

GLOBALIZATION AND NATIONAL SECURITY

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Executive Summary

Globalization --the international integration of markets for goods, services, and capital -- raises serious issues for U.S. national interests because of its effect on technological leadership and economic strength. The underlying concern is that economic globalization will erode America's strength, as jobs, manufacturing and technology move around the world and as the international economy continues to reorganize and integrate itself.

Globalization is not an accident and will not be easily stopped. It is the result of long-standing U.S. policies. For more than a century, the U.S. has emphasized the benefits of free trade, open markets, and the rule of law. Success has been gradual and incomplete, but America has created strong integrative forces in the global economy. Technological change reinforces globalization with unprecedented mobility for goods, people, and ideas.

The risks created by global economic integration are diminished economic strength and technological leadership; a decline in innovation; greater reliance on a foreign supply chain; and risks to critical infrastructure and information assurance. This report looks at how globalization will affect America's strength and security. It identifies areas where policies could maintain national strength and to manage risk in this new economic and security environment.

Implications for U.S. Interests

Globalization creates three distinct problems for the national interest. First, the relative economic strength of the U.S. will decline in relation to other nations. While the U.S. still produces about a quarter of world GDP, economic growth in other countries will reduce this share to less than twenty percent in the next few years. Relative decline is unavoidable, but this need not translate into a loss of leadership if the U.S. takes advantage of and reinforces a combination factors, it can maintain its global position.

Second and more importantly, the U.S. relative share of innovation will fall, potentially affecting technological leadership. Globalization's most significant effect on U.S. interests is the leveling of technological leadership. The increased international mobility of highly skilled labor and the diffusion of technological know-how means that many countries now can compete with the U.S. in producing cutting edge research and innovation.

U.S. policy and regulation reinforces globalization's technological leveling. The U.S. may damage its ability to create new technologies because of funding decisions for research, new homeland security policies and if it fails to compensate for decreased manufacturing activity. Federal investment in physical sciences and engineering has fallen by half since 1970 as a percentage of GDP. Corporate R&D spending has changed significantly and focuses on development of new products, in reaction to competitive pressures and the need to show near-term gains to financial

markets. The result is that the U.S. has seriously underfunded key research sectors.

Homeland security initiatives accelerate the loss of technological and economic leadership. In addressing legitimate security concerns, we have inadvertently made the U.S. a less attractive destination for investors, students, and researchers. The result is the erosion of a major source of economic and technological advantage. The most important element of this is the damage to University research, which is a fundamental component of U.S. strength, and it is likely that this damage outweighs any gains to security.

While much of the concern over the shift in the U.S. economy from manufacturing to services is misplaced, the relationship between manufacturing and innovation is an area of risk. Innovation can come from 'breakthrough technologies,' but also from incremental improvements to existing products. Those who make the product are more likely to be able to improve it or develop the next generation. As the U.S. increasingly depends on foreign manufacturing, it could lose the boost to innovation provided by hands-on experience and will need mechanisms to compensate.

Finally, technological leveling and interdependence give opponents new opportunities to seek asymmetric advantage. The emphasis is to avoid direct engagement with military forces. Civilian and economic infrastructures are soft targets that are more vulnerable to asymmetric attack. Nations and groups will exploit commercial technologies and services to mimic advanced military capabilities and take advantage of unexpected vulnerabilities to gain asymmetric advantages.

Globalization, by giving opponents increased access to U.S. critical infrastructure, creates a new set of risks, particularly in information technologies. Intelligence agencies are opportunistic and foreign production of hardware and software gives them an opportunity to gain access to information or to disrupt critical infrastructures. A potential opponent could take advantage of the access afforded by globalization to intentionally introduce malicious flaws. A few hundred lines of code hidden in programs with hundreds of thousands of lines may be enough to provide an advantage, while being very difficult to detect. Foreign intelligence agencies could exploit opportunities provided by economic integration to insert or recruit personnel with access to critical functions in the U.S.

Strategies for Response

The challenge of this wave of globalization – the largest yet - is daunting and complex, but these earlier experiences suggest we can again find an effective U.S. response. In earlier cases of international economic change, such as the 'globalization' of the early 20th century or the shifts with the end of Bretton Woods and the growth of Japanese industry, the U.S. has faced long periods of economic adjustment resulting from changes in the behavior of firms and in government policies. These experiences suggest that we should ask if there are policies the U.S. should pursue to accelerate its adjustment to the new international environment.

Some courses of action need to be avoided. Policies that seek to prevent or restrict global technological diffusion will fail. We cannot expect to deny potential opponents access to most technologies. Worse, a restrictive approach will damage the implementing country, by cutting it off from global flows of ideas, money, and goods. A range of problems (primary education,

intellectual property, health care) are not addressable in the near term. These touch on larger social and cultural issues where there is little or no national consensus for moving ahead. New industrial policies or efforts to mimic activities that the private sector does better, such as creating federal venture capital firms, will be ineffective.

The broad issue is to determine where and what kind of government intervention can be effective in implementing policies to maintain technological leadership and mitigate risks from globalization, and the extent to which the federal government can use existing authorities to do this. An effective strategy will require policies to maintain technological leadership, increase transparency into foreign participation in sensitive activities, expand the U.S. informational advantage and develop new mechanisms for trust that are not based on nationality.

