

# DGAP POLICY BRIEF

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## Restricting Technology Leakage

### Why Germany Needs an Outbound Investment Screening Mechanism



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In a world marked by geopolitical competition, the United States is taking measures to restrict the diffusion of technologies it considers essential to its security and economy. To make its regime more effective, Washington will pressure its allies to align their policies. Germany, due to its international economic integration, risks being squeezed between American demands and possible Chinese retaliation. Its best option would be to establish an EU regime for screening outbound investment. Failing that, Berlin needs to set up a national mechanism based on the following points:

- Germany needs to identify which existing and emerging technologies will be critical to national security and economic-technological leadership. To this end, the government should establish a scientific advisory council and consult widely.
  - Restricting technology transfers comes with short-term economic costs, but it may also enhance longer-term national security. Policies should be sensitive to these trade-offs.
  - Berlin should prepare for retaliation by countries affected by technology-focused investment restrictions. It also needs to strengthen defenses against industrial espionage.
  - Any policy on outbound investment should be embedded in a broader national economic security strategy to be maximally effective. This should include inward investment restrictions and export controls.
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### THE CASE FOR SCREENING OUTWARD INVESTMENT

As the geopolitical competition between the United States and China intensifies, Washington continues to tighten restrictions on technology exports and technology-related financial flows. In August, the US administration issued a decree establishing an out-bound investment regime in an attempt to limit technology leakage. Any such policies, however, require multilateralization to be efficacious, and Washington will not hesitate to exert pressure on its allies to align their policies.

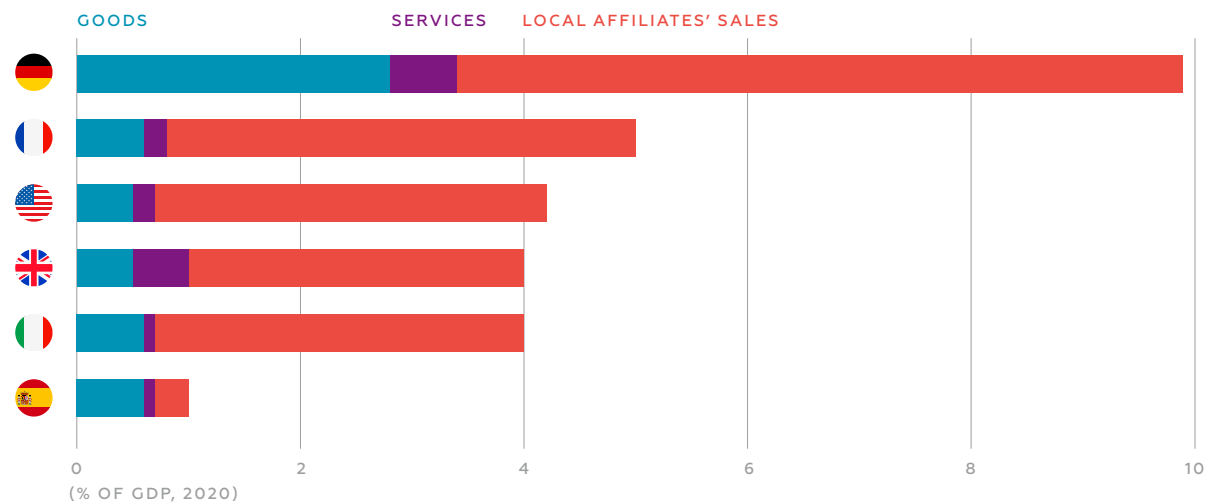
Germany, due to its high degree of international economic integration, risks being squeezed between the United States and China. If it aligns with US policies on a wide spectrum of trade and investment measures, it may become the victim of Chinese retaliatory measures. If it does not, it will face its most important ally's wrath. Washington, and particularly the US Congress will not find it acceptable for Germany to take advantage of commercial opportunities that arise from US restrictions while at the same time supporting the technological progress of its geopolitical competitor.

