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**NAVAL POSTGRADUATE SCHOOL**  
**Monterey, California**



**THESIS**

**THE EXPORT ADMINISTRATION ACT OF 1979 AND  
COMPUTER EXPORTS TO CHINA**

by

Elizabeth D. Perez

December 2002

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**THE EXPORT ADMINISTRATION ACT OF 1979 AND COMPUTER EXPORTS TO  
CHINA**

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Captain, United States Marine Corps  
B.S., Santa Clara University, 1992

Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF SCIENCE IN MANAGEMENT**

from the

**NAVAL POSTGRADUATE SCHOOL  
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## **ABSTRACT**

The importance of computers to the US military and national defense is significant and multifaceted. The statute that regulates computer exports, the Export Administration Act of 1979 (EAA79), has been interpreted both strictly and loosely by policymakers, executive agencies, and export control regimes. The result has been a persistent struggle in balancing the competing interests of national security and commerce. An urgent need exists to rewrite EAA79, yet Congress has not been able to come to a consensus due to overlapping and conflicting committee interests within and across the chambers. While Congress continues to debate rewriting EAA79, the President has been able to adjust the impact of US export control laws on foreign countries, utilizing export controls as means of advancing US foreign policy abroad. In the case of the People's Republic of China, the White House has loosened export controls for high-performance computers to that country in order to encourage free trade and private enterprise.



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# **I. INTRODUCTION**

## **A. BACKGROUND AND RELEVANCE**

The importance of computers to the US military and national defense is, at the same time, significant and multifaceted. High-performance computers are capable of simulating nuclear tests, conducting war games, processing radar data, reducing development time for weapons systems, aiding in the design of super quiet submarines and launch vehicles, directing battlefield missile defense systems, and in the future, simulating atomic explosions. The statute that regulates computer exports, the Export Administration Act of 1979 (EAA79), has been interpreted both strictly and loosely by policymakers, executive agencies, and export control regimes depending upon the circumstances. The result has been persistent friction in balancing national security and commerce.

## **B. RESEARCH QUESTIONS**

The aim of this thesis is to answer the question: How have perceptions of US-Sino relations shaped the administration of EAA79? In addition, this thesis will address the following secondary questions: (1) How do lawmakers, executive agencies, and export control regimes interpret and implement export laws?; and (2) What is the relationship between export control policies, the enforcement of EAA79, and US computer exports to the PRC?

## **C. CHAPTER OUTLINE**

Chapter II will trace the history of the EAA beginning in the 1970s and will describe Congress' role vis-a-vis the President in the export control process. Chapter III will present the arguments in favor of relaxed export controls offered by the computer industry and will analyze their merits. Chapter IV will describe the complex relationships of the government stakeholders involved in the export control process. Chapter V will provide a chronology of US relations with the PRC beginning in the 1980s and will analyze how US-Sino relations affect US export laws. Chapter VI will answer the research questions and provide general observations about the US export control system as well as suggestions for further research.

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## **II. EXPORT ADMINISTRATION ACT OF 1979 (EAA79)**

### **A. INTRODUCTION**

The US Constitution gives Congress the power to regulate commerce with foreign nations (Art. I, Sec. 8). Congress delegated this power—including the power to control high-performance computer exports—to the President in the Export Administration Act of 1979 (EAA79). Congress' role in the export administration process is generally limited to law-making. Consequently, to ensure Congress' position in the post-legislative process, EAA79 and its amendments include detailed language on what actions the President and the Departments are to take in regulating exports.

Originally intended to be in effect for four years, EAA79 was enacted at a time when the US was suffering from huge trade deficits. Since then, extraordinary changes have occurred in world politics: the end of the Cold War and the dismantling of the Warsaw pact, allegations of spying from the People's Republic of China (PRC), the proliferation of weapons of mass destruction including chemical and biological weapons, and an increase in acts of terrorism. Despite these developments, Congress has not been able to agree on a new framework for export control legislation.

An underlying theme of this chapter is the jurisdictional turf war in Congress over the protection of national security versus American economic competitiveness. This turf war is the root cause of Congress' inability to agree on a replacement for EAA79. These competing interests are mirrored at the executive level as well, between the Departments of Commerce, Defense, and State.

### **B. MAJOR PROVISIONS & AMENDMENTS**

#### **1. General Policy**

EAA79 authorizes the President to control the export of US goods and technology to foreign countries. Unlike previous export legislation<sup>1</sup>, EAA79 reflects the shift in priorities from national security and foreign policy to American dominance in the global economy. Congress emphasized the US export control policy at the time EAA79 was enacted:

It is the policy of the United States that export trade by United States citizens be given a high priority and not be controlled except

---

<sup>1</sup> That is, the Export Control Acts of 1949, 1951, 1953, 1956, 1958, 1960, 1962, and 1965.

when such controls (A) are necessary to further fundamental national security, foreign policy, or short supply objectives<sup>2</sup> [and] (B) will clearly further such objectives... (US Congress, 1979, Sec. 3(10)).

In the late 1970s, the US was experiencing a large trade deficit. The bill's sponsor, Sen. Adlai E. Stevenson, D-Ill., said that in balancing the interests of national security and a strong economy, the risk was that the United States would "in the name of national security, shoot itself in the foot" (1979, in p. 1516).

Congress made clear in EAA79 that the President should only impose export controls as last-resort means after negotiations and other actions have failed to achieve the same purpose (Sec. 5(d)). Congress also imposed a reporting requirement on the President, that "in every possible instance [the President] shall consult with the Congress before imposing any export control" (Sec. 5(e)). Moreover, the President and the Secretary of Commerce are required to submit an annual report to Congress containing detailed information on more than 20 items concerning the administration of EAA79 (Sec. 14).

If comparable goods are available abroad, the President cannot control them unless the absence of controls harms national security or is detrimental to foreign policy. To prove foreign availability, the Commerce Department merely has to present "reliable" evidence that the goods are available in sufficient quantity and quality abroad (Sec. 5(f)(3)), which is a relatively easy evidentiary standard to meet. EAA79 also required the Secretary of Commerce to meet with representatives from business on a regular basis to obtain their views on export control policy and the foreign availability of controlled goods and technology (Sec. 4(f)). If the President decides to impose controls for national security reasons, the President must also enter into negotiations with foreign governments and establish export control regimes with these governments to eliminate the availability of the controlled items in the foreign market.

EAA79 allowed the President and the Secretary of Commerce to promulgate detailed regulations—called the Export Administration Regulations (EAR)—to carry out the provisions of EAA79, which is an enabling statute. Congress acknowledged in the language of EAA79 that devising effective controls to prevent a potential enemy of the US from diverting critical technologies for military use is difficult; therefore, Congress provided that in creating the EAR,

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<sup>2</sup> Export control policy to prevent shortages of critical supplies in the US is beyond the scope of this thesis and will not be discussed.

Commerce is to assume that effective safeguards against diversion are in place (Sec. 5(a)(3)). This provision was an outgrowth of the upheaval over the unsuspected technology transfer to the Soviet military. Over \$1 billion worth of US-manufactured equipment, including a sophisticated computer, were sold to a Soviet truck and diesel engine plant on the Kama River. Even though the Soviets assured the US that the factory engaged in purely civilian activities, a House subcommittee discovered that some of the engines were being installed in Soviet military trucks. Congress, realizing that civilian end-use could not be guaranteed, made diversion a non-issue in the debate by directing Commerce to assume that safeguards against it exist and are being practiced.

## **2. National Security Objective**

EAA79 established a bifurcated system for controlling exports to protect national security. Generally speaking, Commerce has primary authority over national security export controls, but Defense has jurisdiction over technologies with military significance. The division of jurisdiction between Commerce and Defense has proven to be the most controversial aspect of the legislation and has prevented subsequent Congresses from arriving at a consensus on the rewrite of EAA79, which expired in 1983.

In developing EAA79, the Senate debated whether Commerce or Defense should have primary control over creating national security export controls. Sen. Stevenson, the bill's sponsor and Chairman of the Senate Banking Committee's International Finance Subcommittee, noted that license applications were frequently subject to unnecessary delays. In 1978, less than one in 200 license applications was denied, and the subcommittee's feeling was that too much review was occurring for the amount of control that was taking place (Livernash, 1979a, p. 1951). Sen. Stevenson, therefore, sought to limit Defense's role in the license application process. Other members of Congress were not confident that the world had seen the last of the Soviet Union. Sen. Henry M. Jackson, D-Wash., wanted to tighten restrictions against exports that would contribute to the Soviet Union's military build-up. He lobbied for the Secretary of Defense to have primary control over deciding which goods and technology would be controlled for national security reasons. In the end, the Senate compromised on shared responsibility between the two departments, which is manifested in the type of export control lists Commerce and Defense maintain.



Commerce develops and maintains the Commodity Control List (CCL) for dual-use items that have both military and civilian uses. Items that appear on the CCL require a license before they can be legally exported. The Secretary of Defense has an advisory role in this process; if the Secretary believes a dual-use item should be controlled, EAA79 invites the Secretary to recommend disapproval to the President. If the President deems a license is not necessary, the President must inform Congress that the Secretary of Defense recommends controls and provide Congress with his justifications against the controls. The Secretary of State may add other goods and technology to the CCL, but the Secretary of Commerce must concur with the additions (Sec. 5(k)). Members of industry are allowed to object to a technology's national security classification. If a substantial segment of industry protests, the Secretary of Commerce has to convene a technical advisory committee consisting of members from industry, Commerce, Defense, and State to evaluate the following:

- the technical merits of industry's complaint
- whether the item is widely available in the foreign market
- how the technology will be used
- any relevant licensing procedures (Sec. 5(h))

As for the Secretary of Defense, EAA79 authorized the Secretary to create and maintain the Militarily Critical Technologies List (MCTL). While Defense has a limited voice in determining which goods or technology are included in the CCL, Commerce has equal authority with Defense in removing items from the MCTL. EAA79 provides that both Commerce and Defense have authority to transfer items from the MCTL to the CCL.

Another controversial aspect of EAA79 concerns the standard of measurement used to gauge whether a technology is obsolete and thus no longer needs to be controlled. EAA79 allows Commerce to create an indexing system that measures the performance level of high-technology exports. For high-performance computers, the standard is millions of theoretical operations per second (MTOPS). Because legislation cannot keep pace with advances in technology, the MTOPS standard has been widely criticized. Any agency or department may object to the reclassification of an obsolete item, but the Secretary of Commerce must concur with the objection before the item is reinstated on the CCL (Sec. 5(g)).

Congress' pro-industry stance is also evident in the various ways the licensing process is facilitated. First, Congress abolished the previous law that required applicants to apply for

specific validated licenses for each individual commodity they exported. Under EAA79, Commerce is instructed to grant qualified general licenses unless the goods or technology is restricted per a multilateral agreement with an export control regime. Secondly, if a license is denied, EAA79 directs Commerce to give the applicant information on what modifications are necessary to make the item licensable. If that information is not available, then Commerce must give the point of contact's name in the department who is familiar with the application, and the point of contact must avail himself or herself to the applicant for questions. Finally, if an application requires review by a multilateral export control regime, EAA79 directs the Secretary of Commerce to approve the application subject to the multilateral review (Sec. 8(h)). If the regime does not make a determination within 60 days, the Secretary of Commerce's approval becomes final.

In addition to controlling *what* can be exported, EAA79 controls *where* an item may be legally exported. In this regard, EAA79 directs the President not to prevent exports to a country solely based on the country's Communist or non-Communist status. Instead, the President has to evaluate other factors such as the country's present and potential relationship with the US.

### **3. Foreign Policy Objective**

EAA79 also controls exports to further certain foreign policy objectives. Past objectives have included protecting human rights, curbing weapons proliferation, and restricting exports to rogue countries or those that sponsor terrorism. The mechanical workings of the foreign policy provisions are generally similar to the national security provisions with only slight variations.

The Secretary of Commerce has primary authority—in consultation with the Secretary of State—to impose export controls for foreign policy purposes. In defending national security, Commerce has the power to control exports with the advice of Defense.

The President is directed to use other means (e.g., negotiations) for advancing US foreign policy before resorting to export controls. When national security is at stake, there is no vacillation; the President is directed to proceed with controlling the good or technology and afterward, has to seek concurrent controls from the multilateral export control regime. If the President decides to impose export controls to support US foreign policy abroad, the President must still submit a report to Congress—as in the national security provisions—that details the reasons for the controls. This was the most controversial item during the debates on the legislation. Originally, House conference committees pushed for a congressional veto capability

to ensure the President would consult with Congress in advance. The Carter Administration argued the veto would undermine the effectiveness of the controls, and Senate conferees highlighted that a veto provision was not the only way to ensure prior consultation with Congress. In the end, the conferees agreed to drop the veto provision (Livernash, 1979b, p. 2219).

Congress also gave Commerce explicit guidelines to follow before imposing a foreign policy control. No such guidelines exist in EAA79's national security provisions. The foreign policy considerations of the controls include: (1) the probability that they would achieve their intended foreign policy purpose; (2) their compatibility with overall US foreign policy; (3) foreign opposition to them; (4) their effects on the US economy; (5) the ability of the US to enforce them; and (6) the foreign policy consequences of not imposing them (Sec. 6(b)(1)-(6)). Unlike the national security provisions, the foreign policy provisions require Commerce to consult with industry before imposing the controls (Sec. 6(c)). Industry can only object after the controls have been established in cases of national security.

#### **4. Extensions to EAA79**

EAA79 was intended to be a temporary law. Congress, at the time, included a sunset provision that caused the act to expire on September 30, 1983. Due to the lack of consensus among the members of Congress in rewriting EAA79, the legislation was extended temporarily by statute until October 31, 1983 (US Congress, 1983a). Further disagreement in Congress resulted in two additional extensions—the first until February 29, 1984 (US Congress, 1983b) and the second until the following month on March 30, 1984 (US Congress, 1984).

#### **5. Export Administration Amendments Act of 1985**

Congress amended EAA79 through the Export Administration Amendments Act of 1985 (US Congress, 1985). Its goals were to improve US export competition and to promote national security through stricter controls and more definitive criteria for the President's and Commerce's actions. The most significant changes dealt with the "foreign availability" exception to the license requirement provided in EAA79. Congress was concerned that requiring a license for a good or technology that was widely available would not serve the purpose of the law and would place undue burdens on American industry's ability to compete against foreign business. Congressional concerns regarding foreign availability are evident in the changes made to the

CCL and the procedures outlined for the President in cases where controlled items are widely available.

The 1985 Amendments distinguish between three types of national security exports: those *not* widely available overseas, those available overseas from allied countries participating in an export control regime, and those available from other nations. National security exports that are not widely available must be controlled. Under EAA79, if a good or technology was widely available in "significant" quantity, then it was exempt from licensing (Sec. 4(c)). Under the 1985 Amendments, if a "sufficient" quantity is available abroad, then exporters must obtain a license (Sec. 104(c)(1)). If an export control regime member is supplying the controlled item internationally, Congress directs the President to "actively pursue" (Sec. 107(c)) rather than "take steps to initiate" (Sec. 5(f)(4)) negotiations with the allied government. This is in sharp contrast to the previous law. In EAA79, the goal was to minimize export controls to a level that was acceptable and enforceable by all of the countries participating. However, the 1985 goal was to utilize export control regimes to enforce US foreign policy abroad.

The 1985 Amendments combined Defense's MCTL and Commerce's CCL into one "control list" (Sec. 106(a)(2)). The new list states the controlled item as well as the country to which the item cannot be exported; previously, the law only required that the controlled item be listed. Also, in order for a good or technology to be controlled under the new list, the country of concern must not only *not* possess the item (or an equivalent), it must not have access to it through foreign sources. This change is significant because, for the first time, Congress mandated that Commerce consider not only the exported technology but the technology in combination with the potential enemy. To assess whether a controlled country has a "functionally equivalent" technology, Commerce has to take into account:

- scientific or physical examinations of the technology
- expert opinion based upon adequate factual information
- intelligence information (Sec. 106(a)(2))

Members of industry may still object to an item's national security classification, but under the 1985 Amendments, the technical advisory committee that reviews the complaint must include members from the intelligence community in addition to industry, Commerce, Defense, and State. The 1985 Amendments require Commerce to review the control list each year, and if the technology is widely available, then the Secretary of Commerce must remove it from the list.

Irrespective of foreign availability, the 1985 Amendments give the President the authority to continue the licensing requirements in cases where national security could be jeopardized, provided the President gives notice to Congress and consults with the congressional committee with jurisdiction.

In EAA79, only general guidance was given to the President in deciding which countries were to be considered "controlled" and closely regulated. Whether or not a country was Communist was irrelevant; however, in reaction to the 1983 Soviet bombing of Korean Airlines flight 007 in which 70 Americans including a Congressman from Georgia were killed, Congress reversed EAA79 and provided explicit factors that the President must consider in determining whether or not a country should be controlled. They are the:

- extent to which the country's policies are adverse to the national security of the United States
- country's Communist or non-Communist status
- present and potential relationship of the country with the United States
- country's nuclear weapons capability and compliance record with respect to multilateral nuclear weapons agreements to which the United States is a party
- other factors that the President considers important (Sec. 103(14)(A)-(D))

In addition to amending the CCL and defining how the President is to proceed in foreign availability situations, Congress amended several other EAA79 provisions that are of significance. First, Congress removed the licensing requirement for certain low-technology items. Also, the Secretary of Commerce is required to report to Congress every three months the number of applications taking longer than the statutory limit of 30 days to process. Under EAA79, multiple exports required a qualified general license, but the Amendments reverse this and require a validated license for multiple exports. The Secretary of Commerce no longer has to explain why an export license application has been denied. Furthermore, the Amendments delete the provision that instructed Commerce to assume—in the course of creating regulations to enforce the EAA—that safeguards are in place against retransfers of controlled items to countries of concern. Finally, under the Amendments, EAA79 was extended to September 30, 1989.

## **6. Omnibus Trade and Competitiveness Act of 1988**

Congress passed the Omnibus Trade and Competitiveness Act of 1988 (OTCA) (US Congress, 1988, 102 Stat. 1107) to allay industry's concerns that American business was not able to compete internationally because US export laws were stricter than foreign laws.

Commentators criticized the pre-OTCA system for hampering trade with Western Europe, a benign trading partner, since only one percent of applications to this region were being denied (Cinelli, 1990, p. 411). The 1985 Amendments provide greater detail about the "foreign availability" exception and its procedures; Congress further refines the exception under the OTCA by delineating the parameters of the US relationship with the then-existing export control regime—known as the Coordinating Committee for Multilateral Exports (CoCom)<sup>3</sup>—in regard to controlled goods that were available in the foreign market.

Because foreign availability became a concern after EAA79, Congress clarified what it meant by foreign "availability" in the OTCA. Goods are "available" not only if they are produced abroad but if the foreign government's export laws are ineffective (102 Stat. 1107, 1356).

Congress also incorporated CoCom provisions into the OTCA; this effectively gave those provisions the force of law. Under the OTCA, Commerce and Defense had to continuously review the availability of controlled goods to countries of concern and submit their findings to CoCom's multilateral review process as stated in the CoCom agreement (102 Stat. 1107, 1354). In the 1985 Amendments, Congress stressed that the President had to actively pursue negotiations with CoCom to eliminate foreign availability among the member nations. Even if the President disagreed with terminating a license on the grounds of national security, the President still had to enter into negotiations with CoCom. Only after a specified time passed and negotiations with CoCom reached a stalemate would the licensing requirement remain in place (102 Stat. 1107, 1355).

The most all-encompassing provisions of the OTCA involve exports to the People's Republic of China (PRC) and the performance levels of high-technology exports. In 1988,

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<sup>3</sup> CoCom members included the North Atlantic Treaty Organization (NATO) countries, Japan, and Australia. CoCom's purpose was to maintain NATO's edge over the Warsaw Pact's numerically superior conventional military forces. CoCom disbanded in March 1994 after the fall of Communism in the Soviet Union and Eastern Europe.

Congress reduced the number of countries that were subject to the strict validated license regulations in the EAR. The PRC was one of those countries. Under the OTCA, exporters are allowed to apply for licenses to the PRC (102 Stat. 1107, 1349). Congress also mandates that Commerce consider removing from the list certain low-technology exports to the PRC. If the low-technology item only requires notice to CoCom but not approval, then an exporter is allowed to file for removal from the control list. If Commerce cannot dispute the exporter's claim, then Commerce has to immediately remove the item from the control list (102 Stat. 1107, 1351). In addition, Commerce is instructed to conduct annual reviews of performance levels of high-technology goods exported to the PRC under general distribution licenses and exported without licenses where licenses are not required. Based on these reviews, Congress directs Commerce to raise the minimum MTOPS' threshold of high-technology goods that require licenses (102 Stat. 1107, 1357) so that obsolete technology is not regulated.

Congress mandates that the Secretary of Commerce review the control list at least once every three months to ensure it is current. Any government agency or member of industry may comment on the updated list, and Commerce must take their recommendations under advisement. Congress clarifies that controlled items that comprise 25 percent or less of the total value of an uncontrolled item do not require a license (102 Stat. 1107, 1348). Congress also provides that controls on certain technologies are presumptively invalid unless Commerce proves that the technology is not widely available from sources outside the U. S. Moreover, Congress reduces the number of goods and technologies on the control list. A license is not required for the export of a controlled technology if the importing country has proliferating safeguards that are substantially similar to CoCom's (102 Stat. 1107, 1348) and the item only requires notification to, not an exemption from, CoCom (102 Stat. 1107, 1350). If a good or technology is found to be widely available, then Commerce has 20 days to expedite the exporter's application. Congress also calls for the elimination of unilateral controls (i.e., controls that only the US, not the other members of CoCom, enforces) (102 Stat. 1107, 1350). Consequently, under the OTCA, greater consistency was achieved between US export laws and the laws of foreign allies. The OTCA also extended EAA79 for one year until September 30, 1990.

## **C. CHALLENGES TO EAA79**

### **1. H.R. 4653 (Export Administration Act Amendments of 1990)**

By 1990, Soviet President Mikhail Gorbachev appeared to have no intention of continuing Communist rule in the USSR. With the Soviet threat greatly diminished and the breakup of the Warsaw Pact, Western European countries began lobbying, via their representatives in CoCom, for open trade with Eastern and Central Europe. President George Bush announced that the goal of the US export control system should be to build "higher fences around fewer goods" ("Export-Control Bill," 1990, p. 1253). At the same time, the US Chamber of Commerce and US high-technology firms urged Congress to relax domestic controls so that American firms could compete with their Western European counterparts for trade in the newly-opened countries. The House agreed and proposed H.R. 4653, the Export Administration Amendments of 1990, which the President ultimately did not sign into law. Much of the debate about H.R. 4653, including its demise, can be traced to two significant events: CoCom's June 1990 meeting in Paris and the US operation against Iraq in Operation Desert Storm.

