U.S. Export Controls and Chokepoint Technologies: Current Successes of A.I. Compute Policy

Andrew Hummel

London School of Economics and Political Science - PP415

Professor Alexander Evans

andrewhummel22@gmail.com

17/10/2024

Abstract

This project examines whether additions to the U.S. Department of Commerce's BIS Entity List increasingly target firms tied to chokepoint technologies—hard-to-replace capabilities such as extreme ultraviolet (EUV) lithography, electronic design automation (EDA) software, and specialty semiconductor gases. Using a longitudinal dataset of all Entity List additions since 2001, each entity will be classified by its exposure to these critical technologies. Statistical and time-series analyses will test whether chokepoint involvement predicts listing and whether this relationship has strengthened or shifted as U.S. export control strategy adapts to geopolitical competition and supply-chain vulnerabilities. The findings aim to clarify how U.S. policy has evolved from broad national-security concerns toward deliberate management of strategically scarce technologies, providing insight into the future trajectory of export controls and their impact on global semiconductor and high-tech supply chains.

Keywords: export controls; BIS Entity List; chokepoint technologies; EUV lithography; semiconductor supply chains

1. Introduction

Over the past decade, the global technology race—particularly between the United States and China—has reshaped the strategic logic of international trade. One of Washington's most powerful instruments in this contest is the Bureau of Industry and Security (BIS) Entity List, which restricts U.S. exports to designated foreign firms and organizations. A listing can effectively cut a company off from key components, software, and services originating in the United States or allied economies. While the Entity List was originally conceived as a broad national-security tool, recent high-profile actions—such as the inclusion of Huawei and Semiconductor Manufacturing International Corporation (SMIC)—signal a sharper focus on the technologies that underpin advanced computing and next-generation manufacturing. Among these technologies, certain chokepoints stand out as both indispensable and difficult to substitute. Examples include extreme ultraviolet (EUV) lithography equipment, which only a handful of companies worldwide can supply; electronic design automation (EDA) software, essential for semiconductor architecture; and specialty gases and materials required for chip fabrication. Because these inputs are scarce, highly concentrated, and often dominated by U.S. or allied firms, controlling access to them provides extraordinary leverage over global supply chains. This project asks a fundamental question: Do additions to the BIS Entity List correlate with exposure to such chokepoint technologies, and has that relationship changed over time? Answering this question sheds light on whether U.S. export controls are evolving from a reactive national-security measure into a proactive strategy of technological statecraft. If the correlation has strengthened, it would suggest a deliberate policy to deny geopolitical rivals the building blocks of advanced manufacturing. If it has weakened or shifted, it may indicate alternative priorities—such as human rights enforcement, counter-proliferation, or more diffuse economic concerns. Despite the policy significance of these chokepoints, there is little systematic evidence on whether exposure to such technologies actually predicts BIS targeting. Most existing accounts rely on high-profile anecdotes or qualitative assessments, leaving unclear whether the United States is consistently tightening export controls around these critical nodes or whether other motives—such as human rights enforcement, counter-proliferation, or broader economic concerns—play the dominant role. Filling this gap is valuable not only for academic understanding of technology-statecraft, but also for policymakers and industry leaders who must anticipate and respond to U.S. export control strategy. To investigate this dynamic, the study will construct a comprehensive, longitudinal dataset of Entity List additions from 2001 to the present and classify each listed entity according to its exposure to critical chokepoints like EUV, EDA, and specialty gases. By combining descriptive time-series analysis with statistical tests of association, the research will trace how the technological composition of the Entity List has evolved and what that reveals about U.S. industrial and foreign policy. Ultimately, this

If interested in viewing the remainder of this project, please contact me. Thank you