,” press release, November 29, 2021, <https://www.commerce.gov/news/press-releases/2021/11/dingell-peters-raimondo-host-roundtable-michigan-about-semiconductor>.

<sup>27</sup> Testimony of Barry Lynn, Open Markets Institute, before the Senate Finance Committee, Subcommittee on Fiscal Responsibility and Economic Growth, “Promoting Competition, Growth, and Privacy Protection in the Technology Sector,” December 7, 2021, <https://www.finance.senate.gov/imo/media/doc/Lynn%20-%20Testimony%20-%20Tech%20Supply%20Chain%20.pdf>.

<sup>28</sup> CNBC, “AMD CEO Lisa Su says chip shortage likely to end next year,” Kif Leswing, September 27, 2021, <https://www.cnbc.com/2021/09/27/amd-ceo-lisa-su-says-chip-shortage-likely-to-end-next-year.html>.

<sup>29</sup> AMD, “AMD to Acquire Xilinx, Creating the Industry’s High Performance Computing Leader,” press release, October 27, 2020, <https://www.amd.com/en/press-releases/2020-10-27-amd-to-acquire-xilinx-creating-the-industry-s-high-performance-computing>.

CEO declared a similar intent saying, “There will be consolidation in the industry... That trend will continue, and I expect that we’re going to be a consolidator.”<sup>30</sup> Furthermore, Intel is rumored to be considering a takeover of GlobalFoundries, the world’s fourth-largest chip manufacturer.<sup>31</sup>

These semiconductor manufacturers are putting stock price, profits, and growth ahead of the needs of American consumers and workers. As the COVID-19 pandemic demonstrated, this behavior can lead to terrible consequences and shortages for our country.

Although the Trump Administration did virtually nothing to stop this harmful consolidation, under President Biden, the federal government is beginning to step up to challenge industry consolidation that could harm supply-chain resiliency. For instance, earlier this month the Federal Trade Commission filed a lawsuit in to halt Nvidia’s \$40 billion acquisition of Arm in what will be the biggest semiconductor deal in history if consummated.<sup>32</sup>

But the U.S. government has other tools beyond antitrust enforcement that could increase competition, protect consumers and workers, and promote supply-chain resiliency. Last year, Congress passed the *CHIPS for America Act* as part of the *FY 2021 National Defense Authorization Act*, and it was signed into law. The Senate has also passed the *United States Innovation and Competition Act of 2021* (USICA), which among other things would fund the *CHIPS for America Act* programs. The Senate and House are working on a path forward on USICA, including to address a number of outstanding issues unrelated to the *CHIPS for America Act*. As Congress works on delivering a final bill to the President’s desk, the Administration should stand ready to implement it.

Crucially, the *CHIPS for America Act* has tasked the Department of Commerce with awarding billions of dollars in grant funding “to incentivize investment in facilities and equipment in the United States for semiconductor fabrication, assembly, testing, advanced packaging, or research and development.”<sup>33</sup> Under USICA funding levels, this would be a significant program, with \$19 billion appropriated for fiscal year 2022, and \$5 billion annually from 2023 through 2026.<sup>34</sup> The *CHIPS for America Act* gives broad discretion in awarding these grants, but funds can only be awarded to projects that the Secretary of Commerce determines are “in the interest of the United States.”<sup>35</sup> It is clearly in the national interest of the United States to use this funding to push back against industry consolidation. I encourage you to seize this

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<sup>30</sup> The Wall Street Journal, “Intel CEO Calls Chip Maker ‘Willing Buyer’ as Semiconductor Industry Consolidates,” Asa Fitch and Cara Lombardo, August 19, 2021, <https://www.wsj.com/articles/intel-ceo-calls-chip-maker-willing-buyer-as-industry-consolidates-11629382046>.

<sup>31</sup> The Economist, “The IPO of GlobalFoundries is perfectly timed,” October 9, 2021, <https://www.economist.com/business/2021/10/09/the-ipo-of-globalfoundries-is-perfectly-timed>.

<sup>32</sup> The New York Times, “F.T.C. Sues to Stop Blockbuster Chip Deal Between Nvidia and Arm,” Cecilia Kang and Don Clark, December 2, 2021, <https://www.nytimes.com/2021/12/02/technology/ftc-nvidia-arm-deal.html>.

<sup>33</sup> William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, §9902, <https://www.congress.gov/116/plaws/publ283/PLAW-116publ283.pdf>.

<sup>34</sup> United States Innovation and Competition Act of 2021, S. 1260, Sec. 1002(a)(2)(A), <https://www.congress.gov/bill/117th-congress/senate-bill/1260>.

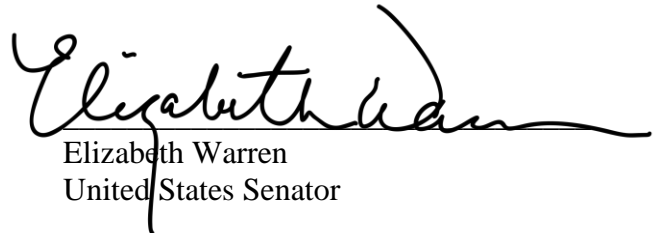
<sup>35</sup> William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, §9902(a)(2)(C)(i)(II), <https://www.congress.gov/116/plaws/publ283/PLAW-116publ283.pdf>.

opportunity through proper utilization and appropriation of these funds, ensuring that American consumers and workers see the full benefits of domestic investment.

In order to better understand how the Department of Commerce will award grants and address supply-chain resiliency and competitiveness in the semiconductor industry, help reduce prices for consumers, and protect and increase the number of good jobs for American workers, I ask that you provide answers to the following questions no later than December 30, 2021:

1. What processes has the Department put in place to begin providing federal financial assistance in the CHIPS Act?
2. What specific criteria will the Department use to choose projects that receive financial assistance?
3. How will the Department use these funds to reduce the harmful effects of consolidation in the semiconductor market, such as higher prices for consumers and layoffs for workers?
4. How will the Department ensure that these funds are not used to pad corporate profits, increase executive compensation, and reward shareholders through stock buybacks?
5. What additional statutory tools or funding should Congress provide to give you the full suite of tools necessary to respond to consolidation in the semiconductor industry?

Sincerely,



Elizabeth Warren  
United States Senator