Rep. Sam Gejdenson, D-Conn., H.R. 4653's sponsor and Chairman of the Foreign Affairs Committee's Subcommittee on International Economic Policy and Trade, heeded President Bush's objective and focused the amendments on shortening the list of controlled items. However, in an attempt to subdue the turf war between Commerce and Defense in administering the EAA, the bill greatly reduced the roles of Defense and State in the export administration process and made Commerce solely responsible for all dual-use exports. At the time, Rep. Gejdenson stated his support of the President's objective: "Th[e] bill's major focus is to limit the bureaucratic wrangling, infighting and the inefficiencies which leave American workers and corporations at a disadvantage" ("House Approves," 1990, p. 1778). The bill also created a presumption of exportability that would have shifted the burden to Commerce to justify putting an item back on the list. The Bush Administration reacted strongly by opposing the changes prescribed by the bill.

The day after H.R. 4653 passed in the House, CoCom convened in Paris to discuss the liberalization of trade to Eastern Europe. Most of the CoCom members "ha[d] long been impatient with US policy on high-tech exports" ("In a Change," 1990, p. 1336) and the dismantling of the Soviet bloc lent greater weight to their position. Ten days after the Paris meeting, the Senate passed its own measure, S. 2927, which the Senate incorporated into H.R.



4653. The measure was negotiated with the Bush Administration, and its provisions closely followed the Paris CoCom agreement (Cranford, 1990, p. 2290). The measure also left the relationship between Commerce, Defense, and State intact. Unlike the House's version, the Senate's won full endorsement by the administration.

Then on August 2, 1990, Iraq launched an invasion of Kuwait with two armored divisions. Five days later, the US sent troops to Kuwait to deter Iraqi forces from overtaking neighboring Saudi Arabia. With Operation Desert Shield in full force, President Bush pocket-vetoed H.R. 4653 because it limited the President's options during war:

I agree with the principal goals of [H.R. 4653], which include improved export controls for and sanctions against the use of chemical and biological weapons; sanctions on Iraq; missile technology sanctions; and reauthorization of the Export Administration Act.... H.R. 4653, however, contains elements that I believe would undermine these objectives and our ability to act quickly, decisively and multilaterally at a time when we must be able to do so. These provisions unduly interfere with the president's constitutional responsibilities for carrying out foreign policy (1990, in p. 3972).

The President further criticized the measure:

The major flaw in H.R. 4653 is not the requirement of sanctions but the rigid way in which they are imposed. The mandatory imposition of unilateral sanctions as provided in this bill would harm US economic interests and provoke friendly countries who are essential to our efforts to resist Iraqi aggression. If there is one lesson we have all learned in Operation Desert Shield, it is that multilateral support enhances the effectiveness of sanctions (1990, in p. 3972).

The President also underscored the need to adjust controls to assist the newly-formed democracies in Eastern Europe. The White House directed, among other things, that: (1) all national security controls on exports to CoCom members be eliminated; (2) the review process for exports for which CoCom encouraged "favorable consideration" or which may be exported based on "national discretion" be reduced from 30 to 15 days; (3) the Secretary of State initiate negotiations to ensure that computer export controls are enforced multilaterally; (4) a new method for indexing high-performance computer thresholds be devised to reflect the rapid advances in the industry; and (5) Commerce "significantly increase" the threshold for distribution licenses on computer exports to democratic countries (Bush, 1990, in p. 3973).

In September 1990, EAA79 expired. President Bush continued the legislation under the authority of the International Emergency Economic Powers Act of 1977 (IEEPA), which grants

the President broad powers to control international economic affairs in the event of a national emergency.

## **2. H.R. 3937 (Omnibus Export Administration Act of 1994)**

In March 1994, the Trade Subcommittee of the House Foreign Affairs Committee submitted H.R. 3937, the Omnibus Export Administration Act of 1994. Two long-time proponents of looser controls, Rep. Gejdenson and Rep. Toby Roth, R-Wis., introduced the bill. H.R. 3937 directly addressed the issues that had plagued previous Congressional debates, and had the bill been signed into law, it would have taken the most radical departure in export legislation since EAA79.

The bill recognized that: (1) the Soviet threat was no longer viable and CoCom, which had been established by NATO to safeguard against advances by the Warsaw Pact, had expired; (2) the capacity to build weapons of mass destruction was spreading globally; (3) unilateral US export controls impeded American business' ability to compete internationally; (4) and export control legislation could not keep pace with the rapid changes that were taking place in technology (US House of Representatives, 1994b, Pt. 1, pp. 2-3). H.R. 3937 responded to these issues by providing that all US export controls would be based on the agreements of multilateral export control regimes, which included the Missile Technology Control Regime, the Australia Group for chemical and biological weapons, the Nuclear Suppliers Group, and CoCom's successor (US House of Representatives, 1994b, Pt. 1, p. 3). Unilateral controls could be imposed for national security or foreign policy objectives, but these controls would expire after six months unless the President and Congress renewed them. To encourage participation in the export control regimes, the bill allowed US goods and technology to be exported without a license to export control regime members.

Criticism of the bill came from the Senate Armed Services Committee, which argued that the bill encroached on Defense's expertise in determining which dual-use items threatened national security. Under EAA79, the Secretary of Defense could review which exports were a threat to national security and could recommend to the President that those licenses be denied. Under H.R. 3937, an interagency committee would have resolved disputes between the agencies on an export license application (Dellums & Spence, 1994). In reaction, the Armed Services Committee introduced its own version, S. 2203, to ensure Defense's role was not restricted.

Another dispute focused on whether the US should allow fiber-optic technology exports to the Soviet Union to help the former-communist country upgrade its banking, airline, telecommunication, and agricultural systems. Rep. Gejdenson cited moral reasons for supporting the Soviets when he stated, "At a time when the issue of aid to the Soviet Union is in the forefront of the American consciousness, the members of [the Foreign Affairs] subcommittee have a unique opportunity" (1995, in p. 40). State disagreed with the release of the technology to the Soviets on the basis that it would impede US intelligence efforts. State criticized the bill for being backward-looking rather than focusing on current developments, including the proliferation of weapons of mass destruction (Silverberg, 1995, p. 40).

In the end, both sides were unwilling to negotiate because it was an election year. H.R. 3937's strongest advocate, Rep. Gejdenson, was involved in a heated race against former Rep. Edward W. Munster, R-Conn., at a time when H.R. 3937 required aggressive backing. Two years earlier, Rep. Gejdenson narrowly lost his seat in the House to Rep. Munster. Rep. Gejdenson won by a mere 21 votes, which was challenged by the rival candidate (MacPherson, 1994, p. 3596). A special House committee was formed to resolve the dispute and ultimately seated Rep. Gejdenson but not before months of arguments made to Congress and the courts.

During this time, EAA79 continued under statutory authority until June 30, 1994 (US Congress, 1993) and was reauthorized until August 20, 1994 (US Congress, 1994). On September 28, 1994, the Foreign Affairs Committee passed H.R. 5108, a one-year extension, but it failed to garner Senate approval. With no consensus from Congress, the President issued Executive Order 12924, the first time on August 19, 1994 and the second on August 15, 1995 to continue EAA79 until 1996.

### **3. H.R. 361 (Export Administration Act of 1996)**

Congress attempted to rewrite EAA79 a second time. On March 29, 1996, the House International Relations Committee approved H.R. 361, the Export Administration Act of 1996, which was introduced by Rep. Roth. H.R. 361 was different from previous legislation in two ways. First, it opened the export control process to judicial review (Whitney & Perles, 1996, p. 258) and relieved Congress of the burden of having to deal with industry complaints. Second, before writing the bill, Rep. Roth secured pledges to broker a compromise from President Clinton and Rep. Floyd D. Spence, R-S.C., Chairman of the House National Security Committee, the other committee with export control jurisdiction (Hitchens, 1996, p. 10). Rep. Roth stated,

"The bill, when it appears, will be much closer to a finished product than any bill you saw last year. That is going to be important" (1996, in p. 10).

When the bill appeared before the International Relations Committee, Democrats called it a "great step backward" because it required both the Secretary of Commerce and the Secretary of Defense to agree to approve the removal of controls if the item was available internationally (Hitchens, 1996, p. 10). Rep. Roth admitted that, without this provision, the National Security Committee, with which he had negotiated earlier, would have asserted jurisdiction over the bill and stalled floor action (1996, in p. 10). The House easily passed H.R. 361, but the bill received strong opposition from defense committee members and Senate Banking Committee Chairman Alfonse M. D'Amato, R-N.Y. (Hitchens, 1996, p. 10). The Senate ultimately took no action on the bill in the final days of Congress.

#### **4. S. 1712**

On December 5, 1995, President Clinton invoked his authority under the IEEPA<sup>4</sup> to extend EAA79 until August 19, 2000. For four years, Congress showed no interest in reviving this legislation. Then, in January 1999, a report by the bipartisan House Select Committee on US National Security revealed that the PRC had obtained sensitive technology from US satellite, missile, telecommunication, and machine tool industries. The Cox Report, named after the Committee's chairman, Rep. Christopher Cox, R-Calif., concluded that weak export laws contributed to the PRC's success in obtaining the sensitive material ("Full Calendar," 1999, p. 23-9). Another report, by former Director of Central Intelligence John M. Deutch, recommended revising EAA79 to curb weapons proliferation. Both reports gave support to lawmakers who were lobbying for a revival of the export controls debate. Senate Banking Chairman Phil Gramm, R-Tex, directed Sen. Michael B. Enzi, R-Wyo., Chairman of the Banking Committee's International Finance Subcommittee, to meet with interested parties to draft a new bill.

The bill, S. 1712, was viewed as a compromise that sought to reduce the number of goods and technologies that were subject to export licenses while it simultaneously increased the penalties for export control violations. The bill gave Commerce the sole authority to determine whether an export was available in the foreign market and exempt from licensing. This meant that personal computers, because they were widely available in the foreign market, would not

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<sup>4</sup> The IEEPA grants the President broad powers to control international economic affairs in the event of a national emergency.

require a license before being exported. At the same time, firms that violated export regulations could be fined \$10 million or more versus \$50,000 under EAA79. Moreover, individuals who were liable for multiple violations could be sent to prison for life rather than the current maximum of 10 years.

The Cox Report's findings, however, were not enough to revive interest in rewriting EAA79. Democrats and other supporters of industry were unalarmed by the report and lightly approached the findings. Rep. David McCurdy, D-Okla. said, "Is there a danger that this could be politicized? Yes.... Is there a tendency for this to be politicized? Yes. Is there a tendency to dig in and find out what's in the marketplace? No" (1999, in p. 268). Sen. Chuck Hagel, R-Neb. of the Senate Banking and Foreign Relations Committees was cautious when he stated, "Before we go much further we have to be careful that we don't overreact and screw this thing so tight that we end up inflicting harm on ourselves" (1999, in p. 269). Rep. Ileana Ros-Lehtinen, R-Fla., Chairwoman of the House International Relations Subcommittee, observed that, "The dilemma we face is how to restrict the spread of potentially destructive technologies while preserving the ability of US technology exporters to develop their civilian technologies" (1999, in p. 562). Furthermore, Sen. Bob Kerrey of Nebraska, the Senate Intelligence Committee's ranking Democrat, delayed a subsequent report by the committee "because he disliked the way portions were written" (1999a, in p. 562).

In the months after the Cox Report's release, Congress and the Clinton Administration addressed the issue of the PRC's espionage in ways that did not include export controls. Senate Intelligence Chairman Richard C. Shelby, R-Ala., urged increased spending on intelligence (McCutcheon, 1999c, p. 975). The Senate Energy and Water Appropriations Subcommittee argued for stricter security requirements for Energy Department employees with access to nuclear information and for warrantless searches of government computers in cases of suspected espionage (McCutcheon, 1999d, pp. 1224-5). Energy Secretary Bill Richardson proposed the establishment of an Office of Security and Emergency Operations and increased computer security training for the Department (McCutcheon, 1999d, p. 1225).

Industry lobbyists feared congressional backlash. A high-technology lobbyist stated, "There's a collective holding of the breath.... This controversy has nothing to do with anything private companies have done. It would be unfortunate if there was a crackdown on exports" (McCutcheon, 1999d, p. 1225).

By November 1999, a rewrite of EAA79 was abandoned. Senate Democrats could not agree to bring up S. 1712 for debate (McCutcheon, 1999d, 1252). Republicans objected to the bill's provision authorizing Commerce to determine whether a product was mass marketed and exempt from export licensing. Sponsors of the bill attempted unsuccessfully to offer the legislation as an amendment to S. 625, a bankruptcy overhaul bill.

In February 2000, with a new Congress in place, Sen. Gramm again spearheaded the passage of S. 1712. This time, he convinced Senate Majority Leader Trent Lott, R-Miss., to calendar the bill for debate, but four Senate committee chairmen wrote the Majority Leader and cautioned him to table the debate until they reviewed the bill's national security implications. The letter was signed by Armed Services' John W. Warner, R-Va., Foreign Relations' Jesse Helms, R-N.C., Intelligence's Richard C. Shelby, R-Ala., and Governmental Affairs' Fred Thompson, R-Tenn. The committee chairmen were concerned about protecting sensitive military technology, expanding the roles of the Secretary of Defense and the intelligence community, and weakening national security with looser controls (McCutcheon, 2000c, p. 488).

In the following weeks, the Senate Majority Leader tried unsuccessfully to resolve the dispute with the four committee chairmen. By March, Sen. Lott was prepared to file for cloture, which would have ended the senators' debate with a two-thirds vote of the full Senate. On March 8, 2000, debate about S. 1712 had been under way for only a few minutes when Sen. Gramm abruptly pulled the bill from the floor, citing the inability of Senate Republicans to reach an understanding about the interests of commerce and national security (McCutcheon, 2000d, p. 556). Although Sen. Gramm believed he had addressed the senators' concerns before going to the floor, he later said staff members were unable to translate what the parties had agreed on in principle into the details of the legislation (2000, in p. 557). Sen. Lott was still interested in bringing the bill back to the floor provided the Republicans could agree on a compromise, but he warned that the Senate's calendar would be tight once the budget and appropriations season got under way in April. Sen. Thompson, one of the four dissenting Senators, effectively stunted all hope for passage of the bill when he announced that he would oppose it if it came to the Senate floor. His statement drew harsh admonishment from the Senate Majority Leader, who said, "I frankly think that what has been done here is very irresponsible by the opponents.... I am extremely disappointed in the conduct of some of the Republican senators on this matter" (2000, in p. 557).

By March 16, 2000, the Senate abandoned S. 1712. Sen. Helms, one of the four dissenters, changed his position and, along with bipartisan members from the Foreign Relations and International Relations Committees, stated in a letter to the Secretary of State that the current law "provides the appropriate structure under which the United States should continue to advance our foreign policy, national security and nonproliferation interests" (2000, in p. 785).

With the discussion of export controls abated in the Senate, the House severed S. 1712 and attempted to pass portions of the bill. The House International Relations Committee tried unsuccessfully to get approval to reduce, from 180 to 30 days, the time Congress had to review MTOPS' levels for setting computer licensing requirements (US House of Representatives, 2000b). The House also passed a bill that mirrored the penalty provisions in S. 1712, but when the Senate received the bill, Sens. Gramm and Enzi—who planned to reserve the penalty language for future discussion of a more comprehensive export control bill—substituted a one-year extension of EAA79. Congress also added a provision to the National Defense Authorization Act of 2000 which required the President, in consultation with the Secretaries of Defense and Energy, to conduct a comprehensive review of the national security implications of exporting high-performance computers to the PRC with annual updates through 2004 (US Code, Title XIV, Sec. 1406). On November 13, 2001, the President extended EAA79 to August 20, 2001 (US Congress, 2000a).

#### **5. S. 149 and H.R. 2581**

In August 2001, the House International Relations Committee approved H.R. 2581 to replace EAA79. One month later, Sen. Enzi sponsored S. 149, which received the President's endorsement. H.R. 2581 bounced between committees, which extended the measure twice until it was discharged in March 2002. As of the writing of this thesis, the Senate had not taken action on the bill. S. 149's fate is also uncertain; the last major action occurred on September 10, 2001 when it was sent to the House and held at the desk.

The distinction between the two bills is in who was given authority over export controls. While S. 149 gives control to Commerce, H.R. 2581 gives primary authority to State and Defense. Both bills remove the licensing requirement for goods and technology that could be obtained abroad, but the trade-off is an increase in penalties for violations of the EAR. Also, both bills allow the President to override the "foreign availability" exception for reasons of

national security or foreign policy. Other significant differences between S. 149 and EAA79 include:

- *National Security Control List.* S. 149 creates a list of items that would be controlled to prevent breaches in national security, the proliferation of weapons of mass destruction, and acts of terrorism. Under the new legislation, the National Security Control List, along with benign dual-use goods and technology, is included in the control list managed by Commerce. EAA79 directs the Secretary of Defense to create the MCTL, which was later integrated into the CCL. S. 149 does not mention the MCTL nor does it require that the Secretary of Defense maintain such a list.
- *Mass Market Commodities.* S. 149 removes the licensing requirement for commodities that are mass marketed. A commodity is mass marketed if it is sold in large quantities or to multiple buyers. The bill requires Commerce to continuously review whether items on the national security control list are mass marketed. EAA79 provides a foreign availability exception but not a "mass market" exception.
- *Re-export of Goods Containing American Components.* S. 149 directs that foreign-produced goods containing less than 10 percent American components be exempt from the licensing requirement. EAA79 is silent in this regard, and the OTCA requires licenses for re-exports containing 25 percent American components.
- *Foreign Availability and Mass Market Determinations.* S. 149 allows any interested party to petition the Secretary of Commerce to make a foreign availability or mass market determination. Under EAA79, only the Secretary or a license applicant can petition for a foreign availability determination. S. 149 also establishes an Office of Technology Evaluation within Commerce to assist the Secretary in making these determinations.
- *Foreign Policy Controls.* Under S. 149, missile technology and chemical and biological weapons fall under national security controls, not foreign policy controls as provided in EAA79. S. 149 also increases the duration of foreign policy export controls from one to two years.



- *New License Category.* S. 149 creates a new license category where exporters provide notification to Commerce in lieu of obtaining a license for specific or multiple exports.
- *Repeal of MTOPS.* S. 149 repeals provisions in the National Defense Authorization Act of 1988, which bases licensing requirements on the controversial MTOPS' standard.

#### **D. SUMMARY**

Chapter II introduces the primary legislation that controls high-performance computer exports, EAA79. Originally enacted to resuscitate the US trade deficit in the late 1970s, EAA79 was only intended to remain in effect for four years; however, because of Congress' inability to agree on a new framework for export control administration, EAA79 and its amendments have endured up to the present day through subsequent statutes, executive orders, and emergency powers authority. The principal reason for congressional inaction is the jurisdictional turf war between congressional committees. This conflict reflects different policy priorities. On one side of the debate are the traditionally pro-military committees that are concerned with defending national security. On the other side are the pro-commerce committees that are more concerned with American industry and US firms' ability to compete against their foreign counterparts in the global market.

On a broader level, this chapter illustrates the role of Congress in the export administration process. Congress derives its power to regulate exports from the Constitution, but its role, for the most part, is limited to enacting export legislation. As a result of these Constitutional limits and in an effort to ensure its participation in the administrative process, Congress provided detailed procedures for the various Departments and created numerous reporting requirements for the President. Commentators have suggested that had Congress empowered the judicial branch with greater review of licensing disputes, this would have relieved Congress of some of the pressure imposed by industry and perhaps would have cleared the way for a rewrite of EAA79.

### **III. COMPUTERS AND THE COMPUTER INDUSTRY**

#### **A. INTRODUCTION**

The Export Administration Act of 1979 (EAA79) and its amendments regulate the export of "dual-use" technology, which includes high-performance computers. High-performance computers are regulated because of their numerous and significant military applications. The computer industry argues, however, that the standard used to measure whether a computer export poses a risk does not ensure national security. They further maintain that strict controls diminish US market share for computers, damage the goodwill of American business, weaken the US economy, and destabilize the US defense industrial base. Nevertheless, data from the Commerce, Labor, and State Departments contradict these assertions.

A specific security concern is the transfer of technical hardware and knowledge to the PRC. Technology transfer, a consequence of exporting technologies to countries of concern, is a prerequisite of doing business in the PRC. The US General Accounting Office (GAO) found that the Commerce Department is unwittingly facilitating technology transfers to the PRC by failing to require "deemed export" licenses for Chinese nationals employed at US high-technology firms.

#### **B. THE SIGNIFICANCE OF COMPUTERS**

##### **1. Computer Applications**

EAA79 regulates the export of dual-use high-performance computers. If left uncontrolled, high-performance computers may pose a serious threat to national security because of the military applications they are capable of performing. By regulating the export of high-performance computers to countries of concern, the US government seeks to ensure its strategic edge in complex weapons system design.

Analysts believe that unsophisticated countries may be able to compete with the more formidable US military because of dual-use computer technology. W. Seth Carus, an expert and author on weapons proliferation, explains:

[M]ilitary systems rely increasingly on digital computers, often identical to those sold in the civilian market, to undertake functions that once required specialized analog devices. Thus a modern strap-down inertial navigation system employed in a ballistic missile can provide high-accuracy guidance using computer chips identical to those used in commercial products (1994, p. 169).

Indeed, the Cox Report revealed that the PRC was diverting US-manufactured computers to perform covert military applications for the Chinese government. Specifically, the PRC was using US computers to design, model, test, and maintain advanced nuclear weapons (US Congress, 1999a).

The security threats posed by high-performance computers are striking both in number and quality. High-performance computers can:

- reduce costs and time for weapons analysis, design, testing, and deployment (US GAO, 2000b, p. 10)
- simulate nuclear tests<sup>5</sup> (US GAO, 2000a, p. 17)
- improve the integration and effectiveness of complex weapons systems (US GAO, 1998c, p. 17)
- reduce the number and cost of prototypes required in military systems designs (US GAO, 2000b, p. 10)
- analyze fluid dynamics and small particles for nuclear weapons design and building (US GAO, 2000a, p. 7)
- increase capabilities of "smart weapons," including precision-guided munitions and reconnaissance satellites (US GAO, 2000b, pp. 43-52)
- manage complex command, control, and communications functions (US Congress, 1999a, Ch. 3, p. 16)
- aid in the design of superquiet submarines, jet aircraft, and launch vehicles (Robbins, 1998, p. 1)
- assist in hardware and software designs for advanced military radar (US GAO, 2000b, pp. 43-52)
- provide rapid and precise encryption and decryption (US GAO, 2002d, p. 12)
- increase electronic eavesdropping capabilities (US Congress, 1999a, Introduction, p. 22)
- control theater missile defense (US Congress, 1999a, Introduction, p. 22)

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<sup>5</sup> This is also a concern because the simulations are, by their nature, undetectable. High-performance computers can assist countries of concern like the PRC in gathering necessary data for nuclear weapons design and, at the same time, allow them to remain within the guidelines of nuclear non-proliferation agreements.