As proven in the past (e.g., Iran sanctions, China export controls), Washington will not shy away from threatening to restrict foreign companies' access to the US market and technology if they fall afoul of US restrictions. This represents a significant risk for German companies, which extensively rely on American markets and emerging technology.

In this context, Germany needs to take the initiative to try and nudge Washington away from maximalist policies. Whether nudging is possible remains to be seen. But without intensively engaging Washington on the issue, and without the ability to offer Washington support to make its policies more efficacious in exchange for making them narrower, the United States will simply forge ahead and lay down the rules, likely including "secondary" measures that would affect German and European economic interests.

Clearly, it is in Germany's interest to gain some leverage vis-à-vis the United States. To that end, it should support a common, coordinated approach at the EU level and work toward a similar agreement among G7 nations. As a fallback, Berlin needs to accelerate efforts to set up an effective and efficacious national

### Germany's Dependence on China Is Significant



Source: OECD, IMF

outbound investment regime. This is a complex task, which involves important economic and political trade-offs and a detailed understanding of how investment facilitates technology diffusion, as explained in this policy brief.

## PUSHING FOR EU-LEVEL INTEGRATION OF NATIONAL POLICIES

In recent years, the EU and its member states have adopted various geo-economic deterrence and trade defense policies aimed at countering geo-economic coercion as well as defensive policies aimed at safeguarding national security. Currently, the European Commission is working on a common approach to outbound investment screening. However, with outbound investment policy remaining firmly under the purview of member states, it will be difficult to reach an EU-wide agreement on an effective and efficacious regime.<sup>1</sup>

Germany has every interest to try and convince EU member states to overcome those difficulties and coordinate and integrate their national policies on outbound investment controls. The harmonization of EU member policies is highly desirable. It increases the efficacy of outbound investment policies; it strengthens the role of the EU in negotiating coordinated policies with third countries; it helps prevent free-riding, and it may help deter third-country retaliation.

Moreover, a harmonized EU regime would give Germany and Europe a much better starting point for negotiations with Washington. The United States is substantially more forward-leaning than Germany as it is more directly affected by geopolitical and military competition with China and economically less vulnerable to Chinese geo-economic retaliation.

To convince Washington to limit its controls to areas that will not cause excessive harm to German and European interests, Berlin and Brussels need to be able to present themselves as credible and influential partners that can help make restrictions more efficacious and easier to enforce. The advantage of

a common EU approach from Germany's perspective is that it creates a stronger position in negotiations with Washington over the desirable scope of restrictions. Transatlantic and G7 coordination will also make it easier to avoid US-European conflict, which would harm everybody's economic and strategic interests.

Germany should push for a more integrated policy at EU level first and then engage Washington. Should the efforts at coordinating and harmonizing national policies within Europe fail, Berlin would be well advised to engage more forcefully Washington and the other G7 members regardless. A common approach among the major advanced economies would help make restrictions more efficacious. Germany and the other G7 members share similar concerns about preserving technological leadership, especially with respect to emerging technologies. However, reaching agreement at the G7 level will not be easy, either. Different levels of international economic dependence and different levels of security competition create different levels of incentives to tighten policies.

## DESIGNING AN OUTBOUND INVESTMENT POLICY FOR GERMANY

Awareness in Germany of the security and economic risks the country is exposed to is growing; this is reflected in Germany's recently published National Security Strategy as well as its Strategy on China.<sup>2</sup> Germany needs to act to contain those risks, and absent an agreement at EU or G7 level, Germany should not hesitate to forge ahead and set up its own outbound investment regime. Yet it should find a format which will permit EU harmonization at a later stage and allow for the right kind of horse-trading with the Americans. Berlin's to-do list for designing and implementing an outbound investment regime should include the following points:

- **Identify existing and emerging technologies critical to national security and economic-technological leadership:** Germany needs to determine which technologies are critical with respect to national security and to economic-technological

1 A measure is effective if investment restrictions curtail another country's access to indigenous technology. They are efficacious if they also help preserve technological advantage. Restricting technology-focused investment restrictions may be effective in terms of preventing another country from accessing indigenous technology. At the same time, it may be inefficacious because that country may find a different source or even develop its own technology. Efficacy often requires multilateral cooperation.