Technological Dynamism: The most important requirement for technological leadership is the ability to innovate – to create new ideas, goods, and services. Innovation has mantra-like qualities in discussions of U.S. competitiveness, but it is in fact crucial for economic performance and military strength. Globalization and interdependence mean that other nations will innovate more and the U.S. share of innovation will decline.

Innovative new technologies come from several sources, but one source is particularly important because it provides the U.S. with comparative advantage. A combination of university research programs, entrepreneurs, and financial support (from venture capital, corporations, or governments) provides an increasingly strong source for innovation. The small, new firms this creates are a strong source of innovation. The U.S. can take advantage of this to increase the pace of innovation. Examples of this ‘system’ include the research triangle in North Carolina, Silicon Valley and the area around MIT. This blend of science and engineering expertise with entrepreneurial skills and capital is a leading source of innovation in the US. One sign of its success is the effort by many countries to create similar centers around their own universities.

This model is neither perfect nor widespread, but a strategy to reinforce and expand it could maintain technological leadership. One way to do this is to strengthen advanced graduate level programs in science and engineering. U.S. graduate programs are world leaders. Ensuring that these graduate programs remain strong is an achievable national goal. Despite concern over the decline of U.S. primary education in science and math, primary education or even undergraduate level education will not be the source of technological innovation. Finding ways to keep U.S. graduate programs strong and to ensure that the ideas they generate flow into economic activity business is the best strategy for maintaining a technological lead.

Risk Mitigation: The U.S. also needs policies to mitigate the risks created by globalization. One area for new policy is to create techniques and organizations to assure access to advanced technology and to harvest private sector innovation. The ability to exploit advanced technologies developed elsewhere will become as important as retaining indigenous capabilities to produce advanced technology.

The U.S. should explore how contract manufacturing with trusted foreign partners can provide for the production of critical or sensitive components no longer manufactured in the U.S. Boutique or fables manufacturing models, where the U.S. would control the intellectual property but leave the

actual manufacture to a trusted partner may be the best alternative in a globalizing economy.

Encouraging diversity in supply would also reduce risk. The goal would be to avoid having a single country as the only source for a particular technology. Expanded commercial partnerships between U.S. companies and foreign innovators, government-to-government arrangements with allied countries, or promotion of partnerships between U.S. companies and trusted foreign counterparts could provide diversity.

The U.S. will also need to accelerate work on mitigating potential risks in the use of foreign components in critical infrastructures. A U.S. response should explore means to increased transparency, new organizational strategies, and research into techniques and technologies for risk mitigation. If either the pace or the scope of risk mitigation is insufficient, federal policy might want to consider mandatory requirements to improve infrastructure stability and performance.

Recommendations

In 1957, when a surprised U.S. saw the Soviet Union launch Sputnik, the first artificial satellite to orbit the earth, there were predictions that this meant the Soviets would reach global technological leadership in a decade. In 1969, the Departments of Treasury, Commerce and Agriculture warned the President that a new economic giant - the European Union - would displace the U.S. as the global economic and technological leader. The rise of Japan evoked similar fears in the 1980s. These predictions were wrong because they did not take the U.S. response into account.

Globalization means that we can no longer assume that leadership in technological innovation will fall automatically to the U.S. or that the bulk of innovation will occur here. However, we should not underestimate the U.S. ability to respond effectively. The best response - the one that provides the U.S. with the greatest range of options for response and which complicates the planning of potential opponents - is to reinforce and accelerate the 'technological dynamism' - the pace and scope of technological innovation - of the American economy and by developing risk mitigation strategies for new areas of vulnerability.

Doing this will require a more focused policy process. Organizing a focused process poses particular problems because the breadth of the challenge overlaps the responsibilities of many agencies. Approaching this as a traditional 'S&T' issue is likely to be counterproductive. The problem must be elevated and addressed as an issue of national security and economic development. Responding to globalization and promoting technological innovation is now an appropriate subject for White House oversight and direction of an interagency process.

Innovation in policy must accompany innovation in technology. Policy innovations can take two tracks. One track is to develop a Presidential-level policy framework for a coordinated U.S. response. The second, parallel effort is to identify initiatives that the national security community can undertake under current authorities. The key is to make maintaining technological leadership a key policy objective for the United States. An initial set of recommendations would include:

Establish a policy framework (using an NSPD or Presidential Directive) that identifies technological leadership as a policy objective for the United States.

Revise the National Strategies for Homeland Security and Critical Infrastructure Protection to reflect the risks created by globalization and mitigation strategies.

Adjust Federal R&D funding to achieve a balanced national portfolio and consider a new scholarship program modeled on the 1958 National Defense Education Act.

Streamline homeland security policies and regulations that are obstacles to continued technological leadership.

Begin initiatives to (a) fund research on building trusted systems from untrustworthy components; (b) promote diversity of supply; (c) create organizations and techniques to harvest innovation from both U.S. and foreign sources; and (d) develop new approaches to trustworthy manufacturing.