- develop and deploy stealth aircraft, sonar arrays, and high-energy rocket fuels (US GAO, 2000b, pp. 43-52)
- manage logistics, including embarkation and maintenance and repair (Branscomb, 1990, p. 43)
- predict weather (US Congress, 1999a, Ch. 3, p. 16)
- quickly process topography data (US Congress, 1999a, Ch. 3, p. 17)
- simulate atomic explosions in the future (US Congress, 2000b, pp. 42-53)

The Defense Department noted in its High Performance Computing Modernization Program's annual plan that as weapons systems design and testing incorporate more computer modeling and simulation, the US can expect "many more examples of the profound effects that [high-performance-computer] capability has on both military and civilian applications" (US GAO, 1998b, p. 7).

The uncontrolled spread of high-performance computers in foreign markets also undermines the strategic position of the US by enabling rogue states to compete against the US in the area of complex weapons system design. The US invests in leading technologies and consequently has to control their proliferation to maintain the country's strategic lead. This investment continuously risks becoming obsolete as new technologies are developed. Consequently, the US must quickly incorporate cutting-edge technology into current and next generation weapon systems and simultaneously limit the release of the same technology into the world market to stay ahead of the curve.

## **2. Millions of Theoretical Operations Per Second (MTOPS) Standard**

EAA79 and the 1985 amendments directed the Secretary of Commerce to create an indexing system to measure the performance level of high-technology exports so that obsolete technology is not regulated (US Congress, 1979, Sec. 5(g); US Congress, 1985, Sec. 105(g)). Computer exports are measured in millions of theoretical operations per second (MTOPS), which is the clock rate of a microprocessor measured in megahertz. The general consensus among industry, think tanks, the GAO, and the Commerce Department is that MTOPS does not safeguard national security.

The computer industry, think tanks such as the Center for Strategic & International Studies (CSIS), and the GAO argue that a performance-based standard is difficult to administer given the rapid advances in computer performance levels. Gordon Moore, former chief

executive officer of Intel, observed that semiconductor technology grows exponentially, and the number of transistors per integrated circuit doubles approximately every 18 months. This phenomenon has become known as "Moore's Law." The Pentium III processor, for example, was introduced in 1999 and operated using 24 million transistors; the next year, the Pentium 4 was available on the market and operated using 42 million transistors ("Moore's Law," 2002). This rapid evolution of technology takes a toll on Commerce and Defense, which must continuously reassess MTOPS thresholds and the impact of prevailing technology on national security. CSIS and the GAO noted that many military applications could be performed using computers that operate below the regulated ceiling. In 2000, the GAO found 191 national security applications for computers operating under the then-current 85,000 MTOPS threshold (2000b, pp. 44-52). The F-117 Nighthawk ("Stealth") fighter, for example, was designed with a computer that operated under 500 MTOPS. In contrast, the common Pentium III home computer operates at 1,400 MTOPS. These realities led the CSIS to conclude in a report to Congress on computer exports and national security that "[t]he best choice may be to simply eliminate MTOPS" as a criterion for regulating exports (2001, p. xvi).

In addition, the MTOPS standard does not account for clustering of computers by potential enemies. Computer clustering involves networking or linking low-performance computers to create greater total computing power. Studies by the Lawrence Livermore National Laboratory show that widely available low-performance computers can be clustered to perform up to 70,000 MTOPS (US GAO, 2000b, p. 10). The expertise needed to build clustered systems is also readily available to countries of concern such as the PRC. Officials at the Los Alamos National Laboratory verified that they are in communication with people building these systems in the PRC (US GAO, 2000b, p. 13).

While clustering is not a perfect substitute for a high-performance computer, the scientific community surmises that in the hands of a determined enemy, clustering can still be a threat. Clustering computers requires "distributed" or "parallel" processing. In this procedure, computational problems are broken down into separate parts and input into many low-performance processors simultaneously. Increased speed is achieved through the breakdown of the computational problem and the number of computers operating at the same time. Assigning pieces of a calculation to different machines and combining the results are difficult without vendor-supplied software; however, some of this software is available on the Internet. Scientists

at Los Alamos note that an efficient schedule is also needed to run the hundreds of separate problems and the input and output of data among the computers, their local disks, networks, and archival storage areas (US GAO, 2000b, p. 14). John L. Hennessy, former Dean of Engineering and President of Stanford University, observes that clustered computers are not as reliable as a single high-performance computer, but depending on the application, clustered computers may be faster (1998, in p.1).

Advocates of stricter export laws criticize the MTOPS standard because obsolete technology is still deadly. After Operation Desert Storm, US inspectors discovered that Iraq was on the verge of completing an atomic bomb. The Iraqis were using calutrons, a primitive technology that the US had abandoned in the 1940s, to create the weapon. Had the Iraqis been successful in their efforts, critics argue that it would have been no consolation to the victims or the US that the bomb was made with obsolete equipment (Milhollin & White, 1994, p. 15.).

Several alternatives to the MTOPS standard have been suggested. Rather than control computer performance levels, commentators suggest Congress:

- count processors
- measure power dissipation
- index control thresholds to a common benchmark
- index based on actual sales in the US and to allied foreign markets
- control the world's top 500 most powerful computers maintained by the Universities of Tennessee and Mannheim
- tag and remotely monitor hardware usage
- raise export control thresholds to the level obtained by clustering
- legislate software applications used in the clustering process
- legislate technology used for interconnection
- regulate computer systems based on bandwidth
- control memory retrieval times and internal bus speeds<sup>6</sup>
- implement military non-technology countermeasures to maintain US military superiority

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<sup>6</sup> An internal bus connects the many internal computer components to the central processing unit and main memory. The size of the bus determines how much data can be transmitted at one time.

None of these alternatives is a panacea,<sup>7</sup> although they may prove more effective than MTOPS given the proliferation of increasingly powerful computers.

## **B. THE COMPUTER INDUSTRY AND ITS PERSPECTIVE**

### **1. Computer Lobbies**

EAA79 prohibits judicial review of license denials by Commerce and Defense. The rationale is that national security issues are more appropriately resolved by the President through the executive agencies rather than judges and juries. The computer industry thus turns to Congress to increase MTOPS thresholds and eliminate delays in the export license application process—areas all controlled by Commerce with input from Defense. Though they are a small group on Capitol Hill, high-technology firms have made an effective impression on lawmakers.

The computer industry employs hundreds of lobbyists and contributes millions of dollars to both Democratic and Republican lawmakers. From 1997 to 1998, the computer industry ranked 31st in political contributions among lobbies (Ota, 1999, p. 1630). Fifty-seven percent of its contributions—slightly more than half—went to Republican candidates (Ota, 1999, p. 1360).

High-technology firms have approached Congress on its own ground, in its own dress, and in its own language. High-technology executives travel to the Hill to personally testify for their industry and lunch with lawmakers (Ota, 1999, p. 1357). Known for their casual demeanor, the executives don suits and are well versed in the lawmaking process. Harvard political science professor David M. Hart noted that executives like Bill Gates of Microsoft "have star power.... They are seen as the promise of the future. And they bank on that. They are in a wholly different position than executives in other industries" (1999, in p. 1359).

The computer industry has been well received by congressional lawmakers. Most lawmakers are in their 40s and 50s and have a limited understanding of computers and their capabilities. They view discussions with industry representatives as learning processes as well as bids for votes. High-technology firms have sponsored field visits to Silicon Valley to cement relationships with lawmakers. Former Senate Minority Leader Tom Daschle, D-SD, commented, "The high-tech industry has become a real presence on Capitol Hill. It has grown in stature economically, and it has a prominent voice on legislation" (1999, in p. 1359).

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<sup>7</sup> For a more complete discussion of these alternatives, see US General Accounting Office, Report to the Chairman, Committee on Armed Services, US Senate, Export controls: system for controlling exports of high performance computing is ineffective, (2000), Washington DC: US General Accounting Office.

## **2. Foreign Competition and Unilateralism**

The computer lobbies argue that export controls unilaterally imposed by the US unfairly hamper US sales abroad and do little to promote national security. The computer industry urges Congress to legislate in areas that conform to multilateral agreements. This would mean increasing MTOPS thresholds to allow sales of high-performance computers to countries of concern. However, the data industry uses to substantiate its position is inconsistent with government data.

The US computer industry characterizes the economic situation involving their foreign competitors as a "crisis" (US House of Representatives, 2000a, p. 7). They observe that "[i]n the wake of [the Coordinating Committee's] dissolution, a chasm has developed between the U.S. and many of its Western allies, who no longer view China as a threat and have relaxed or lifted dual-use export restrictions to China accordingly" (US House of Representatives, 2000a, p. 15).

Even though US computer manufacturers are proscribed from selling in certain foreign countries, this does not diminish their overall competitive standing in the world market. On occasion, the computer industry has misrepresented data to lawmakers to emphasize its point. In 1997, lobbyists testified before Congress that foreign firms were capable of competing against US firms for sales of computers that performed above the then-maximum 85,000 MTOPS threshold. To bolster their claim, lobbyists submitted Table 1 during House Armed Services Committee hearings.

While it may be true that the firms in Table 1 were selling to markets that were proscribed to US manufacturers, the table shows something else. Noticeably absent are the top four foreign computer manufacturers. Either the computer industry did not have data on these foreign manufacturers or the top four were, in fact, foreign subsidiaries of American companies. The GAO found that the latter was true. In 1998, it reported that subsidiaries of US computer manufacturers "dominated" the overseas high-performance computer market, and as American subsidiaries, they had to comply with US export regulations (1998a, p. 5; US GAO, 1998b, p. 5; US GAO, 1998c, p. 5; US GAO, 2000a, p. 11). In markets with the strictest export restrictions, such as the PRC, US manufacturers mainly competed against other US firms, with limited competition from foreign suppliers in Japan (two manufacturers) and Germany (one manufacturer) (US GAO, 1998a, p. 5).



<b>TOP FOREIGN COMPUTER MANUFACTURERS</b>				
<b>Based on Units Sold Worldwide in 1997</b>				
<b>Company</b>	<b>Country</b>	<b>Worldwide Rank Workstations</b>	<b>Worldwide Rank Servers</b>	<b>Worldwide Rank PCs</b>
Acer	Taiwan	18		7
Amdahl	Japan		14	
AST Research	Japan			14
Axil	Korea	13		
Comparex	Germany		16	
Cetia	France	14		
Epson	Japan	25		23
Fujitsu	Japan	9	5	8
Groupe Bull	France		15	
Hitachi	Japan	11	13	17
Hitachi Data Systems	Japan		10	
Japan Computer	Japan	19		
Legend	China			25
Mitsubishi	Japan	24	19	
NEC	Japan	7	8	11
Olivetti	Italy			18
Samsung	Korea	23		15
Sharp	Japan			20
Siemens Nixdorf	Germany	15	6	12
Sony	Japan	21		22
Tatung	Asia/Pacific	12		
TriGem	Korea			19
Toshiba	Japan	20	21	6
Vobis Group	Germany			13

**Table 1. (Source: From US House of Representatives, 1999, pp. 3-4)**

Sen. Fred Thompson, R-Tenn., Chairman of the Senate Governmental Affairs Committee, made the point that sales to countries of concern (i.e., "tier 3" countries under the Export Administration Regulations) are a small percentage of total foreign exports and therefore fail to outweigh the national security risks.

Surprisingly...little money appears to be at stake in the decisions over [high-performance computer] export controls to China and other tier 3 countries. Let me

be clear. [High-performance computers] can be sold license-free to most countries in the world. With regard to tier 3 countries—China, India, the former Soviet Union, all of the Middle East, Vietnam, and most of Eastern Europe—computers under 85,000 MTOPS can be sold license-free. Computers over 85,000 MTOPS require a license, but even then, over 90% are approved for sale. [High-performance computers] cannot be exported to any of the rogue states. In short, given that sales to tier 3 countries represent less than 10% of all [high-performance computer] sales abroad, and [high-performance computer] sales don't appear critical to the economic health of most U.S. computer companies, it is hard to justify the national security risks simply to sell a few hundred more of them to China and other 'high risk' destinations (US Senate, 2001, p. 2).

Indeed, Table 2 shows that from 1998 to 2001, the PRC ranked only eight among the top ten foreign destinations of US computer exports.

<b>US COMPUTER EQUIPMENT EXPORTS</b>					
<b>Top 10 Destinations</b>					
<b>(\$ Millions)</b>					
<b>Country</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2000/2001 % Change</b>
Canada	3,929	3,736	4,260	3,438	-19.3
Japan	2,068	1,968	2,448	2,242	-8.4
Mexico	1,095	1,374	1,896	1,980	4.4
Netherlands	1,535	1,728	1,885	1,820	-3.5
United Kingdom	1,958	1,756	1,998	1,744	-12.7
Hong Kong	648	781	1,019	1,083	6.3
Germany	1,430	1,401	1,155	975	-15.6
<b>China</b>	<b>543</b>	<b>473</b>	<b>764</b>	<b>786</b>	<b>2.9</b>
Korea	374	737	1,319	714	-45.9
Brazil	799	620	749	644	-14.0
10 Country Subtotal	14,381	14,573	17,491	15,425	-11.8
All Other	7,049	7,267	7,379	6,464	-12.4

**Table 2. (Source: From US Commerce et al., 1998-2001)**

If the PRC represents a relatively small market, why does the US computer industry vigorously lobby Congress to loosen computer export laws? The computer industry explains that it wants to be the first to penetrate the potentially vast Chinese market, and being "first to

market" has benefits in a country such as the PRC, which places importance on long-term relationships.

The PRC has 1.2 billion consumers—the largest of any single country in the world—and demand for computers is on the rise. From 2000 to 2001, US computer exports to the PRC increased by 61.4 percent (US Commerce, 2002). The Chinese computer market in 1999 grew 16.2 percent compared to a 7.1 percent increase in GDP (US Embassy, Beijing, 2000, p. 28). Because of the growth of the Internet and the educational needs of their children, Chinese consumers paid \$15.6 billion in 1999 for computers and peripheral equipment, nearly twice the amount paid in 1998 (Table 3). Furthermore, the number of Internet users in the PRC is expected to increase from approximately 4 million in 1999 to 9.4 million in 2002, which would rank it second in Asia behind Japan in Internet usage (Hwang, 2001, p. 12).

<b>PRC Computer &amp; Peripheral Equipment Market (\$ Millions)</b>		
<b>Item</b>	<b>1998 Sales</b>	<b>1999 Sales</b>
Mainframes	175	224
Minis	1,966	3,645
Stations	6,225	11,759
PC Servers	.12	.13
Notebooks	.24	.30
Monitors	4.15	4.92
Printers	1.83	2.34
Scanners	.20	.41
Switches	.13	.16
Hubs	.38	.33
Network Cards	3.25	5.05
Modems	.96	1.45
Routers	.12	1.35
<b>Total</b>	<b>8,377.38</b>	<b>15,644.44</b>

**Table 3.** (Source: From US Embassy, Beijing, 2000, p. 29)

The computer industry is particularly concerned with being "first to market" in the PRC. "First to market" theory states that a computer product must be the first to penetrate a market

because market share becomes hard to recover once it is lost.<sup>8</sup> Industry representatives explain, "We need to establish a presence[,] get market share and develop customer loyalty" (Nakashima, 2001, p. E4). Being "first to market" is particularly important in the PRC. State Department export manuals advertise to American exporters that Chinese firms can be reluctant to negotiate with outsiders:

Personal relationships in business are critical. The Chinese feel more comfortable dealing with 'old friends,' and it is important for exporters...to establish and maintain close relationships with their Chinese counterparts and relevant government agencies.... A web of strong personal relationships will help ensure smoother development of business in China (US Embassy, Beijing, 2000, p. 12).

The problem with the computer industry's position is that it is asking Congress to choose future sales in the PRC over national security. Regulating sales to the PRC and other countries of concern does not significantly hurt the US computer industry since US firms dominate the overseas market.

### **3. "Unreliable Trading Partner" and Obsolescence**

In addition to what it believes is unfair competition from one-sided regulations, the US computer industry contends that the bureaucratic export licensing process threatens to make American manufacturers an unreliable trading partner in the eyes of their foreign customers and increases the risk of obsolete inventories for manufacturers. The manufacturers have advocated streamlining the license application process and shortening the time for congressional review of MTOPS increases.

In the National Defense Authorization Act of 1998 (NDAA 1998), Congress established a six-month waiting period before MTOPS levels became effective to give Congress time to consider Presidential increases to the thresholds. After the enactment of this statute, high-technology firms argued that a six-month delay had serious implications for their industry. They noted that computer product-introduction lifecycles were rapid, running three months, and the six-month waiting period increased the risk of obsolete equipment. They also claimed that six months was too long for an industry that depended on being the "first to market," and foreign competitors were "ready and willing to exploit such market opportunities" (US House of Representatives, 1999b, p. 9).

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<sup>8</sup> Different factors contribute to consumers' reluctance to switch brands: the large initial investment in hardware, the relatively inexpensive cost to upgrade a system rather than buy a new one, and familiarity of usage. Netscape is an example of a successful "first to market" story.

In 2000, the computer industry lobbied for a bill, S. 2539, to reduce the waiting period to 30 days. They have had to settle instead for 60 days in NDAA 2001 (US House of Representatives, 2000c, Title XII, Subtitle D, Sec. 1234).

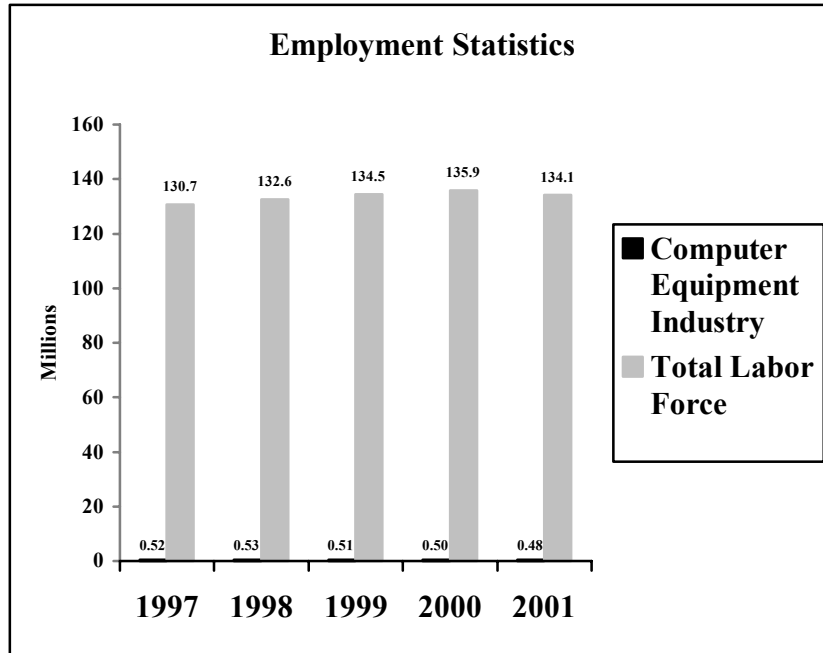
**4. Industry Contributions to the Gross Domestic Product (GDP)**

Computer lobbies maintain that the US economy reaps huge benefits from increases in US computer sales. They assert that computer sales significantly contribute to the US GDP and that unfair restrictions that cause the industry to lose market share will create a cycle of increased unemployment and less spending. The computer industry notes that in 2000, computers were responsible for one-third of real economic growth (US House of Representatives, 2000a, p. 3). However, government statistics in Table 4 show that computer *exports* have contributed only two-tenths of one percent of the total US GDP in the last four years.

<b>US Computer Export Contributions to the GDP</b>				
	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
US Computer Exports (\$ Billion)	21.4	21.8	24.8	21.8
US GDP (\$ Billion)	8,781.5	9,274.3	9,824.6	10,082.2
Contribution (%)	.2	.2	.2	.2

**Table 4. (Sources: After US Commerce, 2002a; US Commerce, 1997-2001)**

The computer industry also claims that unfairly restricting computer exports would significantly impact its sales and revenue. If these were to decline, severe unemployment would occur. However, employment in the computer industry represents only a marginal percentage of the total US labor force as indicated in Figure 2.



**Figure 1.** (Sources: After US Labor, 1997-2001a; US Labor, 1997-2001b)

### **5. Weakened Defense Industrial Base**

The computer industry also argues that restricting high-technology exports could have a stifling effect on the US military's rate of technological advancement. The computer industry contends that strict export controls result in the loss of overseas market shares. If earnings continue to decrease, industry stresses it will not be able to invest in research and development of next-generation technologies that benefit the military.

However, in order for research and development to be affected, the loss in market share has to be substantial. The vast majority—90 percent—of computer exports receive licenses, but only 10 percent are restricted (US Senate, 2001a, p. 2). Critics have argued that regardless, research and development that provide for the common defense should be funded by the Defense Department if it is necessary to regulate technology to countries of concern (Fergusson, 2001, p. 7).

Sen. Thompson noted that industry's national security position is a circular argument. He observed that the computer industry wants the US to "jeopardize its national security in order to improve its national security" (US Senate, 2001a, p. 2). In other words, the US would not be safeguarding its national security if it sold to potentially hostile countries.

## **D. TECHNOLOGY TRANSFER**

### **1. As a Prerequisite to Trade in the People's Republic of China (PRC)**

An additional concern is technology transfer to the PRC, which is a consequence of exporting. Technology transfer is the process by which hardware or expertise is transferred from one country to another via licensing of technology in the receiving country; sharing of designs, patents, formulas, management practices, and accounting procedures in high-technology joint ventures; training of foreign employees; collaboration in research and development among academia; *pro bono* donations of technologies; and recruitment and employment in the US of nationals from countries of concern.