2 Federal Ministry of Defence National Security Strategy, 2023: <https://www.bmvg.de/en/national-security-policy>; Federal Government, Strategy on China, 2023: <https://www.auswaertiges-amt.de/blob/2608580/49d50fccc479304c3da2e2079c55e106/china-strategie-en-data.pdf>

## China and United States Lead High-Impact Research in Emerging Technologies

MONOPOLY RISK		HIGH	MEDIUM	LOW	LEAD COUNTRY	GERMAN RANK
ADVANCED MATERIALS AND MANUFACTURING	1. NANOSCALE MATERIALS AND MANUFACTURING				CHINA	
	2. COATINGS				CHINA	
	3. SMART MATERIALS				CHINA	
	4. ADVANCED COMPOSITE MATERIALS				CHINA	
	5. NOVEL METAMATERIALS				CHINA	
	6. HIGH-SPECIFICATION MACHINING PROCESSES				CHINA	5
	7. ADVANCED EXPLOSIVES AND ENERGETIC MATERIALS				CHINA	4
	8. CRITICAL MINERALS EXTRACTION AND PROCESSING				CHINA	
	9. ADVANCED MAGNETS AND SUPERCONDUCTORS				CHINA	3
	10. ADVANCED PROTECTION				CHINA	
ARTIFICIAL INTELLIGENCE, COMPUTING AND COMMUNICATIONS	11. CONTINUOUS FLOW CHEMICAL SYNTHESIS				CHINA	3
	12. ADDITIVE MANUFACTURING (INCL. 3D PRINTING)				CHINA	3
	13. ADVANCED RADIOFREQUENCY COMMUNICATIONS (INCL. 5G AND 6G)				CHINA	
	14. ADVANCED OPTICAL COMMUNICATIONS				CHINA	
	15. ARTIFICIAL INTELLIGENCE (AI) ALGORITHMS AND HARDWARE ACCELERATORS				CHINA	
	16. DISTRIBUTED LEDGERS				CHINA	
	17. ADVANCED DATA ANALYTICS				CHINA	
	18. MACHINE LEARNING (INCL. NEURAL NETWORKS AND DEEP LEARNING)				CHINA	
	19. PROTECTIVE CYBERSECURITY TECHNOLOGIES				CHINA	
	20. HIGH PERFORMANCE COMPUTING				USA	4
ENERGY AND ENVIRONMENT	21. ADVANCED INTEGRATED CIRCUIT DESIGN AND FABRICATION				USA	4
	22. NATURAL LANGUAGE PROCESSING (INCL. SPEECH AND TEXT RECOGNITION AND ANALYSIS)				USA	
	23. HYDROGEN AND AMMONIA FOR POWER				CHINA	
	24. SUPERCAPACITORS				CHINA	
	25. ELECTRIC BATTERIES				CHINA	4
	26. PHOTOVOLTAICS				CHINA	
	27. NUCLEAR WASTE MANAGEMENT AND RECYCLING				CHINA	
	28. DIRECTED ENERGY TECHNOLOGIES				CHINA	
	29. BIOFUELS				CHINA	
	30. NUCLEAR ENERGY				CHINA	
QUANTUM	31. QUANTUM COMPUTING				USA	4
	32. POST-QUANTUM CRYPTOGRAPHY				CHINA	4
	33. QUANTUM COMMUNICATIONS (INCL. QUANTUM KEY DISTRIBUTION)				CHINA	4
	34. QUANTUM SENSORS				CHINA	3
	35. SYNTHETIC BIOLOGY				CHINA	4
DEFENCE, SPACE, ROBOTICS AND TRANSPORTATION	36. BIOLOGICAL MANUFACTURING				CHINA	
	37. VACCINES AND MEDICAL COUNTERMEASURES				USA	
	38. PHOTONIC SENSORS				CHINA	5
	39. ADVANCED AIRCRAFT ENGINES (INCL. HYPERSONICS)				CHINA	
	40. DRONES, SWARMING AND COLLABORATIVE ROBOTS				CHINA	
	41. SMALL SATELLITES				USA	4
	42. AUTONOMOUS SYSTEMS OPERATION TECHNOLOGY				CHINA	4
	43. ADVANCED ROBOTICS				CHINA	
	44. SPACE LAUNCH SYSTEMS				USA	3