Technology transfer was mandated in PRC regulations and industrial policies up until 2002. In 2002, the PRC entered the World Trade Organization (WTO) after extensive work by the White House that began in the mid-1990s. Pursuant to WTO rules, the PRC has agreed not to condition investment or trade in the country on the transfer of technology. However, the American Chamber of Commerce in the PRC expressed skepticism one year earlier about the PRC's commitment to this promise: "Despite the updating of provisional regulations on technology licensing in preparation for China's WTO entry, foreign companies are still required to submit technology licensing documents to the Chinese government for review—and licensors often must trade significant technology rights for approval to continue their project. In some industries, informal administrative measures in the form of "advice" to foreign companies make technology transfer a pre-condition to market entry" (US-China Security Review Commission, 2002, Ch. 2, p. 10)

US firms use technology transfer to seal business deals or as an added benefit in joint venture contracts in the PRC (US Commerce, 1998a, p. v). The motivating factor for firms transferring technology is economic gain and market penetration. US investors in the PRC are willing to exchange technology in order to be "first to market," and they expect the country's 1.2 billion-person market will pay off in the long run. A study commissioned by Commerce's Bureau of Export Administration found that US businesses believed that this cost was fair (US Commerce, 1998a, p. iv).

To demonstrate their commitment to the PRC and to establish goodwill, US firms have donated equipment and funds for training and education to the Chinese. Several large US high-

technology firms have transferred technology, often in connection with a Chinese university or research center. For example:

- Boeing contributed two multi-million dollar simulators to the Chinese Civil Aviation Flying College under the auspices of training assistance
- Hewlett-Packard donated \$200,000 in high-technology equipment to Qinghua University in connection with a joint-venture electronics research lab
- IBM donated 100 Model 5550 computers to Beijing, Tsinghua, Fudan, and Jiaotong Universities in 1985
- IBM donated \$25 million in computers and training to establish information technology centers in 23 different universities in 1995 under an agreement with the Chinese State Education Commission
- IBM, two years later, donated computer servers which cost \$32 million to four Chinese universities
- Intel donated Pentium computers to Beijing and Tsinghua Universities and more than 60 Pentium computers to Fudan and Jiaotong Universities. It also donated Pentium-based servers to Nanjing University and workstations to the University of Electronics Science & Technology in Chengdu
- Microsoft donated software to the Chinese
- Texas Instruments donated \$1 million in software, components, development tools, and personal computers for a new technology center in Qinghua University (US Commerce, 1998a, pp. 40-1)

US industry has also provided training to the Chinese. In the mid-1990s, Motorola established "Motorola Universities" in Beijing and Tianjin to train Chinese employees, customers, suppliers, and government officials in management and technology (US Commerce, 1998a, p. 41). Rockwell donated computers and software to the Harbin Institute of Technology, Shejiang University, and Guangdong University of Technology for student training. Silicon Graphics established a training center with Shanghai Automobile Industry Technology Center for employee training on workstations (US Commerce, 1998a, p. 41). Sun Microsystems built 10 Java training centers at major Chinese universities and five Java competency centers, as well as a manufacturing training center, at Shanghai's Jiaotong University (US Commerce, 1998a, p. 41).



To put this all into perspective, Europe has fully and officially embraced technology transfers to the PRC, while Japan has been more conservative in investing and sharing its advanced technologies (US Commerce, 1998a, p. v). However, the US approach has been in between (US Commerce, 1998a, p. v). The Commerce report concluded, "This study does not identify any specific Chinese military advances made as a result of US commercial technology transfers, but does suggest that continued pressures on foreign high-tech firms to transfer advanced commercial technologies, if successful, could indirectly benefit China's efforts to modernize its military" (US Commerce, 1998a, p.1).

## **2. "Deemed Export" Licenses**

Not only is technology transfer a condition of doing business in the PRC, but the GAO found that Commerce may be facilitating technology transfers by undocumented Chinese nationals working in US high-technology firms. US computer firms recruit and employ foreign nationals to temporarily work in specialized areas. Under the Export Administration Regulations, a firm must obtain a "deemed export license" from Commerce if the export of the technology to the foreign national's country would require a license. In addition, the foreign national must obtain an H-1B specialty employment visa through the State Department (if applying from outside the US) or the Immigration and Naturalization Service (INS) (if applying from inside the US). In fiscal year 2001, Chinese nationals accounted for 73 percent of the "deemed export licenses" approved by Commerce, and most worked in the electronics and semiconductor industries (US GAO, 2002e, pp. 2 and 11).

The GAO discovered several deficiencies in this system where potential enemies could illegally transfer US technologies. First, Commerce lacks procedures for coordinating with INS on deemed export licenses. The department does not have a process for reviewing the thousands of H-1B applications from foreign nationals already in the US (US GAO, 2002e, p. 12). Even though this information is readily available from INS, Commerce does not review it (US GAO, 2002e, pp. 12-3).

Also absent are procedures for suspicious H-1B applications. Commerce does not have a system for tracking problematic H-1B applications submitted from outside the US (US GAO, 2002e, p. 13). In fiscal year 2001, Commerce identified 160 questionable applications and sent these cases to field offices for follow-up (2002e, p. 2). When the GAO inquired into the

disposition of these applications, Commerce was unable to provide any because the department did not have a system for tracking the cases (2002e, pp. 2-3).

Commerce, moreover, does little to enforce the requirements of the "deemed export control license." Nearly 10 percent of the export licenses approved by Commerce are "deemed export control licenses" (US GAO, 2002e, p. 6). The GAO found that Commerce personnel do not regularly visit firms to determine whether they are in compliance with the license or whether they need to apply for one because they have foreign nationals working on sensitive technologies (2002e, p. 3). Commerce's response was that it lacks the resources to send personnel to the field to verify compliance (US GAO, 2002e, p.3). Even if the department had the resources, Commerce personnel would not have the technical expertise to determine if a foreign national is helping design semiconductors that exceed the MTOPS threshold (US GAO, 2002e, p. 3). Commerce further stated that it cannot monitor intangible technology transfers such as a foreign national's conversation with fellow employees (US GAO, 2002e, p. 3).

#### **E. SUMMARY**

Chapter III discusses the significance of computers to national security and presents the computer industry's perspective on export controls. The computer industry argues that unilateral controls restrict US firms from competing against foreign competition and do little to ensure national security when countries of concern can obtain computers from the competition. Industry also stresses that strict regulations threaten firms' reputations, protract the application process, and create costly obsolete technology. Industry warns against a weakened GDP and defense industrial base unless export controls are relaxed. However, based on statistics from the Departments of Commerce, Labor, and State, it can be argued that the US dominates overseas computer markets and sales to countries of national security concern represent a relatively small portion of total US computer sales.

Chapter III also discusses technology transfer, which is a result of trading. Technology transfer to the PRC is prevalent, but the computer industry shows little concern for the threat posed to national security. Furthermore, Commerce does not consider technology transfer a priority given the department's limited resources and lack of training in detecting "deemed export license" violations.

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## **IV. EXPORT CONTROL LEGISLATION, ADMINISTRATION, AND ENFORCEMENT**

### **A. INTRODUCTION**

The US Constitution authorizes the President to consult with departments to carry out the functions of the executive branch (Art. II, Sec. 2). The Constitution enables Congress to empower the executive departments to execute the provisions of the law (Art. I, Sec. 8). These provisions form the constitutional basis for the President and the Commerce, Defense, and State Departments to administer the Export Administration Act of 1979 (EAA79). Under EAA79, Congress established a bifurcated system for controlling exports that served the competing interests of national security and economic commerce. EAA79 expired five years after its enactment, but attempts to replace the legislation have not gone past the committee level because Senate and House rules assign jurisdiction over national security and commerce to multiple committees.

The conflict between ensuring defense and promoting trade is also evident in the executive branch. Congress assigned primary authority for export control administration to the Commerce Department whose purpose is to promote trade, but the Defense and State Departments—both of which safeguard national defense—were also made stakeholders in export controls. Because Congress has not agreed on a replacement for EAA79, the President has been left free to adjust the impact of export control regulations on US foreign trading partners. Since the mid-1990s, the President has indeed made such an allowance, moving the emphasis of the regulations away from safeguarding national defense to advancing US trade abroad.

Furthermore, enforcing EAA79 and its regulations is difficult given: (1) the Commerce Department's commercial bias; (2) the unstable statutory authority used to extend the Act since its expiration in 1983; (3) the loss of US credibility in multilateral arrangements due to the inability of Congress to agree on a new export control policy; and (4) the reluctance of the People's Republic of China (PRC) to allow inspections.

### **B. EXPORT CONTROL LEGISLATION**

Since EAA79's expiration in 1983, there has been urgent need for a more modern, responsive successor. Attempts at rewriting EAA79 have been unsuccessful largely because of different perspectives in Senate and House committees. Committee jurisdiction is specified in

Rule XXV of the Standing Rules of the Senate and in Rule X of the Rules of the House of Representatives. These rules treat EAA79's goals—American economic competitiveness and national security—as separate jurisdictions under multiple committees with various agendas on export controls.

Committees in the Senate have overlapping jurisdictions over export controls. Senate Rule XXV(d)(1) gives primary authority for export controls and foreign trade promotion to the Banking, Housing, and Urban Affairs Committee. The Foreign Relations Committee also exercises jurisdiction over "[m]easures to foster commercial intercourse with foreign relations and to safeguard American business interests abroad" (US Senate, 2002a, Rule XXV(j)(1)). In addition, the Finance Committee has an interest in export controls since it oversees revenue-generating matters, such as customs and reciprocal trade agreements (Rule XXV(i)(2) and (3)).

Commerce stakeholders in the Senate often receive opposition from House committees with jurisdiction over national security. The latter includes the House International Relations Committee which oversees export controls, trading with the enemy, and the nonproliferation of nuclear technology and hardware (Rule X(j)(4), (6), (11), and (16)). Congressional commentators observe that the fundamental difference between the Banking, Housing, and Urban Affairs and International Relations Committees "ha[ve] long been an obstacle in getting a new export control bill passed" (McCutcheon, 2000a, p. 371). In 1996, H.R. 361, which originated in the International Relations Committee, met its demise when the Senate Banking, Housing, and Urban Affairs Committee took no action on the bill in the last days of the congressional session (Hitchens, 1996, p. 10).

The Senate Armed Services, Governmental Affairs, and Intelligence Committees are also stakeholders in export control legislation because of the interagency framework established in EAA79. The Act enabled relationships between the Departments of Commerce, Defense, State, and—in cases involving nuclear applications—Energy. Thus, the Armed Services Committee, which oversees the Defense Department (Rule XXV(c)(1)), and the Governmental Affairs Committee, which participates in US nuclear export policy matters, have an interest in rewriting EAA79 (Rule XXV(c)(1) and (k)(1), respectively). In addition, the sharing of intelligence information among the various stakeholders draws responsibilities from the Select Committee on Intelligence. Pursuant to S. Res. 400, the Select Committee on Intelligence "shall make every effort to assure that the appropriate departments and agencies of the United States provide

informed and timely intelligence necessary for the executive...to make sound decisions affecting the security and vital interests of the Nation." In 1999, these seemingly disparate committees allied to successfully block export control legislation that did not align with their individual agendas. S. 1712 never reached the Senate floor after the Chairs of the Armed Services, Governmental Affairs, and Intelligence Committees implored the Senate Majority leader not to introduce the bill for debate on the Senate floor (McCutcheon, 2000b, p. 424).

Other alliances have formed among committees in the House of Representatives. In 1994, the Foreign Affairs Committee unsuccessfully attempted to pass a new export control bill. H.R. 3937 was pulled from the House's schedule because the Armed Services, Intelligence, and Ways and Means Committees—the latter of which has jurisdiction over customs (Rule X(s)(1))—could not agree on a compromise ("Special Legislative Outlook," p. 30).

Congress recognizes the stalemates caused by the committee system, and in the 1970s, efforts were made to remove the overlap in jurisdiction rules. In 1973, the House appointed a bipartisan Select Committee on Committees to revise House rules. The Committee's report recommended a realignment plan that included 15 exclusive and seven nonexclusive committees. The report was strongly opposed by committee chairs who feared losing jurisdiction and "iron triangle" alliances among committees, lobby groups, and executive agencies that benefited from the status quo framework ("The Congressional Committee System," p. 8). In the Senate, members have not considered full-scale jurisdiction changes since the passage of EAA79. The last major revision took place in 1977, when the Senate passed S. Res. 4, which established the jurisdictions under which the Senate operates today.

## **C. EXPORT CONTROL ADMINISTRATION**

### **1. Export Classification and Jurisdiction**

Congress established a bifurcated system for controlling exports based on whether the export is a dual-use commodity or a munition. Under EAA79, Congress directed the Commerce Department, with input from Defense, to regulate exports that are intended for commercial but may have military uses. Under the Arms Export Control Act, Congress directed the State Department to regulate exports utilized for military purposes. Determining whether a civilian good or technology could have military applications is complicated, and this divided system has given rise to power struggles between Commerce, Defense, and State over the proper classification of exports.

Commerce's Bureau of Industry and Security (BIS) (formerly Bureau of Export Administration) develops and maintains the Commerce Control List for dual-use exports, while Defense, through the Defense Technology Security Administration, may recommend to the President that an item be included in the Control List (US Congress, 1979, Sec. 8(g)(2)(A)). However, recommendations by State's Export Control & Nonproliferation Office and Office of Defense Trade Controls require concurrence from Commerce before additions to the Control List are made (US Congress, 1979, Sec. 5(k)).

A 1999 Defense Inspector General's report found that in a three-year period, Commerce referred only 12 of thousands of cases to Defense (p. 3). In 2001, the former Acting Inspector General of the Defense Department testified before the Senate Armed Services Committee that "Commerce referred far too few commodity classification reports to the Department of Defense and has made decisions...without having any review discussion with the department" (2000, in p. 11). Former national security advisor Bill Greenwalt found the lack of interagency cooperation problematic; he observed that because technical innovation originates in industry and not the military, Defense needs the window provided by the export control system to remain abreast of potential technology transfers and to accurately assess strategic threats (2001, in p. 12). James Bodner, former Deputy Under Secretary of Defense for Policy, echoed a similar sentiment: if Commerce decides a good or technology is not subject to classification, Defense would "never know of its consideration" (2000, in p. 11).

If an exporter is unsure whether a good is a dual-use commodity or a munition, the exporter may request a commodity classification from Commerce or a determination of commodity jurisdiction from State. Determining which department has jurisdiction has important implications. Commerce, a trade-promoting agency, is generally less restrictive with dual-use exports; however, State, which implements US foreign policy, has a stringent perspective of munitions. Thus, exporters are able to shop among departments for license determinations.

In April 1996, the National Security Council (NSC) issued guidance requiring Commerce to confer with State and Defense on classification requests. The guidance was in reaction to the improper transfer of satellite technology to the PRC by Hughes Space and Communications International, Inc. Hughes had first obtained a license from State, but when the Chinese purchasers had difficulty launching the satellite, Hughes shared technology information with

them after the firm "department shopped" and received unauthorized clearance from Commerce. After this scandal, NSC directed Commerce to refer classification requests to State and Defense if the "items/technologies [are] specifically designed, developed, configured, adapted and modified for a military application, or derived from items/technologies specifically designed, developed, configured, adapted or modified for a military application" (US General Accounting Office (GAO), 2002f, in p. 5).

Commerce, however, uses a department-modified interpretation of NSC's guidance. In 2002, the GAO found that Commerce refers requests for items derived from a military application only if the item is recently adapted for civilian use (US GAO, 2002f, p. 6). Commerce explained the distinction was necessary because

[t]o be sure, the NSC Guidance could be interpreted in such an awkward fashion as to merit referral of a larger array of commodity classification requests. For example, a product such as the *Barbie Chat With Me* walkie talkie could require referral because the first portable FM two-way radio was originally designed by Motorola for the U.S. Army Signal Corps in 1940. This is not how the NSC Guidance has been traditionally interpreted, and such an interpretation would result in inefficient use of scarce government resources and an unnecessary burden on U.S. exporters (Boorman, 2002, Enclosure, pp.2- 3).

Since the April 1996 guidance, Commerce has referred few classification requests to State or Defense. From 1997 to 2001, Commerce referred less than one percent to outside departments ("US Export Policy," 2002; US GAO, 2002f, p. 6) even though at least 250 should have been under the strict letter of the guidance (US GAO, 2002f, p. 2).

## **2. Interagency Review of License Applications**

EAA79 set forth general guidelines for department review of export license applications. By default, the intricacies of license application review were left to the departments to determine for themselves. This has resulted in conflicts between and within the departments and has reduced the transparency of the export licensing process.

EAA79 mandated that Commerce send license applications with national security and foreign policy implications to Defense and State respectively. This provision has led to a convoluted system for license application determinations. The Bureau of Industry and Security (BIS) (formerly the Bureau of Export Administration) within Commerce refers applications having national security implications to the Defense Threat Reduction Agency. However, applications raising foreign policy concerns are sent to one of four different agencies depending on the exported technology as follows:



- *Foreign Policy.* Generally, a dual-use license application that raises foreign policy questions is reviewed by State's Export Control and Nonproliferation Office.
- *Nuclear Nonproliferation.* If the dual-use license application involves nuclear nonproliferation matters—either because the export may have a nuclear application or the end-user has a nuclear background—the application is referred to the Energy Department. Energy, along with the Nuclear Regulatory Commission, licenses nuclear material exports. When either Commerce or Energy believes that because of the destination of the export, its timing, or any other relevant considerations, a particular application requires review by all of the departments, the application is referred to the Subgroup on Nuclear Export Coordination (SNEC), an interagency group. The SNEC then advises Commerce.
- *Missile Technology.* On the other hand, if the application involves missile technology, the application is sent to the Missile Technology Export Control Group, an interagency group chaired by the Office of Chemical, Biological, and Missile Nonproliferation within State's Bureau of Political-Military Affairs.
- *Chemical and Biological Weapons.* A license application involving chemical and biological weapons is reviewed by "SHIELD,"<sup>9</sup> an interagency group also chaired by a State official.

If differences between the agencies cannot be resolved, the application is sent to the NSC's Ad Hoc Group on Nonproliferation. If the Ad Hoc Group is unable to reach an agreement, the license is referred to the President. In fiscal year 2000, Commerce referred 83 percent of the applications received to other departments (US GAO, 2001a, p. 3).

Commerce may also refer license applications for dual-use exports to the Central Intelligence Agency's Nonproliferation Center if an application raises security concerns. Beginning in 1996, Commerce referred all license applications for exports to the PRC to the Central Intelligence Agency (US House of Representatives, 1999a).

If an outside agency fails to respond to a referred license application within 30 days as required by Executive Order 12981, Commerce's electronic application system automatically

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<sup>9</sup> "SHIELD" is not an acronym but rather a name chosen to illustrate the subgroup's purpose with regard to chemical and biological weapons proliferation.

pulls the application from the department and returns it to Commerce (US GAO, 2001a, p. 29). The application is then sent to the Operating Committee, which is chaired by a Commerce official. Decisions made by the Commerce Chair prevail; however, they may be appealed to the Advisory Committee on Export Policy, a sub-cabinet group chaired by the Assistant Secretary of Commerce for Export Administration and consisting of representatives from the same agencies as the Operating Committee. Unlike the latter, a majority vote of the Advisory Committee determines the outcome of a license application. If the application cannot muster a majority in the Advisory Committee, it is referred to the Export Administration Review Board chaired by the Secretary of Commerce at the cabinet level and, as a last recourse, to the President.

The Commerce Department has complained that the other departments take advantage of the license review system. It noted that departments intentionally allow the 30-day-review limit to expire in order to buy more time in the Operating Committee process or to access intelligence information available to the Operating Committee (Evans, 2001, in p. 54).

On the other hand, critics of the license review system argue that the process is biased toward commercial interests. Sen. Fred Thompson, R-Tenn., observed that the system is "designed basically for Commerce to get its way and...to discourage appeal" (2001, in p. 11). Gary Milhollin, a proponent of stricter export laws, contends that if the purpose of the license review process is to protect national security, then those agencies [i.e., Defense and State] should garner greater priority in the deliberations (2001, in p. 11).

Not surprisingly, Commerce and Defense have opposing views on export controls. Commerce promotes American business and is more likely to err on the side of approving a license than is Defense, which protects national security. Former Deputy Under Secretary of Defense Stephen D. Bryen explained, "The Commerce Department is a trade promotion agency. Giving it a contradictory mission—to restrict trade—creates confusion and conflicts. For example, Commerce Department officials are not given incentives for stopping trade deals—they are rewarded for helping encourage trade deals. Licensing officials who say 'no' will not be on the career enhancement track" (1999, in p. 182).

For State, the control of exports is collateral to the department's mission of developing White House foreign policy. The department does not have formal guidelines for determining which State agencies and offices need to review license applications, and licensing officers receive insufficient training in the export control process (US GAO, 2002a, pp. 1-2). Licensing

officers rely on "rules of thumb" learned over time to make license application determinations (US GAO, 2002a, pp. 6-7), and State license application reviewers consider their job a low priority (US GAO, 2002a, p. 2). Licensing officers have other duties in addition to reviewing applications, and in some State Department offices, this job is a collateral duty, as in the case of military officers who sometimes serve as licensing officers while stationed as attaches in geographic bureaus (US GAO, 2002a, p. 8). License reviewers admitted to the GAO that they are not always sure why they have been asked to review specific license applications; they do not always understand the issues or concerns associated with an application, and they do not know how the export licensing process works (US GAO, 2002a, p. 7). Two licensing officers, for example, assumed that they received all of the license applications for their region and were surprised when the GAO pointed out that they reviewed only a portion (US GAO, 2002a, pp. 7-8).

### **3. Export Administration Regulations (EAR) and the Bureau of Industry and Security (BIS)**

EAA79 authorized the Commerce Department to promulgate the Export Administration Regulations (EAR) to carry out the purposes and provisions of the Act (US Congress, 1979, Sec. 15), and the Commerce Department has delegated the function of export administration and management of export regulations to the BIS. The EAR contains four main parts: General Prohibitions, the Commerce Control List, the Commerce Country List, and License Exceptions. Several observations can be made about the impact, genesis, and enforcement of the EAR. First, the EAR was written with the exporter as the audience, placing the onus on the exporter to screen his or her own transactions. Second, the Commerce Country Chart and the License Exceptions adjust the impact of US export control regulations depending on the foreign country-of-destination and its relationship with the US. Third, industry informs the creation of regulations, and enforcement is subdued due to Commerce's contradictory mission of controlling and promoting exports.

The EAR is written directly to the exporter, in the second person rather than in the third, which illustrates exporter self-enforcement. This is demonstrated in the EAR's opening statement:

## §730.8

### HOW TO PROCEED AND WHERE TO GET HELP

#### *(a) How the EAR are organized*

The Export Administration Regulations (EAR) are structured in a logical manner. In dealing with the EAR you may find it helpful to be aware of the overall organization of these regulations. In order to determine what the rules are and what you need to do, review the titles and the introductory sections of the parts of the EAR.

Thus the EAR is intended to be a step-by-step guide for the exporter. The rest of the provisions read like a manual more than rules of law, and the language is void of confusing legalese. The simplicity of the language, as well as Commerce's addressing the exporter as "you," confirm the Department's desire to transfer responsibility of export control administration to the exporter.

Given the EAR's foundation, the first part encountered by the exporter is the General Provisions, which serve as basic tenets of US export regulations. The General Provisions relate to:

- export and re-export of controlled items to listed countries ("Exports and Re-exports")
- export and re-export of foreign-made items with US components ("Parts and Components Re-exports")
- export and re-export of foreign-produced direct product of US technology and software ("Foreign-Produced Direct Product Re-exports")
- actions prohibited by a denial order against a foreign importer
- export or re-export to prohibited end-users and end-uses ("End-Use End-User")
- export or re-export to embargoed destinations ("Embargo")
- support of proliferation activities ("US Person Proliferation Activity")
- in-transit shipments and items to be unladen from vessels or aircraft ("In-transit")
- violations of any order, term, or condition ("Orders, Terms, and Conditions")
- transactions with knowledge that a violation has occurred or is about to occur ("Knowledge Violation to Occur") (US Commerce, 2002c, Title 15 (15 CFR) Sec. 736.2(b)(1)-(10))

After reviewing the General Prohibitions, the exporter examines the second and third parts of the EAR, the Commerce Control List and the Commerce Country Chart. The exporter identifies specific characteristics and functions of the export and matches them with detailed descriptions provided in the Control List to arrive at an alpha-numeric designator called the Export Control Classification Number (ECCN). The ECCN is a precise way of determining whether the exporter's particular good or technology requires a license, falls under a "License Exception," or requires further review (e.g., input from the State Department). Once the exporter ascertains the ECCN, the exporter looks to see whether the ECCN provides a "Reason for Control." A Reason for Control may include:

- national security (including Dual-Use and International Munitions List) and items on the National Security Group Dual-Use Annex and Trigger List
- missile technology reasons
- nuclear nonproliferation reasons
- chemical and biological weapons reasons
- anti-terrorism, crime control, regional stability, short supply, UN sanctions, etc. (15 CFR Sec. 738.2(d)(1))

Exports to the PRC are currently controlled for reasons of chemical and biological weapons nonproliferation, nuclear nonproliferation, missile technology control, national security, missile technology control, regional stability, and crime control (15 CFR Supp. No. 1 to Sec 738, p. 3).

Once the Reason for Control is identified, the exporter is then referred to the third part of the EAR, the Commerce Country Chart (cf. 15 CFR Supp. No. 1 to Sec. 774). The Country Chart, which is updated periodically in 15 CFR Supp. No. 1 to Sec. 738, determines whether the Reason for Control applies to the country with which the exporter intends to trade. A high-performance computer, for example, may represent a national security concern, but exported to a benign trading partner, it represents no security risk to the US and may be exported without a license. In essence, then, the ECCN and the Country Chart are a reflection of the executive's foreign trade policy toward specific countries.

However, the exporter is not finished because a License Exception may still apply under the fourth part of the EAR. The License Exceptions are caveats to the General Prohibitions and the Control and Country Lists and allow an exporter who is otherwise barred from exporting to proceed with a trade. As with the Control and Country Lists, the License Exceptions reflect the

impact of US export regulations derived from the relationship of the US with the country-of-destination. For example, in 1995, the EAR changed to allow exporters to trade items normally controlled for national security reasons to the PRC, provided the items are for civilian end-users and end-uses (15 CFR Sec. 740.5 & 15 CFR Supp. No. 1 to Sec. 74). In 1996, the law was changed again, this time authorizing exports of certain computers to "eligible" countries (15 CFR Secs. 740.7(c) & (d)). Countries are ranked according to four tiers, with each tier above Tier 1 representing a successively higher level of national security concern.

Current US export control policy does not require an exporter to obtain a license to export to Tier 1 countries (15 CFR Sec. 742.12(b)(1)). In 2001, Tier 1 and 2 countries were merged. Tier 3 countries are considered national security concerns and include the PRC, India, Israel, Pakistan, and Russia. Exports of high-performance computers above 190,000 millions of theoretical operations per second (MTOPS) to Tier 3 countries require a license, and computer exports to the PRC require an additional End-User Certificate from the Chinese government (15 CFR Sec. 742.12(b)(3)(i)(B)). Exports of high-performance computers to Tier 4 countries—Iran, Iraq, North Korea, Cuba, Libya, and the Sudan—also require licenses (15 CFR Sec. 742.12(b)(4)(i)). Tier 4 countries are viewed as supporting terrorist activities or are subject to comprehensive trade embargoes, so licenses to these countries are generally not approved.<sup>10</sup>

The EAR stipulates that license applications for exports and re-exports to Tier 3 countries are usually approved (15 CFR Sec. 741.12(b)(3)(iii)) even though the PRC has strict import protocols. In 2001, exporters applied for 1,300 licenses to the PRC (Jochum, 2002, pp. 4-5). Of these, 936 (or 72 percent) were approved, 30 were denied, and 325 were returned to the exporter without further action<sup>11</sup> (Jochum, 2002, pp. 4-5). Forty-six percent of the 1,300 applications were for "deemed export" licenses meant to prevent technology transfers by foreign nationals employed at US high-technology firms (Jochum, 2002, pp. 4-5).

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<sup>10</sup> The Treasury's Office of Foreign Assets Control administers these trade embargoes; however, to avoid duplication in the licensing process, Commerce and Treasury have divided licensing jurisdiction between themselves. Commerce exercises licensing jurisdiction for exports and re-exports to Cuba and North Korea and for re-exports to Libya. Treasury exercises licensing jurisdiction for exports and re-exports to Iran and Iraq and for export to Libya.

<sup>11</sup> Applications are returned to exporters for a variety of reasons: a license is not required, there is insufficient information to process the application, or the item falls under State's jurisdiction.

Before Commerce regulates a technology, the department must consult with industry. Industry representatives are organized into Technical Advisory Committees based on specific areas of interest, including: Information Systems, Materials, Materials Processing Equipment, Regulations and Procedures, Sensors and Instrumentation, and Transportation and Related Equipment (15 CFR Supp. No. 2 to Part 730, (7)). Representatives from agencies outside of Commerce may participate in these committees, but they must be selected by Commerce (15 CFR Supp. No. 2 to Part 730, (7)). Technical Advisory Committees exert tremendous influence on the export control process, as EAA79 requires,

Such committees, where they have expertise in such matters, shall be consulted with respect to questions involving (A) technical matters, (B) worldwide availability and actual utilization of production technology, (C) licensing procedures which affect the level of export controls applicable to any goods or technology, and (D) exports subject to multilateral controls in which the United States participates, including proposed revisions of any such multilateral controls. (US Congress, 1979, Sec. 5(h)(2)).

## **D. EXPORT CONTROL ENFORCEMENT**

### **1. Post-shipment Verifications**

Section 1213 of the National Defense Authorization Act of 1998 directed the Secretary of Commerce to conduct post-shipment verifications on high-performance computer exports. The multilateral Wassenaar Arrangement also requires the US to verify end-users and end-uses as a condition of membership in the export control regime (Initial Element V). The purposes of post-shipment verifications are to confirm the physical location of a computer and to verify that the exported item is being used as intended, yet several factors render post-shipment verifications ineffective: Commerce's reliance on exporters to provide the initial data necessary to conduct the inspections, Commerce inspectors' lack of knowledge about computers, inconsistencies with export enforcement laws and MTOPS thresholds, and non-cooperation from the Chinese government.

Exporters must provide post-shipment reports to Commerce and maintain export records pursuant to Sec. 743.12(b)(iv) of the EAR. Post-shipment reports are required for high-performance computers in excess of 190,000 MTOPS exported to Tier 3 countries (Sec. 743.12(b)(iv)(A)). The reports must include:

- exporter's name, address, and telephone number
- license number

- date of export
- end-user's name, address, telephone number, and point of contact
- carrier
- air waybill or bill of lading number (Sec. 743.12(b)(iv)(B))

The GAO has criticized the post-shipment verification process because "[e]xporters became responsible for determining whether exports required a license by screening end-users and end-uses for military or proliferation concerns" (1998a, p.10). In its study, the GAO identified three exporters that reported intermediate consignees (i.e., resellers and distributors) as end-users. One firm provided information on one intermediate consignee, even though representatives of the firm told the GAO that the firm used multiple resellers (1998a, p. 11). A second firm filed "end-use statements" from its resellers instead of information on the actual end-users, all the while noting that the end-use was for "resale" (1998a, p. 11). Moreover, a third firm contractually required its resellers to provide end-use statements from ultimate end-users, but the firm itself did not file information about the resellers (1998a, p. 11).

In addition to relying on exporters, the system utilizes agents who lack computer expertise to conduct post-shipment verifications. The Office of Export Enforcement in the BIS is in charge of post-shipment verifications and employs special agents located in major American cities, as well as in Moscow and Beijing. The export control attache in Beijing is a criminal investigator, responsible for conducting all end-use verifications in the PRC. During the verification process, the attache investigates:

- computer upgrades
- computer use and whether it is consistent with the purpose stated on the export license application
- remote access to the computer from an off-site location
- physical security and whether the level of security is consistent with the functions performed by the computer (e.g., if the computer is being used in a commercial setting but the level of security is overly strict, then this is an indication of misuse)
- activities of the end-user, including indicia of ownership, operations for military purposes, or involvement in the design, manufacture, storage, use or testing of nuclear, chemical, or biological weapons (US GAO, 1999b, pp. 6-7).



If a discrepancy is found, "Export Enforcement *may* investigate the inconsistency, depending on its seriousness" (italics added) (US GAO, 1999b, p. 7). According to computer experts at the Energy Department, it is easy to conceal how a computer is being used.

[Energy officials] believed that the U.S. government officials performing the verifications cannot make a determination on [computer use], partly because they have received no computer-specific training. Although it is possible to verify how [a high-performance computer] is being used through such actions as reviewing internal computer data, this would be costly and intrusive, and require experts' sophisticated computer analysis (US GAO, 1998a, p. 11).

Another limitation to post-shipment verifications is Commerce's inability to complete the legislatively-mandated verifications. The primary reason for this is that the MTOPS threshold is continuously being increased, but Export Enforcement must still conduct post-shipment verifications of computers at the old MTOPS levels (Garcia, 2002, p. 3).

A final concern is the Chinese government's reluctance to allow foreign governments to conduct post-shipment verifications in the PRC. Prior to 1998, the PRC strictly forbade US officials to conduct end-user checks. In June 1998, Commerce negotiated a memorandum of understanding with the Chinese Ministry of Foreign Trade and Economic Cooperation to allow limited end-user verifications by US officials; however, the provisions of the memorandum displayed extreme deference toward the PRC, which rendered the agreement ineffective at safeguarding national security. Specifically, requests from Commerce to verify end-users and end-uses are nonbinding upon the PRC (US GAO, 2000a, note 14). If the PRC agrees to an inspection, its government reserves the right to have Chinese representatives conduct it; also, US Embassy personnel are not allowed to attend unless invited by the Chinese government (US GAO, 2000a, note 14). Furthermore, scheduling of end-user verifications is at the discretion of the PRC, and after the computer has been in the country for six months, the US is forbidden to conduct a post-shipment verification (US GAO, 2000a, note 14).

Additionally, the effective date of the memorandum is not retroactive. Congress first required post-shipment verifications in the National Defense Authorization Act of 1998. The Act mandated post-shipment verifications beginning November 18, 1997, but the agreement with the PRC became effective in June 1998. Therefore, a window exists during which high-performance computers were exported to the PRC without verification of their stated recipient or use. Commerce believes it would be "futile to seek such visits" (US GAO, 2000a, pp. 14-5) and "would not be a good use of the Department's limited resources" (US GAO, 2000a, p. 15).

Moreover, between June 1998 and September 1999, Commerce was not able to conduct post-shipment verifications on 82 computers because the exports did not conform to the US-PRC arrangement (US GAO, 2000a, p. 15). The GAO identified a total of 700 outstanding cases for which post-shipment verifications have not been completed (2002b, pp. 7-8).

The GAO also found Commerce remiss in failing to incorporate the agreements reached in the US-PRC memorandum into the EAR until seven months later (2000a, p. 15). The memorandum was signed in June 1998, but Commerce did not require exporters to obtain a Chinese end-user certificate until February 1999 (US GAO, 1999a, p. 12).

## **2. Pre-license Checks**

The Office of Export Enforcement reviews specific license applications with national security risks. This pre-license check is included with Export Enforcement's licensing recommendation to the Office of Exporter Services. A basic assumption and requirement of the system that erodes its effectiveness is that exporters will self-police.

Under the law, exporters must refer to US export embargoes and government-generated lists of dangerous countries and end-users before exporting items abroad. These lists serve as legal notice to the exporter should an export transaction result in misconduct, regardless of the exporter actually reviewing the lists. The lists include: (1) Commerce's Country Chart, (2) Commerce's Table of Denial Orders, (3) Commerce's Unverified List, (4) Treasury's Office of Foreign Assets Control List of "Specially Designated Nationals," and (5) a multi-agency Entity List.

The Table of Denial Orders lists foreign importers who are barred from trading with the US because of past infractions under EAA79 or the EAR. Denial Orders prohibit the listed individual or business from participating in US export transactions for a certain number of years depending on the infraction. US exporters are required to review the Table of Denial Orders, which is updated daily in the Federal Register, prior to selling goods or technologies overseas. The basis of this list, however, has been questioned by the GAO. The GAO found that under the current system, Commerce does not have the intelligence resources to determine whether an applicant is serving as a front for terrorists or weapons proliferators (2001b, p. 8).

The Foreign Assets Control List of "Specially Designated Nationals" provides names of individuals and firms that are "designated nationals" of countries upon which the US has

imposed embargoes. As with the Table of Denial Orders, exporters are legally bound to continuously review the Foreign Assets Control List in the Federal Register.

The Unverified List contains names of foreign importers who purchased technologies for which the Commerce Department could not conduct a pre-license check or post-shipment verification. A license application to export to an importer whose name appears on the Unverified List raises a legal "red flag" under the EAR. If a transaction raises a "red flag," exporters have an affirmative duty to inquire, verify, or otherwise substantiate, to their satisfaction, that the proposed transaction does not involve a proliferation activity or violation of the EAR (US Commerce, 2002c, Part 732, Supp. No. 3). There are currently nine (out of a total of 11) firms on the Unverified List that originate in the PRC ("Unverified List," 2002), and updates to the list are published on a periodic basis in the Federal Register.

The Entity List is promulgated under the authority of the Enhanced Proliferation Control Initiative, a measure approved by the President in 1990 to curb the spread of nuclear, chemical, and biological weapons. The Entity List, which is updated daily, identifies specific end-users who present an unacceptable risk of diverting weapons of mass destruction. The Entity List is developed through an interagency process and is based on specific intelligence. There are currently 19 end-users from the PRC that appear on the list (US GAO, 2002c, in p. 4). As with the previous lists, exporters are legally bound to review the Entity List prior to applying for an export license.

### **3. Multilateral Agreements**

Multilateral agreements reinforce US export controls by limiting the number of suppliers from which rogue countries may purchase regulated goods and technologies. Unilateral export controls are effective in preventing the proliferation of dangerous exports when the US is the sole supplier, but in today's global market, countries of concern can turn to non-US sources for goods and technologies that the US is not willing to supply. For mass-market commodities such as computers, multilateral export controls are more effective. In EAA79, Congress directed the President to enter into multilateral arrangements in order to minimize export controls to a level that was acceptable and enforceable by all of the member countries. That goal changed in the 1985 amendments, in which Congress viewed export control regimes as a means of enforcing US foreign policy abroad. Today, the argument is more practical than political: export control laws are ineffective unless foreign suppliers conform to the same rules. US influence in multilateral

arrangements, however, is undermined by the inability of the US Congress to agree on a new export law.

In 1979, the US was a member of the Coordinating Committee for Multilateral Export Controls (CoCom). Established in 1949, CoCom included most of the North Atlantic Treaty Organization countries, in addition to Japan and Australia. CoCom's purpose was to prevent the spread of scarce and strategic resources to the former Soviet Union and its communist allies. Member states agreed to control, through their own domestic laws, goods and technologies that appeared on the regime's Munitions List and International Industrial List.

At the end of the Cold War and upon the recommendation of the US, CoCom members agreed to disband. Recognizing certain exports still posed a risk to regional and international security due to the proliferation of conventional weapons and dual-use technologies, the members established an interim multilateral arrangement called the "New Forum."

On December 19, 1995, New Forum members met in Wassenaar, the Netherlands and agreed on a new multilateral arrangement for the control of dual-use goods and munitions. The "Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies" was formed and still exists today. Wassenaar is comprised of 33 member states, including Japan, the Russian Federation, and other former Warsaw Pact countries. Wassenaar members periodically meet to review the regime's Munitions List and List of Dual-Use Goods and Technologies. US delegates to the arrangement are primarily drawn from the Commerce and State Departments, and Commerce's Office of Strategic Trade and Foreign Policy Controls incorporates agreements by member states into US law. According to the Initial Elements of the arrangement, Wassenaar members "will control all items set forth in the List of Dual-Use Goods and Technologies and in the Munitions List" (III. 1.), but actual implementation is based on "national discretion" (II. 3.). Thus, rather than "controlling" dangerous goods in the sense of regulation, Wassenaar members provide notice of transfers and denials to the other members (Initial Elements. II. 4.). In practice, when a member reports a denial of export, no member will approve a sale to the country that was denied the trade without first consulting the denying member (US Congress, 1999b, p. 10). Members also agree to share information on the risks involved in the transfer of arms and dual-use goods and technologies (Initial Elements. II. 2.).

Analysts criticize Wassenaar on a number of fronts. Agreements reached in Wassenaar require a consensus of member states, but critics argue this limits controls to levels that are only

acceptable to all of the member states (Fergusson, 2001, p. 9). Others observe that Wassenaar's reporting rules, which require members to notify the regime after a good or technology is exported, preclude member states from preventing the transfer or engaging in pre-export consultation with the exporting member (Fergusson, 2001, p. 9). Proponents of stricter export laws argue that a multilateral export control policy based on the policies of other nations negotiated by consensus is ineffectual in safeguarding US national security (Fergusson, 2001, p. 10). They also contend that strengthening Wassenaar cannot be realized if Washington itself is loosening export controls; they advocate an isolationist strategy where the US takes the lead and convinces the other members to follow (Fergusson, 2001, p. 10).

Besides Wassenaar, the US participates with Japan in a bilateral arrangement called the Supercomputer Regime. Its purpose is to control high-performance computer exports used for weapons of mass destruction and advanced conventional weapons. Japan and the US agree to notify one another before exporting a high-performance computer, and the arrangement calls for a set of conditions and safeguards that each country applies to exports. The arrangement, which was agreed upon in 1984 when the US and Japan were the only two suppliers of high-performance computers, has become less effective over the years as more foreign suppliers have entered the computer market. Poor coordination and the absence of a clear strategic purpose have also plagued the Supercomputer Regime, so Japan has asked to terminate the arrangement (Center for Strategic & International Studies, 2001, p. xvi).

Overarching these multilateral arrangements is the inability of Congress to agree on a replacement for EAA79. In the mid-1990s, US credibility was challenged when the US urged the former Soviet Union and other Warsaw Pact countries to adopt export control laws passed by their legislatures (US Senate, 1996, p. 2). The lack of US domestic consensus sent the wrong policy message to allies and undermined US leadership in the regimes (US Senate, 1996, p. 2).

#### **4. International Emergency Economic Powers Act (IEEPA) of 1977**

EAA79 expired in 1983, and Congress has not consistently continued the Act under public law. When this happens, the President has to intervene under the authority of the International Emergency Economic Powers Act of 1977 (IEEPA) and extend the law via Executive Order. Since 1983, the President has issued five Executive Orders<sup>12</sup> to extend

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<sup>12</sup> That is, Executive Orders 12470 (March 1984), 12525 (July 1985), 12867 (September 1990), 12924 (August 1994), and 13222 (August 2001).

EAA79. Extending EAA79 is necessary for the executive to legally continue its day-to-day export control functions, yet use of the IEEPA makes enforcement under the export control system vulnerable to challenge in court.

Litigants have questioned the propriety of using the IEEPA as a basis for search and seizure, arrest, and prosecution under EAA79 and the EAR. To avoid these claims and reinforce their police powers, enforcement agents at Commerce have had to obtain Special Deputy US Marshal status (US Senate, 1996, p. 2). In addition, because the IEEPA does not have a specific anti-boycott provision, respondents have argued that the BIS has no authority to implement and enforce the anti-boycott provisions in EAA79 and the EAR.

Commerce has also encountered difficulty in maintaining the privacy of export licensing documents because the IEEPA does not have a confidentiality provision similar to Section 12(c) of EAA79. In 2000, a Florida newspaper litigated for the disclosure of certain licensing records. Congress intervened and extended EAA79 under public law to avoid a disclosure judgment. Had the newspaper been successful, Commerce would have had to release proprietary business information and complete licensing files, the latter of which would have divulged the process used by Commerce for identifying dangerous end-users and end-uses (US Senate, 2002b, p. 3). If the IEEPA is found to be improper as a statutory basis for the prosecution and confidentiality of export licensing documents, the US may lose future enforcement challenges in court, and this prospect has been "a long-standing concern [of] federal enforcement officials" (US Senate, 2002b, pp. 3-4).

#### **5. Absence of a New Export Administration Act**

Congressional failure to enact a new Export Administration Act has meant that malfeasant exporters face nominal fines dating back to 1979. Criminal and administrative penalties appearing in the EAR cannot exceed the penalties established in EAA79. These penalties, originally enacted over two decades ago, have gradually become less of a deterrent due to inflation. "The longer we are under...the EAA of 1979," Commerce noted, "the more...companies will begin to think of the lower penalties merely as a cost of doing business...." (US Senate, 1996, p. 2).

#### **E. SUMMARY**

This chapter provides an analysis of US export control legislation, administration, and enforcement. An urgent need exists to rewrite EAA79, yet Congress has not been able to come

to a consensus due to overlapping and conflicting committee interests within and across the chambers. Attempts at streamlining committee rules have been met with staunch resistance from committees fearing losses in their jurisdictions. While Congress continues to debate rewriting EAA79, the executive, through the Commerce Department, has been able to adjust the impact of US export control laws on foreign countries, aligning US trade with White House foreign and security policy.

As long as Congress continues to disagree on replacing EAA79, export regulations will be difficult to enforce. Chinese obstinacy and claims to sovereignty further limit the government's ability to enforce US export controls, and disagreements at home undermine US leadership in multilateral arrangements.