[I] Biotechnology, gene technology, and vaccines; [II] Defence, space, robotics, and transportation  
 Source: Australian Strategic Policy Institute

leadership. In many instances, there will be an overlap. Much will depend on how extensively national security is defined. Technologies should be scored in terms of their present and future potential to affect national security and technological leadership (including national competitiveness and productivity). For this purpose, the government should establish a scientific advisory council and consult widely to evaluate the economic and national security implications of existing and, even more importantly, emerging foundational technologies.

- Take into account the cost-benefit trade-off regarding national security and economic leadership:** Restricting technology transfers or restricting cross-border technological cooperation comes with short-term economic costs, but it may also enhance longer-term national security. Policies should be sensitive to these trade-offs. If, for example, a technology has the potential to confer critical and long-lasting military advantage, restrictions should be tighter, and higher short- and long-term economic costs will be acceptable. But if a technology is assessed to confer only a temporary economic advantage, possibly because it can be easily reverse-engineered, restrictions should be limited and associated costs kept to a minimum. The same argument applies with respect to whether a technology is likely to be monopolized by any one country. Determining costs and benefits requires making complex assessments under conditions of significant uncertainty, particularly in view of emerging technologies. This cannot be helped.
- Design rules with a focus on activist investments:** Overseas investment in technology companies is accompanied by both financing and so-called intangibles, such as access to know-how and capabilities, managerial expertise, access to networks and markets. As far as technology diffusion is concerned, the financing aspect is far less relevant, particularly in the case of China, which has the ability to direct massive resources of its own at technological innovation. Investment restrictions need to target the transfer of intangibles. At risk of over-generalization, measures should be focused on activist rather than passive investors and investment; they should be more focused on equity investment than debt; and they should focus on the more opaque private markets (including private equity, venture capital, and joint ventures) rather than public markets. The reason is that equity and activist investments come with a greater incentive

to provide intangibles due to the greater financial upside associated with this type of investment.

- Prepare for retaliation by countries affected by technology-focused investment restrictions:** Restrictions, particularly if directed against specific countries, may lead to retaliation and reciprocal restrictions, targeting technological dependencies. They may even target broader geo-economic vulnerability related to trade, foreign investment, or German companies' operations in the retaliating country. The German government should assess the likely nature and costs of potential retaliation and prepare risk mitigation measures. At the macro-level, the greatest vulnerabilities arise, as recent events have shown, from restrictions pertaining to difficult-to-substitute critical imports (e.g., energy, rare earths). The prospect of retaliation needs to be factored into the cost-benefit assessment discussed above.
- Strengthen defenses against industrial espionage:** Technology restrictions will increase the economic and financial returns on acquiring critical technology in "non-economic" ways. Therefore, it is crucial to strengthen the defense against industrial espionage targeting national technology companies, regardless of whether they are located at home or abroad. The measures should be robust enough to defend against sophisticated, state-sponsored cyber espionage. Here, the German government can provide support by helping to strengthen corporate cyber-capabilities and by sharing intelligence.

To safeguard its security and economic interests, Germany needs a policy on outbound investment, but it also needs to embed this policy in a broader national economic security strategy. Outbound investment policies will only be effective in limiting technological diffusion if they are part and parcel of an array of policies, including inward investment restrictions and export control policies. It makes little sense to limit the transfer of critical technologies by way of outbound investment if the targeted country can simply get access to the technology via imports or overseas investment. Measures should also cover technology transfer licensing and restrictions on the ability of nationals to work for specific foreign technology companies. Outbound investment screening needs to be integrated with other foreign economic policies to be maximally effective. This is true just as much for policies at the national level as for what would altogether be a better approach at EU level.



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