## **V. US COMPUTER EXPORTS TO THE PEOPLE'S REPUBLIC OF CHINA (PRC)**

### **A. INTRODUCTION**

The US Constitution gives Congress the power to regulate commerce with foreign nations and to make all laws that are necessary and proper to carry out its powers (Art. I, Sec. 8). The Constitution also gives the President the power to enter into treaties with foreign countries (Art. II, Sec. 2). These provisions provide the constitutional basis for the Export Administration Act of 1979 (EAA79), which established the US export control system and serves the competing interests of national security and economic competitiveness.

Congress and the President, however, have not always agreed on US foreign policy, especially in regard to the PRC. The PRC's communist ideology and civil rights policy contrasts with those of the US. The PRC also has a formidable military, sells munitions and technologies to US enemies, and has stolen US military technology secrets.

The President uses export controls as a tool to promote US foreign policy abroad. In the late 1980s to early 1990s, President George Bush instituted a policy of qualified denial in regard to trade with the PRC. Under this policy, exports to PRC civilian end-users were left unfettered while exports to military end-users were restricted. Throughout most of the 1990s, President Bill Clinton sought to engage with the PRC in the hope that the PRC would adopt Western economics and civil rights. Export controls for high-performance computers were liberalized during this time, prompting Congress to enact legislation that limited the President's authority to control exports. President George W. Bush has shown a willingness to continue with the policy set under the Clinton Administration, and high-performance computer export controls continue to be loosened.

The PRC has implemented policies and strategies aimed at modernizing its military. To this end, the country has opened select regions and cities to trade with the US and other foreign countries. The PRC realizes that it is generations behind other industrial nations in terms of technology. To close this technology gap, the central government relies on technology transfers from foreign countries. The PRC has also used espionage to acquire information on US military technologies.

Multilateral export control regimes play a minor role in the export control process. Member nations implement multilateral agreements on a "national discretion" basis, and the US



has acted independently when regime policy conflicted with US policy. Moreover, the European Union has expressed a desire to remove high-performance computers from regime control lists.

## **B. THE PRC THREAT**

US relations with the PRC have been tenuous due to ideological differences between the two countries. The Chinese Communist Party (CCP) holds most of the senior government positions in the PRC, and ultimate authority rests with the CCP-dominated Politburo, particularly its seven-member Standing Committee. Over the years, the PRC has suppressed speech that advocated democratic reform and religions that contradicted communist ideology.

The PRC threatens US interests because it has provided assistance to terrorist-sponsoring states. The PRC is one of the leading countries in the world that supplies missile technologies and nuclear material to Iran, Iraq, Syria, Libya, North Korea, and Sudan (US-China Security Review Commission, 2002, Ch. 7, p. 1). Appendices A and B outline contributions the PRC has made to the technological advancement of these anti-US countries.

Buttressing the PRC's polar philosophy and rogue activities is a formidable military. The PRC has the largest military force in the world with 1.7 million troops. Moreover, it has the second largest national defense budget in the world (US-China Security Review Commission, 2002, Ch. 9, p. 1). The Defense Department estimates that the PRC's 2002 defense budget was \$65 billion<sup>13</sup> (US-China Commission, 2002, Ch. 9, p. 1). In the 1990s, PRC defense spending rose exponentially. Some analysts interpreted this dramatic increase as a desire on the PRC's part to simply modernize its military (Shambaugh, 2001, in Ch. 9, p. 7). Others viewed it as evidence of a hostile PRC military buildup (US-China Security Review Commission, 2002, Ch. 9, p. 7; US-China Security Review Commission, 2002, Ch. 10, p. 3). The US-China Security Review Commission views PRC defense spending as relatively moderate—the fiscal year 2002 US defense budget was \$329 billion by comparison— but warns that if the PRC used a modest part of its budget on a focused, regional target, US interests would be challenged (2002, Ch. 9, p. 7).

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<sup>13</sup> This is an approximation. While the PRC publishes an official defense budget, a significant portion of actual defense expenditures are paid from secret accounts, the PRC national budget, and other sources (US-China Commission, 2002, Ch. 9, p. 1)

The PRC's defense spending is linked to an ambitious military acquisition strategy. This strategy is aimed at accelerating the country into a position where it will be a formidable world force capable of undermining the advantages of the US military. The PRC's strategy includes:

- Research and development to improve the range, capabilities, and mobility of strategic missiles
- Acquisition of a next-generation fighter aircraft with aerial refueling capability
- Acquisition of a weapons system capable of sinking a US aircraft carrier
- Development of asymmetrical weapons to counter sophisticated US military technology (US-China Security Review Commission, 2002, Ch. 10, p. 2)

It is important, therefore, to ensure the PRC does not surpass the US in terms of technological hardware and expertise. Export controls limit the proliferation of high-performance computers to the PRC by curbing the country's ability to compete against the US in complex weapons system design. By keeping PRC technology several generations behind, the US is attempting to ensure its strategic lead and advantage in sophisticated weaponry.

### **C. PRC DEFENSE ACQUISITION STRATEGIES IN THE 1980'S**

In 1982, Chinese Premier Deng Xiaoping announced a policy to guide PRC defense acquisitions in science and technology. Called the "16-Character Policy," this strategy focused on the development of commercial technologies that would be converted or "spun off" into defense applications. The 16-Character Policy promoted:

- Integrating the military with the civilian (*Junmin jiehe*)
- Giving priority to weaponry (*Pingzhan jiehe*)
- Combining peace and war (*Junpin youxian*)
- Allowing civilian production to support military production (*Yimin yangjun*) (US-China Security Review Commission, 2002, Ch. 10, note 1)<sup>14</sup>

In practice, this policy resulted in: (1) quantity over quality, (2) vertical hierarchies with highly redundant mass-production systems, (3) self-reliance, (4) scarcity of communication and know-how, (5) political—as opposed to technical—goals and quotas, and (5) a lack of incentives for technological innovation (Gill, 1998, in p. 37).

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<sup>14</sup> Another interpretation of *junpin youxian* and *yimin yangjun* is "make goods for civilian use, and use the profits thus generated to maintain the military" (US Commerce, 1998a, p. 37).

To facilitate the spin-off effort, the PRC government established a managing agency to oversee acquisitions and altered official science and technology and economic policies. The managing agency was the Commission on Science, Technology, and Industry for National Defense. Among the various tasks performed by the Commission, its most important was to assist in the transfer, development, production, and marketing of civilian technologies for military use.

The science and technology policy was known as "Anchor at One End and Let the Other End be Free"—a policy that continues to this day. To encourage economic growth in the PRC, the state (or "anchor") administers and provides partial funding for research and development related to the country's industrial and commercial (or "free") sectors (US Commerce Department, 1998a, p. 6). Two industrial programs were established under this policy. The first, the "863 Project," promotes research in industrial high-technology. The companion project to the 863 Project is the "Torch Program," the mission of which is to develop industrial applications for the technologies created in the 863 Project. Research for these projects is partially funded by the central government and doled out on a competitive basis. The rest of the funding comes from foreign investment in the form of joint ventures, joint research, technology transfers, and technology exports (US Commerce, 1998a).

In 1984, the CCP opened select areas along China's eastern coastline for foreign trade of and investment in technology. The areas were designated as "Open Port Cities," with market-oriented import and investment policies. The following year, the central government redesignated these areas as "Economic and Trade Development Zones" with the predominance of trade centering on computers and electronics. Today, there are 12 official and at least 200 unofficial Economic and Trade Development Zones, each of which operates under separate regulations and incentives for foreign investment (US Commerce Department, 1998a, p. 23).

The Coordinating Committee for Multilateral Exports (CoCom) reacted favorably to the PRC's openness. In 1981, CoCom members voted to give the PRC access to higher-performing technology over the Soviet Union. Under the so-called "Green Line Policy," the PRC was given preferential treatment in regard to 27 categories of controlled goods and technologies. Over the years, PRC preferential treatment expanded, covering higher-performing technologies and more categories of exports, until the massacre in Tienanmen Square on June 4, 1989. After

Tiananmen, CoCom cancelled all further planned liberalizations; however, preferential benefits, up until then were left in place (US Congress, 1999a, p. 37).

Simultaneously, the People's Liberation Army (PLA) shifted to a more focused military strategy. Prior to 1985, the PRC was poised to fight a major land-based war with numerically superior forces, but after 1985, PLA doctrine changed, focusing on fighting smaller, regional wars with technologically advanced forces. Today, the new doctrine, called "Local War Under High-Tech Conditions," remains PLA doctrine.

In sum, the CCP embarked on a course of modernization and openness that was part of an overall strategy to strengthen its military forces. This was confirmed in 1998 by a Commerce Department study which found, "Although China's indigenous R&D programs have resulted in some notable past achievements in the military sector (e.g., nuclear weapons and space launch vehicles), overall they seem to have only marginally benefited China's industrial sector. For example, approximately five percent of about 30,000 Chinese patents annually prior to 1995 were actually developed into products" (US Commerce, 1999a, p. 9). US allies, in the form of CoCom, supported the PRC in its transition toward an open market economy, indirectly assisting the PRC to meet its military objectives.

#### **D. 1989 – 1993: THE BUSH ADMINISTRATION AND QUALIFIED DENIAL**

Immediately after Tiananmen Square, the US Congress enacted hard-line sanctions against the PRC satellite industry. In the Appropriations Act for fiscal year 1990, Congress directed President George Bush not to renew or approve licenses that related to the launch of US satellites on PRC rockets. This mandate was waivable if: (1) the President made a favorable report to Congress on the PRC's political and human rights reforms, or (2) the President deemed it was contrary to national interest (Sec. 610). On December 19, 1989, President Bush submitted "national interest" waivers to Congress for three commercial satellites built by Hughes Aircraft: the Aussat-1, Aussat-2, and Asiasat (US Congress, 1999b, p. 39)

In addition, the Appropriations Act required the President to negotiate with CoCom members for a period of six months to suspend further preferential benefits to the PRC, especially bulk licenses and increased performance levels for high-technology exports (Sec. 610(d)(6)). The Act did not affect applications for dual-use goods and technologies to PRC civilian end-users (US Congress, 1999b, p. 37). While President Bush approved of the sanctions

in the beginning, he vetoed extending the Act another six months in the Foreign Relations Authorization Act for fiscal years 1990 and 1991.

In June 1990, CoCom voted to end PRC preferential entitlements. Members agreed to significantly reduce, and in some cases, eliminate all preferential treatment (US Congress, 1999b, p. 37). CoCom members also agreed not to afford the Chinese any further liberalizations under the Green Line Policy.

In May 1991, the State Department's Bureau of Political-Military Affairs announced sanctions against the China Great Wall Industry Corporation and the China Precision Machinery Import-Export Corporation for the transfer of M-11 short-range ballistic missiles and computer technology to a Pakistani firm (US Congress, 1999b, pp. 42-3). In effect for two years, the sanctions denied export licenses for high-performance computers, commercial satellites, and missile technology for both firms (US Congress, 1999b, p. 42). The sanctions also prohibited the US government from entering into contracts with the PRC for these technologies (US Congress, 1999b, p. 43). In the following month, President Bush limited the export of high-performance computers to the PRC to 41 millions of theoretical operations per second (MTOPS) (US Congress, 1999b, p. 51). On March 23, 1992, the President lifted these sanctions after the PRC agreed to end missile technology trade with Pakistan (US Congress, 1999b, p. 43).

While Congress maintained a hard line with the PRC, the White House advocated more open trade between CoCom members. Prompted by the fall of the Berlin Wall in 1989, President Bush suggested, in May 1990, that CoCom reduce its Industrial List to include only essential technologies. In the following month, CoCom accepted the "Core List" (also called the "List of Dual-Use Goods and Technologies") which eliminated 30 items from the Industrial List and partially decontrolled 12 more (US Congress, 1999b, p. 7).

In the 1990s, the PRC shifted from acquiring commercial technologies for defense uses ("spin-off" technology) and focused on acquiring specially-made military technologies ("spin-on" technology), particularly advanced electronics and information technologies. Experts believe this change in policy was brought about by the Gulf War and the lessons that emerged about the importance of coordination through the use of sophisticated technologies (US Commerce, 1998a, p. 38). The PRC's spin-off policy is characterized by:

- a modern industrial base modeled after the Western/US system
- investment in China's urban and coastal areas

- emphasis on research and development and quality over quantity
- sharing of expertise and knowledge across the PRC defense industrial base
- self-reliance with purchases from foreign suppliers to fill gaps
- more realistic technological goals
- profit-making incentives for technological innovation (US Commerce, 1998a, p. 38)

Because PRC technology is generations behind those of other industrial nations, the success of its spin-off policy has depended on foreign acquisitions. A Commerce Department study concluded,

Domestic military or defense-related R&D [is] necessarily...accompanied by acquisition of foreign technologies as part of the defense conversion and modernization efforts. Accordingly, China's defense industry has cooperated extensively with foreign partners in developing products for civilian use. By 1994, over 300 Sino-foreign joint ventures had been established with Chinese defense industrial institutions or corporations (1998a, p. 38).

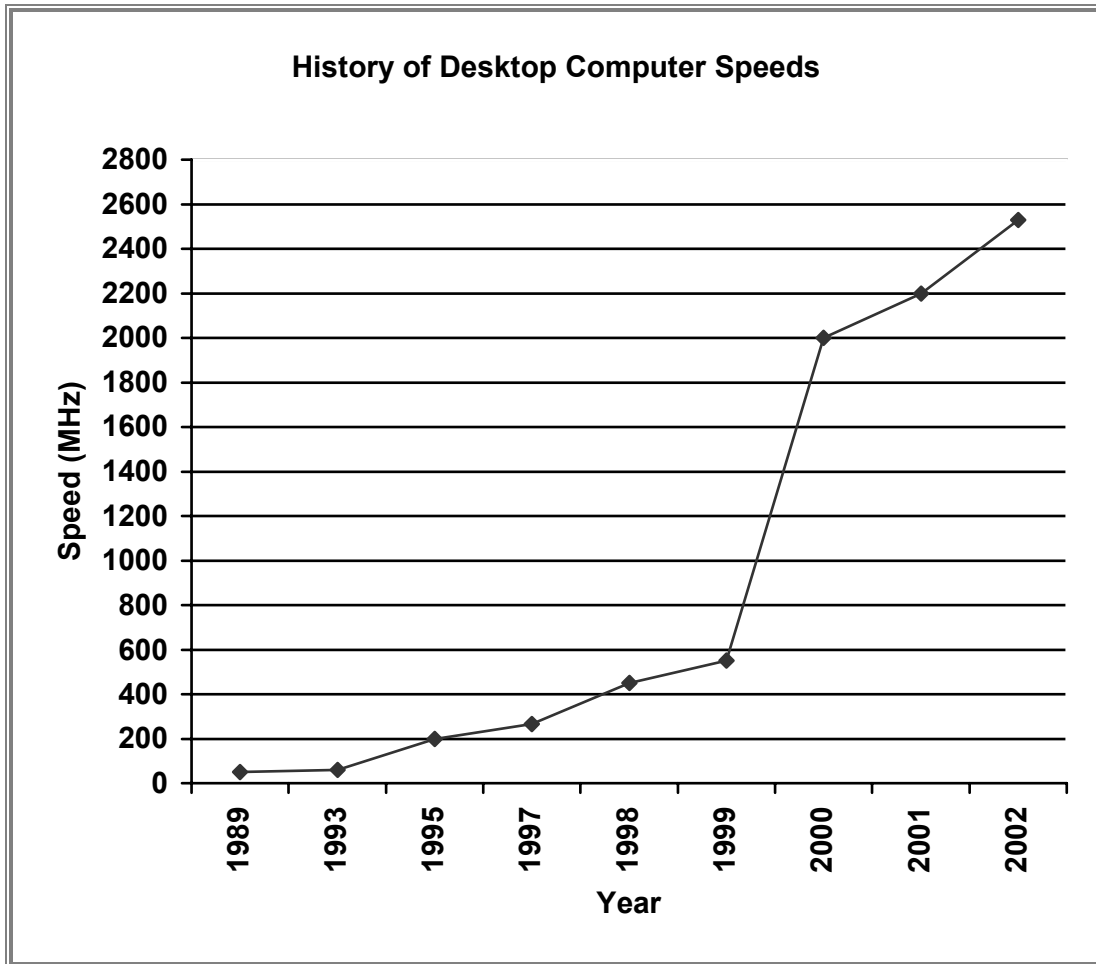
In 1992, the PRC central government introduced a third economic model, "Free Trade Zones," in certain urban areas that were previously Economic and Trade Development Zones. The central government encouraged trade in these zones by allowing foreign manufacturers to export to these zones duty-free provided the exports were not resold in the PRC (US Commerce, 1998a, p. 23).

US export policy under the Bush Administration was one of qualified denial. While military and defense exports were curbed, civilian exports to the PRC were exempt from sanctions. Unlike the White House, Congress was not ready to lift sanctions against the PRC as evidenced in the proposed Foreign Relations Authorization Act for fiscal years 1990 and 1991. Moreover, multilateral export controls were loosened under the Bush Administration in reaction to the fall of Communism in Eastern Europe. All the while, the PRC continued opening regions in China to foreign trade alongside its movement toward modernizing the country's military.

#### **E. 1993 – 2001: THE CLINTON ADMINISTRATION, ENGAGEMENT, AND EXPORT LIBERALIZATION**

From 1993 through 2001, the Clinton administration arduously negotiated engagement with Beijing. The theory was that, if the PRC was engaged with the West, the PRC would be exposed to free and open markets and democracy, be exposed to these benefits, and hopefully adopt them. During this time, MTOPS controls were relaxed for high-performance computer

exports. The changes in MTOPS not only pleased US computer manufacturers, but they were used by President Clinton as a tool of engagement with the PRC. Similarly, the increases in MTOPS under the Clinton Administration came at a time when great strides were being made in the development of desktop computers (see Figure 2).



**Figure 2.** (Sources: After "Moore's Law," 2002, p. 1; Hyde, 2002, p. 1; Barnett, 2002a, p. 1; Barnett, 2002b, p. 2; Barnett, 2002c, p. 3; "Microprocessor History and Information," 2002, p. 1; Computer Consulting Ltd., 2002, p. 1; Polsson, 2002, p. 1)

### **1. Trade Promotion Coordinating Committee (TPCC) Reform**

In the Export Enhancement Act of 1992, Congress created the Trade Promotion Coordinating Committee (TPCC) to "coordinate the export promotion and export financing activities of the U.S. government" (Sec. 2312). With such an ambiguous purpose, then-Secretary of Commerce Ronald H. Brown took the opportunity to have the TPCC review US export control

regulations (US Congress, 1999b, p. 46). The TPCC's first report, issued on September 29, 1993, quoted President Clinton as saying,

[F]or some time the United States has imposed stringent export controls on many of our most competitive exports.... One reason I ran for President was to tailor export controls to the realities of a post-Cold War world. Let me be clear. We will continue to need strong controls to combat the growing threat of proliferation of weapons of mass destruction and dangerous conventional weapons as well as to send a strong signal to countries that support international terrorism. But we also need to make long overdue reforms to ensure that we do not unfairly and unnecessarily burden our important commercial interests (US Commerce, 1993, in p. 46).

President Clinton emphasized a similar message to computer industry leaders. A few days before, President Clinton wrote to industry leaders who had attended a White House luncheon regarding export controls. In his letter to Edward McCracken, Chief Executive Officer of Silicon Graphics, President Clinton noted,

As a part of [the TPCC] process, the National Security Council has led an effort to develop specific export controls reforms.... I am optimistic that the steps we take will help liberalize controls on many of our most competitive exports, while protecting important national security concerns.... I am also engaged in seeking major reforms to COCOM, which should lead to significant liberalization of controls on computers... (1993, in p. 51).

The TPCC report also stated that the Clinton Administration was planning to propose an increase in MTOPS safeguards from 12.5 to 500 MTOPS (US Commerce, 1998b, in p. 51). The TPCC made "numerous consultations with exporters" (US Commerce Department, 1993, in p. 46) before writing the report, but no mention was made of the defense and intelligence communities being consulted (US Congress, 1999b, p. 46). In January 1994, CoCom members agreed to increase thresholds to 260 MTOPS (US Commerce, 1998b, p. 52). In addition, the report explained that the President would propose changing the definition of a "supercomputer" in the US-Japan Supercomputer Regime from 195 to 2,000 MTOPS and update the safeguard requirements for high-performance computers (US Commerce, 1998b, in p. 51). Japan, however, only agreed to a 1,500 MTOPS increase (US Commerce, 1998b, p. 52), and in February 1994, MTOPS thresholds under US export regulations were increased to 1,500 MTOPS (see Appendix C).

Shortly after the TPCC's report was presented to Congress, the US submitted a proposal to CoCom to dissolve the arrangement and create a new post-Cold War regime aimed at halting trade with rogue countries. One day before the dissolution of CoCom, the Clinton



Administration announced it would be lifting the licensing requirement for high-performance computers operating at 1,000 MTOPS to civilian end-users in the former CoCom-controlled countries (US Commerce, 1998b, p. 52). The license waiver would only apply to computers for civilian end-users but would include exports to the PRC, the former Soviet Union, and the former Warsaw Pact countries. The Administration justified the unilateral increase as being consistent with national security because licenses would still be required for "high-end" and military computers (White House Press Secretary, 1994, in p. 52)

CoCom members concurred with the US proposal and refocused their multilateral strategy against rogue countries. To this end, the new Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies agreed to prevent the proliferation of conventional weapons to Iran, Iraq, North Korea, and Libya and to increase multilateral coordination on technology exports to countries of concern (US Congress, 1999b, p. 8). However, this multilateral alignment with US policy was eroded by the regime's resolution to employ agreements reached in Wassenaar only on the basis of "national discretion." In addition, there was no written agreement between Wassenaar members to restrict trade to Iran, Iraq, North Korea, and Libya (US Congress, 1999b, p. 9).

In 1994, PRC Lieutenant General Li Jijun, Vice President of the Academy of Military Science, observed that Operation Desert Storm had exposed many weaknesses in the US military. In particular, US reliance on "high-tech equipment was intensive and its key links were rather weak" (US-China Security Review Commission, 2002, Ch. 1, p. 5).

A year later, the PRC central government established a fourth type of open market in China, "High-Technology Development Zones," which still exist today. Organizations in these zones research commercial applications for high-technology. High-Technology Development Zones encompass whole provinces, cities, and sections of urban areas where high-technology research and industry are located. The zones are established in 53 (out of 56) of China's inner provinces, and many more unofficial zones exist (US Commerce, 1998a, p. 23). Pursuant to PRC regulations, each zone has a "three-in-one system," consisting of a university-based research center, an innovation center to provide applied technology for product development, and partnerships with commercial firms for manufacturing and marketing (US Commerce, 1998a, p. 24). In addition, foreign investors are given preferential treatment to encourage investment in these zones (US Commerce, 1998a, p. 24).

In April 1995, Secretary of Commerce Brown announced that the TPCC had completed an "overhaul" of export regulations that would "cut costs and red tape for American businesses, spur economic growth and speed job creation in the nation" (1995, in p. 265).

## **2. Stanford University Report on High-Performance Computers and Sweeping Changes in US Export Regulations**

Citing the need to balance national security and nonproliferation concerns with the recent developments in computer technology, President Clinton announced further increases to MTOPS thresholds in October 1995 (US Congress, 1999b, p. 52). The new policy, noted the President, would be forward-looking by 18 to 24 months to accommodate the rapid increases in computer technology (US Congress, 1999b, p. 52). Borrowing language from the EAA79, then-Under Secretary of Commerce William Reinsch explained that the 18 to 24 month lead time was a form of "forward-looking foreign availability" (US Congress, 1999b, p. 54) based on Moore's Law.

In November 1995, the Center for International Security and Arms Control at Stanford University released a controversial report commissioned by the Commerce and Defense Departments. Entitled, Building on the Basics: An Examination of High-Performance Computing Export Control Policy in the 1990's, the 221-page report concluded: (1) there was a proliferation of US-manufactured computers operating between 4,000 and 5,000 MTOPS around the world, and this proliferation was uncontrollable; (2) by 1997, computers operating at 7,000 MTOPS would be widely available; (3) many US national security programs use computers operating at 7,000 MTOPS; and (4) controlling computers at 7,000 MTOPS would be cost-prohibitive for government and industry (US General Accounting Office (GAO), 1998b, p. 2).

Based on the Stanford study, the Commerce Department, on January 25, 1996, made sweeping changes to the Export Administration Regulations (EAR). In announcing these changes, Commerce stated that "one goal of the revised export controls was to permit the government to tailor control levels and licensing conditions to the national security or proliferation risk posed by a specific destination (US GAO, 1998b, p. 3; US GAO, 1998c, p. 2). The executive branch assessed countries-of-destination based on:

- evidence of development of weapons of mass destruction and weapons-delivery systems
- membership in multilateral export control regimes and adherence to multilateral export control agreements

- an effective export control system, including regular assessments of the threat of diversion and vigorous enforcement
- overall relations with the US
- record of United Nations' sanctions
- past licensing history (US GAO, 1998c, p.7)

Accordingly, countries-of-destination were categorized under one of four tiers of Computer Country Groups in the EAR. Tier 1 countries were considered benign, Tier 2 and 3 countries were countries of concern, and Tier 4 countries were rogue. In 1996, controls placed on the Computer Country Groups were as follows:

- *Tier 1.* US exporters were allowed to export high-performance computers without a license to these countries, which included Western Europe and Japan. For exports operating at 2,000 MTOPS and above, exporters were required to retain records and submit certain information to the Commerce Department regarding the sale.
- *Tier 2.* Exporters were authorized to ship high-performance computers up to 10,000 MTOPS to Tier 2 countries. Tier 2 countries, which included Africa, Hong Kong, Latin America, and Central and Eastern Europe, had mixed proliferation histories. Exporters were directed to retain records for exports above 2,000 MTOPS and to submit certain information to the Commerce Department.
- *Tier 3.* These countries posed proliferation, diversion, or other security risks and included the PRC, Russia, India, and Pakistan. US manufacturers could export computers up to 7,000 MTOPS to civilian end-users and up to 2,000 MTOPS to military end-users without a license. As with exports to Tiers 1 and 2, records for computer exports over 2,000 MTOPS were required to be kept on-hand.
- *Tier 4.* A license was required to export any computer, regardless of MTOPS capabilities, to Tier 4 terrorist countries. These countries included Cuba, Iran, Iraq, Libya, and North Korea. Computer exports of 6 MTOPS and above to Syria and Sudan were permitted with licenses from Commerce. (US Congress, 1999b, pp. 53-4).

In February 1996, a satellite sold by US-manufacturer Hughes Space and Communications International, Inc. to the PRC exploded in an attempted launch. Hughes

determined that, in order to fix the problem and have a successful launch, the firm had to transfer satellite technology data that went beyond the parameters of the export license approved by the State Department. Rather than seek authorization from State which had originally issued the license, Hughes went to Commerce for approval. Commerce issued the license, which was later determined to be improper (US Congress, 1999a, Vol. II, Chap. 5, p. 3). In reaction to the Hughes incident, President Clinton approved a change to National Security Guidelines that required Commerce to consult with State and Defense for classification requests involving military-related items (Clinton, 1996).

In that same year, the PRC announced a plan to implement "national treatment" of foreign-investment enterprises in China (US Commerce, 1998a, p. 34). The "Ninth Five-Year Plan" called for phasing out foreign investment in the coastal regions of China and increasing investment in the central and western regions where, during the PRC's alliance with the Soviet Union, much of the country's heavy industrial sector was built (US Commerce, 1998a, p. 24). The plan was supposed to take place over five years. In late 1997, however, it became apparent that foreign firms were pulling their investments from the country instead of shifting to the inner-regions. To stop the hemorrhaging of resources, Premier Zhu Rongji established tariff waivers for high-technology investments and investments in excess of \$30 million (US Commerce, 1998a, p. 24).

### **3. Reaction from Congress**

Congress found that the Stanford study inadequately justified President Clinton's sweeping changes to the EAR. To minimize their effect, Congress included provisions in the National Defense Authorization Act of 1998 (NDAA 1998) aimed at forcing more communication between the President and Congress and between the Departments and agencies.

With NDAA 1998, Congress required exporters to provide notice to the Commerce Department for exports to civilian end-users in the PRC up to 7,000 MTOPS (Sec. 1211). Commerce was directed to notify the State, Defense, and Energy Departments and the Arms Control and Disarmament Agency within 24 hours of receipt of notice from the exporter (Sec. 1211). The Departments and Agency had nine days to object in writing, otherwise Commerce was authorized to process the license (Sec. 1211). The Act also required the President to submit a justification report to Congress prior to raising MTOPS levels for Tier 3 countries. The report had to address: (1) the wide availability of high-performance computers from other countries, (2)

all potential military applications of high-performance computers at the new thresholds, and (3) the impact of such uses on US national security (US GAO 2000b, p. 15). Increases took effect six months after the submission of the report (Sec. 1211). The Act also required post-shipment verifications on all high-performance computer exports to Tier 3 countries. Moreover, if the President moved a country out of Tier 3, the President had to first inform Congress, at which time Congress had four months to deliberate the President's decision before the change took effect.

Moreover, Congress in NDAA 1998 directed the Defense and Energy Departments to study the national security implications of selling high-performance computers to Tier 3 countries.<sup>15</sup> The Energy Department found that "the acquisition and application of [high-performance computers] to nuclear weapons development would have the greatest potential impact on the Chinese nuclear program—particularly in the event of a ban on all nuclear weapons testing" (1998a, in p. 4), and that a high-performance computer operating at 10,000 MTOPS or greater would be of significant utility to the PRC in examining likely gaps in the country's nuclear weapons program (1998b, in p. 14).

#### **4. The Cox Report and Chinese Espionage**

The Hughes incident in 1996 prompted an investigation by Republicans in the House of Representatives of the unauthorized transfer of military technologies, including high-performance computers, to the PRC. A Select Committee, chaired by Rep. Christopher Cox, R-Calif., was established to lead the investigation. In January 1999, the Select Committee produced a now-famous report: the Cox Report.

Originally classified, the Cox Report was made available to the public in May 1999. The declassified version confirmed that, since the late 1970s, the PRC used a network of spies, front companies, and visitors to the US to obtain nuclear secrets (US Congress, 1999b, Introduction, pp. 23-5) and that Chinese espionage "almost certainly" continues today (US Congress, 1999a, p. 1252). Moreover, the committee found that the PRC had obtained 600 high-performance computers manufactured in the US and possibly used them to process stolen US thermonuclear warhead designs (US Congress, 1999d, in p. A2).

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<sup>15</sup> As of the release of the GAO's report, the Defense Department had not yet completed its report (US GAO, 1998c, p.4)

The media seized the opportunity to report on more findings of Chinese espionage. On March 6, 1998, The New York Times published an article alleging that Chinese spies stole secrets from the Los Alamos National Laboratory in New Mexico in the mid-1980s (Pomper, 1999a, p. 626). It was believed that the information helped the PRC develop smaller nuclear weapons so that a single missile could carry several warheads aimed at different targets (Pomper, 1999a, p. 626). Two days later, Secretary of Energy Bill Richardson announced that Dr. Wen Ho Lee, a Chinese-American scientist working at Los Alamos, was fired for allegedly transferring large amounts of computer code detailing the workings of US warheads to an unsecure computer (Pomper, 1999a, p. 627).

The reaction of Congress, even before the report was released, was to turn the debate into a partisan issue. The Republican-dominated House accused the Democratic administration of stalling the release of the sensitive 1,016-plus-page, three-volume report (McCutcheon, 1999a, pp. 152-3). Rep. Cox, who was negotiating the release of the report, commented that the Administration's initial proposal was "'vastly overbroad'" about what should be kept classified (1999, in p.4). House Republicans also attempted to connect the espionage findings with PRC contributions to the Democratic Party (Pomper & McCutcheon, 1999a, p. 29). Later, Republicans called for the resignation of National Security Advisor and Clinton-appointed Samuel R. Berger (Pomper, 1999a, p. 626). In the Senate, Armed Services Chairman John W. Warner, R-Va., held a special committee hearing to receive testimony from current and former Energy Department employees about the Clinton Administration's handling of the Los Alamos spy case (McCutcheon, 1999b, p. 911). These efforts, however, were stymied by the fact that the security breaches began prior to the Clinton administration and during two Republican administrations.

PRC officials denounced the findings of the Special Committee, calling them an attempt to demonize the PRC (McCutcheon, 1999e, p. 1253). Chinese Premier Zhu Rongji responded, "I have no knowledge whatsoever of any allegation of espionage or the theft of nuclear technology.... And I don't believe such a story.... It is not the policy of China to steal so-called 'military secrets' from the United States" (1999, in p. 911).

US manufacturers worried that the government would clamp down on trade with the PRC as a result of the Cox Report. Rep. Fred Upton, R-Mich., remarked, "We haven't gotten a lot of comments on the Cox report.... But I have heard from a number of businesses.... They've

clearly turned up the heat" (1999, in p. 1340). Rep. Matt Salmon, R-Ariz., a conservative member of the House International Relations Committee, commented, "Sometimes, I go to town hall meetings, and someone will stand up and call me a traitor [for supporting trade with China].... If I ask where they work, occasionally they'll say Motorola or Intel [both of which have five campuses in Arizona], and I wonder how come they don't know about the importance of this.... It's a lot easier to defend politically an anti-China posture right now, but I think it's the chicken way out" (1999, in p. 1341). One computer lobbyist noted, "There's a collective holding of the breath" among members of the computer industry (McCutcheon, 1999e, p. 1252). Two weeks after the report was released, computer manufacturers embarked on a two-day lobbying effort in Congress to ensure that export controls would not be affected by the Cox Report (Loeb & Morgan, 1999, p. A2).

The computer lobby's efforts were successful. Rather than restrict exports to the PRC, Congress sought other ways to respond. House Democrats wanted to amend the fiscal year 2000 Defense Authorization Bill (H.R. 1401) to include provisions for upgraded security at nuclear weapons labs (McCutcheon, 1999e, p. 1253). Some Republicans, including Armed Services Committee Chair Floyd D. Spence, R-SC, proposed that the Defense Department assume control over all Energy Department national security programs, weapons production sites, and national laboratories (McCutcheon, 1999e, p. 1253). To provide oversight into Energy security matters, Sen. Jon Kyl, R-Ariz., provided an amendment to the National Defense Authorization Act of 2000 establishing the National Nuclear Security Administration, an agency that has a direct link to the Secretary of Energy on nuclear security issues (Public Law 106-65, Sec. 3202(3)).

Once eager to release his committee's report, Rep. Cox softened from his earlier position. He stated that he supported computer exports to Chinese civilian end-users up to 10,000 MTOPS without a license because such sales were permitted to Hong Kong, a territory of the PRC; however, he advocated keeping controls the same for Chinese military end-users (Loeb & Morgan, 1999, p. A2). Sen. Bob Kerrey, D-Neb., tellingly observed, "China is a threat, but China's not as big a threat as the Soviet Union was during the Cold War.... This is not a nation that is hunkered down, preparing to go to war with us" (1999b, in p. 1004).

##### **5. The PRC's Accession into the World Trade Organization (WTO)**

While Congress debated how to protect against Chinese espionage, President Clinton was engaged in negotiations with Chinese Premier Zhu Rongji over the PRC's accession into the

WTO. The PRC's efforts to join the WTO were hampered by US refusal to restore "permanent normal trade status," which the US revoked after Tienanmen Square. WTO rules required all member nations to agree to grant normal trade status to new members. The US was the last country to hold out on the PRC's accession.

The PRC's entrance into the WTO was part of a larger policy by President Clinton to engage the PRC and expose the country to Western markets and rules. Commenting on his support of the PRC, President Clinton said, "This is not a favor to China, but a means of opening and reforming China's markets and holding China to the rules of the global trading system—developments that will benefit America" (McCutcheon, 1999f, June 5, p. 1340). On November 15, 1999, the US agreed to support the PRC's entry into the WTO in exchange for lower trade barriers for American exports ("Legislative Summary," 1999, p. 2893).

Many conservatives in Congress agreed with the President. Sen. Charles E. Grassley, R-Iowa, the Chair of the Senate Finance Committee's International Trade Subcommittee, was "pleasantly surprised" to find many conservative senators willing to support trade with the PRC (1999, in p. 1342). Robert Kagan, a contributing editor at the conservative magazine Weekly Standard and a senior associate of the Carnegie Endowment for International Peace, observed, "Republicans want to make a growing issue out of China, which is a hot opportunity...but they also want the continued support of American business" (1999, in p. 1006).

Moreover, the American people seemed to agree. In a CNN/Time poll from May 26 to 27, 1999 pollsters—two to one—favored encouraging trade with the PRC (McCutcheon, 1999f, p. 1342).

## **6. Congress Advocates Increases and the Executive Automatically Reviews MTOPS Thresholds**

Urging him to increase MTOPS levels, members of Congress wrote to President Clinton in June 1999. Among the 79 legislators who wrote the President were House Majority Whip and long-time skeptic of Beijing, Rep. Tom DeLay, R-Tex., and House Minority Whip David Bonior, D-Mich. Of concern to the lawmakers was the inability of American industry to compete against foreign manufacturers (Davis & Cooper, 1999, p. A24).

On July 1, 1999, the Clinton Administration announced the first in a series of increases in MTOPS controls to Tier 3 countries. The Administration determined that controlling MTOPS at the 1996 levels (cf. Appendix C) was becoming more difficult because of the widespread commercial availability of faster high-performance computers (Federal Register, 1999, p.



42010). Moreover, the Commerce Department identified 28 foreign manufacturers located in countries that were not members of Wassenaar and therefore, not constrained by the agreements of the Arrangement (Reinsch, 1999, p. 3). Accordingly, the Administration announced increases in controls for Tiers 2 and 3 as illustrated in Appendix C. Tier 2 controls were raised from 10,000 to 20,000 MTOPS. Controls for Tier 3 countries were raised from 7,000 to 12,300 MTOPS for civilian end-users, while controls for military-users were raised from 2,000 to 6,500 MTOPS. The Administration also expressed a desire to work with Congress in reducing the NDAA 1998 mandatory waiting period for MTOPS increases from six months to one (Clinton, 1999, p. 1).

In House Armed Services testimony, former Under Secretary of Commerce William A. Reinsch stated that Commerce's position and recommendation to the President was that computers had military applications at all levels (1999, p. 4). Under Secretary Reinsch also agreed with the growing opinion that MTOPS was a less effective national security safeguard compared to capabilities such as software design, access to sophisticated manufacturing, experience, and test data (1999, p. 4).

The President's increases, however, exceeded then-current MTOPS levels. The first increase raised threshold levels from 2,000 to 6,500 MTOPS for Tier 3 military end-users. However, in the printed "Fact Sheet" accompanying the President's announcement, the White House noted that US computer manufacturers were planning sales of high-performance computers rated at only 5,000 MTOPS—1,600 less than the revised level—by late 2000 (Office of the Press Secretary, 2000, p. 1). The President also directed the departments to assess the benefits of a dual system for military and civilian end-users (Office of the Press Secretary, 2000, p.1). In addition, the President mandated that the Commerce Department review all control levels by April 2000 to determine if other changes were warranted (Office of the Press Secretary, 2000, p. 1).

On February 1, 2000, the President again increased MTOPS thresholds, this time nearly doubling the previous increases. MTOPS controls to Tier 3 countries were raised from 6,500 to 12,500 for military end-users and from 12,300 to 20,000 for civilian end-users. The President explained, "This decision reflects my commitment to a control system that will enhance U.S. national security by implementing controls on computer exports that are effective and enforceable" (Clinton, 2000, p. 1).

Finally, the August 30, 2000 increase (cf. Appendix C) was not fully analyzed before it was announced. MTOPI levels to Tier 3 countries were raised from 20,000 to 28,000, and the distinction between civilian and military end-users was eliminated. In the President's justification report to Congress, the executive made the general argument that most countries lack the expertise to effectively use high-performance computers (US GAO, 2000b, p. 18) rather than providing specific information about the national security impact of raising MTOPI levels to 28,000 as required by NDAA 1998. Moreover, the executive admitted that the PRC had demonstrated that it had the expertise to use high-performance computers for the development of submarines, advance aircraft, and composite war materials (US GAO, 2000b, p. 19). This report based the decision to increase threshold controls on data provided by industry (US GAO, 2000b, pp. 14-15). The Defense Threat Reduction Agency was responsible for this section of the report, but the agency did not have the resources to conduct a more current review, so it lifted information previously submitted in a 1998 report (US GAO, 2000b, p. 17). Furthermore, in 2000, the agency only reported 22 out of 172 military applications that were reported in 1998 (US GAO, 2000b, p. 18). When the new threshold levels became effective, however, the fastest computer that was widely available was operating at 4,000 MTOPI. By the Fall of 2000, computing levels had increased to 6,100 MTOPI, and by early 2001, they had leaped to 26,000 MTOPI. Therefore, the Tier 3 28,000 MTOPI controls were vastly higher than what was occurring in the market (US GAO, 2000b pp. 16-17).

At the same time the US was increasing MTOPI controls to countries of concern, Chinese Major General Wang Pufeng, former Director of the Department of Strategy at the PRC's Academy of Military Science announced, "In the future, information warfare will control the form and future of war. We recognize this developmental trend...and see it as a driving force in the modernization of China's military and combat readiness. This trend will be highly critical to achieving victory in future wars" (Gauthier, 1999, in Ch. 1, p. 9). In addition, Xie Guang, Vice Minister of the PRC's Commission of Science, Technology, and Industry for National Defense wrote that as information technology expands and greater reliance is placed on rapid and secure electronics transmission of information, information activities will infiltrate every dimension of peacetime and wartime space (1999, in Ch. 10, p. 6). Shortly after these announcements, the PRC launched "Project 1-26," which was aimed at developing six major

technology projects. One of these projects included the development of dual-use space and information technology (US-PRC China Security Review Commission, 2002, Ch. 10, p. 8).

## **7. Congressional Restraints on Presidential Actions**

In reaction to the President's decision to ramp up MTOPS thresholds, Congress included provisions in the National Defense Authorization Act of 2000 to curb the President's export control authority. The President had to: (1) annually report to Congress on the cumulative impact of exports of military-related technologies to countries of concern, and (2) provide countermeasures for combating that impact (Sec. 1402).

On January 10, 2001, the Clinton Administration announced its final MTOPS revision. Tier 1 and 2 countries were combined under a single tier, Tier 1 (see Appendix C). High-performance computer exports up to 6,500 MTOPS to Tier 1 countries could be exported without a license. Thresholds for high-performance computer exports to Tier 3 countries were increased from 28,000 to 85,000 MTOPS (or approximately 32 Pentium III computers clustered together) (Bridis, 2001, p. A6)).

## **F. 2001 – PRESENT: THE BUSH ADMINISTRATION AND CONTINUED ENGAGEMENT AND EXPORT LIBERALIZATION**

Since the Gulf War, PRC military strategy has shifted from complete annihilation to a more focused strategy of employing quick and decisive force against critical US military vulnerabilities (US-China Security Review Commission, 2002, Ch. 1, p. 8). This point was confirmed when the Liberation Army Daily reported that as early as August 1999, Premier Jiang Zemin had directed increased development of asymmetric weaponry designed to exploit US military weaknesses (US-Chinese Security Review Commission, 2002, Ch. 10, p. 5). The US-Chinese Security Review Commission explained,

[The PRC's new strategy] focuses on such weaknesses as the U.S. reliance on computer networks and dependency on satellites for our strategic military and economic civilian communications systems or on the vital nervous systems of our economic institutions such as the New York Stock Exchange's computer system. Since mid-1999, the PLA has openly recruited, in civilian newspapers, an "army of hackers." The PLA is also attempting to develop an ability to target forward-based command, control, communications, computers, and intelligence (C4I) nodes, airbases, aircraft carriers, and sea- and space-based command control platforms (2002, Ch. 10, p. 5).

On January 2, 2002, President Bush raised Tier 3 controls from 85,000 to 190,000 MTOPS. The Bush Administration stated that these changes reflected the President's ongoing

efforts to update the US export control system so that it protected national security and simultaneously allowed US high-technology firms to be innovative and compete in today's marketplace (Deputy Press Secretary, 2002, p. 1). The GAO, however, found that the increase was prompted by a letter from the Computer Coalition for Responsible Exports (CCRE), a computer lobby (US GAO, 2002d, p. 6).

One month earlier, the President sent a justification report to Congress as required under NDAA 1998. The report noted that ten US and foreign computer manufacturers would be selling Intel Itanium-type 190,000 MTOPS processors in early 2002. By the summer of 2002, only one firm had produced computers at that capability (US GAO, 2002d, p. 3). The GAO found,

According to Defense officials responsible for producing the [President's December 2001] report, industry representatives told them that (1) the market would be flooded with 32-way, Itanium-based servers in early 2002, (2) the People's Republic of China is the long-term market of importance, and (3) U.S. industry is concerned that, if the threshold is not raised, foreign competitors will capture the market (US GAO, 2002d, p. 10).

Defense officials also stated that the level of control selected (i.e., 190,000 MTOPS) was "driven by the market and what the administration believes it [could] control, not by the military and national security applications that could be run on high performance computers" (US GAO 2002d, p. 13).

Commerce officials told the GAO that, in assessing the availability of these new computers, the Department had sought the advice of the computer industry as required by the EAA79 and reviewed the websites of computer manufacturers (2002d, pp. 10-11). The GAO reviewed the material relied upon by Commerce and found "little additional evidence about the availability of 32-way, Itanium-based servers beyond the information contained in the CCRE's August 2001 letter requesting a change in the export control threshold" (2002d, p. 11). It is no coincidence that the co-chair of the CCRE was the Director of Government Affairs for Unisys Corporation (US GAO, 2002d, note 7) and that the only computer manufacturer producing 190,000 MTOPS computers in the summer of 2002 was Unisys (US GAO 2002d, p. 11).

President Bush's report also included a general statement that high-performance computers posed little threat by countries of concern because these countries lacked the expertise to use the computers in military applications; however, the report did not address the PRC's demonstrated knowledge in this area (US GAO 2002d, p. 3).

The State Department argued to the GAO that the report was still valid because high-performance computers could not be feasibly controlled due to computer clustering (Burnham, 2002, in p. 31). The State Department's position contradicted an October 2001 report by the Defense Department that concluded that clustered computers were not as capable as a single high-performance computer (US GAO, 2002d, p. 5).

In addition to the letter from the CCRE, President Bush's decision to increase MTOPS controls was also influenced by a proposal submitted by the European Union members of the Wassenaar Arrangement to remove all controls on computer hardware (Evans, 2002, Enclosure, p. 2). The European Union comprises the majority in Wassenaar. At the December 2001 Wassenaar Plenary, US delegates informed Wassenaar members that they could not concur with removing all controls because US law required that an assessment of the national security implications be conducted and that the MTOPS metric be used to measure risky exports (Evans, 2002, Enclosure, p. 2).

A more recent example of President Bush's engagement with the PRC occurred in April 2002, when the President sent the Secretary of Commerce and a delegation of US business executives to the PRC. The aim of the delegation was to "strengthen economic relations between China and the United States by helping U.S. businesses explore new trade and investment opportunities that have resulted from China's accession to the World Trade Organization" (US Commerce, 2002d, p. 1). The delegation included, among others, representatives from the information technology and telecommunications industries (US Commerce, 2002d, p. 1).

The PRC continues to acquire US military secrets and aid US enemies. On June 27, 2000, The Washington Times reported that the Chinese Academy of Engineering Physics secretly used US high-performance computers to simulate warhead detonations (Gertz, in Ch. 10, p. 13). In March 2001, CNN reported that the Pentagon was unofficially accusing the PRC of helping improve Iraq's aircraft targeting capabilities in violation of UN sanctions. Huawei Technologies, which was founded by a former PLA officer, is believed to have supplied Iraq with fiber optics to improve the Iraqi's air defense system. The PRC reportedly acknowledged violating the UN sanctions but denied that its support was linked to Iraq's military (Gershman, 2001, in Ch. 7, p. 4).

The PRC is also altering its technology acquisition strategy. Prior to the 1990s, the PRC's industrial policies focused on acquiring whole production infrastructures, licensing of

foreign technology, and preference for advanced technological products (US Commerce, 1998a, p. 35). While continuing this general strategy, PRC policy since the 1990s focuses on acquiring "process technology," i.e., the expertise to enhance the quality and sophistication of its technology and to integrate technology from foreign investment and trade (US Commerce, 1998a, p. 35).

In addition, there are signs that US export controls are thwarting PRC efforts at acquiring dangerous technology. The US-China Security Review Commission found that

China has gone to extensive legal and illegal lengths to target and acquire advanced U.S. and Western defense and dual-use technologies. To counter problems with the U.S. export control system, Chinese manufacturers and designers have made significant efforts to find sensitive technology suppliers in Europe and Japan, particularly in those technologies equivalent to U.S. standards. China's military-industrial sector still lags significantly behind that of the West, giving the PLA little choice but to continue to rely on the imports to close the gap between strategic requirements and operational capabilities. Consequently, pressure for more contacts between the military and civilian sectors is expected. [Moreover,] China has implemented programs directed at leveraging useful dual-use and military technologies through indigenous R&D as well as foreign joint ventures in specified industrial sectors (2002, Ch. 10, p. 9).

Thus, it appears that the Bush Administration is following the previous Administration's policy of engagement with the PRC and increased MTOPS controls and that the US export control system is having at least some of its intended effect. The PRC continues to improve its military through the acquisition of sophisticated US technologies through covert development of its technology base. Regardless, export controls do hamper the PRC's ability to acquire technologies that threaten US national defense.

#### **G. US EXPORT POLICY TOWARD HONG KONG**

An analysis of computer exports to the PRC is not complete without consideration of US trade with Hong Kong. Hong Kong presents a threat to US security because of the risk of diversion to the PRC. The vast majority—nearly 90 percent—of Hong Kong exports to the PRC between 1998 to 2000 were imported by Hong Kong from other foreign countries (US-China Security Review Commission, 2002, Ch. 5, p. 8).

In 1992, the US granted preferential licensing treatment to Hong Kong as a result of its designation as a CoCom "cooperating country" (US GAO, 1997, p. 6). The US government agreed to treat Hong Kong as a separate territory from the PRC for purposes of trade (US Congress, 1992a, Sec. 103(1)) and ensured Hong Kong's access to sensitive US technologies so

long as those technologies were protected (US Congress, 1992c, Sec. 103(8)). More dual-use items may be exported to Hong Kong without prior review from Commerce than to the PRC (US Congress, 1999b, p. 56). Moreover, Commerce more readily approves licenses to Hong Kong than the PRC (US Congress, 1999b, p. 56). The Cox Report noted with concern that "[t]he result of the 1992 [United States-Hong Kong Policy] Act has been to continue a less restrictive export control policy for Hong Kong than for the rest of the PRC" (US Congress, 1999b, p. 56).

In July 1997, Hong Kong reverted to the PRC pursuant to an agreement with the United Kingdom. In the 1984 Sino-British Joint Declaration, both countries agreed to treat Hong Kong as a Special Administrative Region of the PRC with a "high degree of autonomy" for 50 years (US GAO, 1997, p. 1). The US has declared that it will not change its export control policy toward Hong Kong unless there is evidence that Hong Kong is unable to operate independently of the PRC (US GAO, 1997, p. 2). To that end, the US has established comprehensive benchmarks with baseline information to measure Hong Kong's export control activities (US Congress, 1999b, p. 57). The State Department noted that the current level of diversion activity in Hong Kong has not changed since the country's reversion to the PRC (US GAO, 1997, p. 57).

The PRC has used Hong Kong to obtain sensitive US technology, and US Customs officials confirm that re-exports from Hong Kong to the PRC is a common PRC method for illegally transferring technologies (US Congress 1999b, p. 57). A significant number of Hong Kong firms serve as covers for PRC intelligence services, including the Chinese Ministry of State Security. Therefore, it is likely that over time, these covers could "provide the PRC with a much greater capability to target US interests in Hong Kong" (US Congress, 1999b, p. 57).

## **H. SUMMARY**

Chapter V traces the history of high-technology export policy toward the PRC over the last thirty years and the concomitant loosening of high-performance computer export controls. This chapter argues that the President uses export controls as a tool of US foreign policy. The administration under George Bush sought to deny the PRC military access to US technologies but qualified this policy, allowing the PRC civilian market to acquire US-manufactured computers. Higher-performing desktop computers were being developed and mass marketed in the 1990s, prompting the Clinton Administration to loosen MTOPS controls. Congress resisted this policy by requiring the President to fully study the national security implications of raising

MTOPS thresholds. The present administration under George W. Bush has continued engaging with the PRC and liberalizing export controls.

The PRC has opened select regions and cities in China to trade as part of an overarching strategy to modernize its military. Because the PRC is generations behind other industrial nations technologically, the central government relies on technology transfers from foreign countries to speed up its modernizing efforts and fill gaps that PRC research and development cannot fill. The PRC has also used espionage to acquire US military technology secrets.

Multilateral export control regimes play a secondary role in the export control process. While the US has been a long-standing member of CoCom and Wassenaar, the US has acted independently in loosening computer export controls. Members are not required to implement controls agreed upon by the current arrangement, and the European Union has expressed a desire to decontrol high-performance computers.



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## **VI. ANSWERS, CONCLUSIONS AND RECOMMENDATIONS, AND SUGGESTIONS FOR FURTHER RESEARCH**

### **A. ANSWERS TO RESEARCH QUESTIONS**

This thesis set out to answer the primary question: How have perceptions of US-Sino relations shaped the administration of the Export Administration Act of 1979 (EAA79)? US foreign policy toward the PRC has resulted in increasingly looser export controls beginning with the Clinton Administration in 1994 and continuing to the present day under the Bush Administration. Evidence of US perceptions of foreign countries is clearly found in the Commerce Country List, which is published in the Export Administration Regulations (EAR). The PRC, which is considered a country of national security concern, is placed in Tier 3, a middle category between allies and embargoed countries. Evidence of Chinese espionage has not persuaded policymakers to redesignate the PRC as a Tier 1 country because, as one Senator put it, the PRC is less of a threat than the USSR during the Cold War.

In addition to the primary question, this thesis answered the secondary question: How do policymakers, executive agencies, and export control regimes interpret and implement export laws? Pursuant to EAA79, the Commerce, Defense, and State Departments formulate export control policy. Commerce's primary function is to promote American business and thus the department interprets EAA79 from a pro-commerce perspective, placing the onus on the exporter to review and self-police the EAR. Defense, on the other hand, is charged with providing national defense and therefore advocates tighter export control laws. State treats export controls as collateral to the department's mission of developing the President's foreign policy. Export control regimes—first the Coordinating Committee for Multilateral Export Controls and now the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods—only control exports at a level that is agreeable by all of the member states. Even then, Wassenaar members are free to implement regime controls based on national discretion.

Finally, this thesis answered the secondary question: What is the relationship between export control policies, the enforcement of EAA79, and US computer exports to the PRC? Trade has been, and continues to be, a tool of foreign policy for the President to achieve American interests abroad. The US encourages trade with the PRC in the hopes that market rules will encourage openness in the PRC. This explains why, during the Clinton Administration, the US

resumed relations with the PRC after Tienanmen Square and why the US continues to export computers to the country even though the US cannot conduct meaningful post-shipment verifications in China. Export controls, in short, are part of an overarching foreign policy and are subservient to the aims of that policy.

## **B. CONCLUSIONS AND RECOMMENDATIONS**

Based on the information provided in this thesis, several conclusions may be drawn and recommendations offered in regard to the US export control system.

### **1. The Statutory Basis for Export Controls is Outdated and Needs to be Replaced to Reflect Current Technology.**

EAA79 is an outdated law that fails to address US national security concerns in an era where computers have become prevalent. Lawmakers in 1979 did not conceive of high-performance computers and the dangerous ways in which they could be used against the US militarily. EAA79's lack of relevance is manifested in the number of amendments, Executive Orders, and export control provisions added to other statutes that have been promulgated since EAA79's expiration in 1983. These extensions and modifications have allowed stakeholders—Congressional committees, executive departments and agencies, and the President—to shape the US export control system according to their particular agendas. Limiting the jurisdiction in Congress over export controls would facilitate the passage of a new, more responsive Export Administration Act (EAA).

### **2. The US Computer Industry is Highly Influential and Has a Formidable Lobby on Capitol Hill, and Industry Data Must be Treated with Skepticism.**

In the 1990s, when development of higher-performing computers was increasing, the computer industry single-handedly convinced lawmakers of the importance of American competitiveness in overseas markets to the disadvantage of national security. Computer lobbies have skewed the data in such a way that enables them to argue that higher unemployment, lower gross domestic product, and the inability of American business to compete abroad would result if export controls were made more stringent. This message appeals to lawmakers, who cannot agree on a replacement for EAA79. In the future, national security stakeholders should treat data provided by the US computer industry with skepticism.

**3. The US Export Control System is Both a Perpetrator and Product of Stagnation, and in Rewriting the EAA, Congress Should Begin by Detailing the Purposes Behind the New Act.**

The US export control system, which may be thought of as the legislative and administrative processes for controlling US exports, contributes to the government's inability to create a more modern and responsive export law. Not only does it perpetuate stagnation, but the system is a product of that very stagnation, having been born from the extensions and modifications to EAA79. In rewriting the EAA, Congress should begin by detailing its purposes. These purposes may then be used to guide the executive in carrying out the Act.

**4. The Tension between the President and Congress Plays a More Prominent Role than Partisan Politics, and a New EAA Should Consider Trade as a Tool in Advancing White House Foreign Policy.**

Interestingly, the export control debate does not fall along traditional party lines. Both Democrats and Republicans have an interest in ensuring American jobs, which is the message industry portrays. While some Republicans are hawkish about defense, they are the minority. Instead of party politics, the balance of power between the President and Congress is relevant. The limits of presidential authority are being challenged by Congress in this debate, and in rewriting the EAA, legislators must factor in the role of trade in advancing White House foreign policy.

**C. SUGGESTIONS FOR FURTHER RESEARCH**

This thesis only touches on satellites and how they affect US-Sino foreign policy, but there is a rich body of literature on export controls and satellite exports to the PRC which may be researched. In addition to sharing many of the issues presented in this thesis, satellites were transferred from Commerce's to State's jurisdiction in 1999 following a charge of improper licensing by Commerce. Unlike computers, which are manufactured by firms serving the civilian market, satellites are produced by the defense industrial base, which raises the issue of the financial viability of the defense industrial base and US preparedness to go to war.

Another interesting area of research is export controls and software exports to the PRC. Software threatens US national security because it can be used, for example, to design rockets and nuclear reactors and detect the path of anthrax spores. A large black market exists in the PRC for software. What makes software distinguishable from other exports is the nonphysical nature of the technology; trade in software can occur over the Internet and thus elude export controls. Furthermore, in addition to EAA79, US copyright laws apply to trade in software.

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## APPENDIX A

### PEOPLE'S REPUBLIC OF CHINA NUCLEAR TECHNOLOGY ASSISTANCE

COUNTRY	TYPE OF ASSISTANCE
Algeria	<ul style="list-style-type: none"> <li>• Research reactor (construction began around 1988); 15 metric weight pressurized heavy water research reactor; possible provisions of heavy water for the reactor; placed under safeguards in 1992.</li> <li>• Designs for construction of third stage of Algeria's Center for Nuclear Energy Research</li> </ul>
India	<ul style="list-style-type: none"> <li>• Heavy water (1982-1987); 130-150 metric tons; no safeguards.</li> <li>• Low-enriched uranium for India's Tarapur reactors (1995); supplied under safeguards.</li> </ul>
Iran	<ul style="list-style-type: none"> <li>• Research reactors.</li> <li>• 27 kilowatt subcritical, neutron source reactor (1985); currently safeguarded.</li> <li>• Zero-power reactor contract signed in 1991); currently safeguarded.</li> <li>• HT-6B Tokamak nuclear fusion reactor at Azan University.</li> <li>• 20 metric weight reactor (contract signed in 1992 but canceled under US pressure).</li> <li>• Two 300 metric weight power reactors (suspended in 1995 and canceled in 1997).</li> <li>• Calutrons (electromagnetic isotope separators) (contract signed in 1989); for Karaj and Isfahan facilities; safeguarded.</li> <li>• Uranium hexafluoride (UF<sub>6</sub>) production facility (canceled in 1997); PRC possibly provided blueprints for facility.</li> <li>• Zirconium tube production facility (assistance continuing).</li> <li>• Uranium mining assistance.</li> </ul>
Iraq	<ul style="list-style-type: none"> <li>• Ring magnets.</li> <li>• Exports of samarium-cobalt magnets for gas centrifuges (1989-1990).</li> </ul>

Pakistan	<ul style="list-style-type: none"> <li>• Designs for basic Hiroshima-sized nuclear weapons.</li> <li>• Possible inclusion of Pakistani observers at PRC's Lop Nur nuclear weapons test facility (1989).</li> <li>• Possible provision of tritium gas (1986); no safeguards.</li> <li>• Uranium enrichment; assistance to Kahuta enrichment facility; no safeguards.</li> <li>• Ring magnets (1995); about 5,000 for A.Q. Khan Research Laboratory in Kahuta; no safeguards.</li> <li>• Weapons-grade uranium for two devices (early 1980s); no safeguards.</li> <li>• Plutonium production reactor at Khushab.</li> <li>• Construction assistance for 50-70 metric weight heavy water reactor; no safeguards.</li> <li>• Special industrial furnace and high-technology diagnostic equipment (1994-1995).</li> <li>• Possible assistance in construction of reprocessing facility at Chashma; no safeguards.</li> <li>• Chashma-1 power reactor (deal signed in late 1995 and operations began in 1999); 300 metric weight; safeguarded.</li> <li>• Miniature neutron source research reactor (1991); safeguarded.</li> <li>• Construction assistance for Pakistani Research Reactor 2 (PARR-2); safeguarded.</li> <li>• Heavy water (D2O); up to five metric tons per year for safeguarded Pressurized Heavy Water Reactor (PHWR) at Karachi Nuclear Power Plant (KANUPP) research reactor; possibly diverted by Pakistan to the Khushab research reactor against PRC wishes.</li> <li>• Fuel fabrication services</li> </ul>
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(Source: After US-China Security Review Commission, 2002, Ch. 7, pp. 9-13)

## APPENDIX B

### PEOPLE'S REPUBLIC OF CHINA MISSILE TECHNOLOGY ASSISTANCE

COUNTRY	TYPE OF ASSISTANCE
Iran	<ul style="list-style-type: none"> <li>• Ballistic Missiles               <ul style="list-style-type: none"> <li>• 8610/CSS-8</li> <li>• M-9/DF-15 (sale cancelled under US pressure)</li> </ul> </li> <li>• Cruise Missiles               <ul style="list-style-type: none"> <li>• HY-1</li> <li>• 100 HY-2 Silkworm</li> <li>• HY-4/C-201</li> <li>• C-601</li> <li>• YJ-1/C-801 (sales halted in October 1997)</li> <li>• YJ-2/C-802 (sales halted in October 1997)</li> <li>• FL-10</li> </ul> </li> <li>• Assistance to Indigenous Missile Programs</li> <li>• Extensive production assistance for the 8610/CSS-8 missile</li> <li>• Extensive production infrastructure for HY-2, C-801, and C-802 missiles (assistance halted in 1997)</li> <li>• Possible assistance to the Shahab-3 ballistic missile</li> <li>• Missile Fuel</li> <li>• Various ingredients for missile propellants</li> <li>• Ammonium perchlorate energetics booster for rockets and missiles</li> <li>• Missile Guidance and Control Technology (mid-1990s)</li> <li>• Guidance kits</li> <li>• Gyroscopes</li> <li>• Accelerometers</li> <li>• Test equipment for ballistic missiles</li> </ul>
Iraq	<ul style="list-style-type: none"> <li>• Cruise Missiles (1980s)               <ul style="list-style-type: none"> <li>• HY-2 (Silkworm)</li> <li>• C-601</li> <li>• YJ-1/C-801</li> </ul> </li> <li>• Missile Engine Testing Facility/Project 3209 (late 1980s)</li> <li>• Supply of standard parts for liquid propellant engines for missiles</li> <li>• Missile fuel</li> <li>• 10 tons of unsymmetrical dimethylhydrazine (UDMH) missile propellant (late 1980s)</li> <li>• 7 tons of lithium hydride heat absorbent (1989-1990); exported by the China Wanbao Engineering Company</li> <li>• Ammonium perchlorate energetics booster for rockets and missiles (1994)</li> </ul>



Libya	<ul style="list-style-type: none"> <li>• Missile fuel</li> <li>• Lithium hydride</li> </ul>
Pakistan	<ul style="list-style-type: none"> <li>• Ballistic Missiles and Launchers</li> <li>• 34 M-11/DF-11 missiles (delivered in 1992); stored at Sargodha Air Force Base near Lahore</li> <li>• M-11 transporter erector launchers</li> <li>• Possible Assistance to Indigenous Missile Programs</li> <li>• Hatf-1, Hatf-2, and Hatf-3 ballistic missiles</li> <li>• Missile Fuel</li> <li>• Ammonium perchlorate energetics booster for rockets and missiles; 10 tons seized in Hong Kong in 1996; Pakistan's SUPARCO was caught attempting to import ammonium perchlorate from a company in Xian, PRC</li> <li>• Missile Guidance</li> <li>• Gyroscopes</li> <li>• Accelerometers</li> <li>• On-board computers</li> <li>• Blueprints and construction equipment for missile production factory in Rawalpindi, 40 kilometers west of Islamabad (possibly ongoing); likely producing Pakistani version of M-11 missile</li> </ul>
Saudi Arabia	<ul style="list-style-type: none"> <li>• 30+ DF-3 (CSS-2) ballistic missiles (deliveries began in 1988); included construction of launch complex, training, and post-sale systems maintenance; in 1997, Saudi Arabia requested from PRC possible replacements for the aging DF-3 missiles; PRC declined</li> </ul>
Syria	<ul style="list-style-type: none"> <li>• Ballistic Missiles</li> <li>• DF-15/M-9 missiles (cancelled under US pressure in 1991); Syria possibly received test missile</li> <li>• Assistance with Indigenous Programs</li> <li>• 30 tons of ammonium perchlorate energetics booster for rockets and missiles (1992)</li> <li>• Technical exchanges</li> </ul>

(Source: After US-China Security Review Commission, 2002, Ch. 7, p. 13-6)

## APPENDIX C

### REVISIONS TO MILLIONS OF THEORETICAL OPERATIONS PER SECOND (MTOPS) CONTROLS DURING THE G. BUSH, CLINTON, AND G. W. BUSH ADMINISTRATIONS

	G. BUSH	CLINTON						G. W. BUSH
Export Region	June 1991	February 1994	January 1996	July/ August 1999	January/ February 2000	August 2000	January 2001	January 2002
Tier 1	195	1,500	No limit	No limit	No limit	No limit	No limit	No limit
Tier 2	195	1,500	10,000	20,000	33,000	45,000	--	--
Tier 3	195 (both civilian and military end-users)	1,500 (both civilian and military end-users)	7,000 (civilian end-user) and 2,000 (military end-user)	12,300 (civilian end-user) and 6,500 (military end-user)	20,000 (civilian end-user) and 12,500 (military end-user)	28,000	85,000	190,000
Tier 4	Embargo	Embargo	Embargo	Embargo	Embargo	Embargo	Embargo	Embargo

(Source: After Jimmison, 2001, p. 2)

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