by the committee. The system, however, worked to the benefit of biomedical research during the late 1950's and early 1960's when the late Representative John Fogarty of Rhode Island headed the labor HEW subcommittee and championed NIH growth to a billion dollar budget in a decade.

The Armed Services Committee of the House has been another committee with a tradition of strong chairmen and selective assignment. Because of regional attitudes in martial matters and practical interests in military installations, the South has predominated in the committee's affairs. The current chairman is F. Edward Hébert (D–La.), and his predecessors were Carl Vinson of Georgia and Mendel Rivers of South Carolina. In the last Congress, 14 of 25 Democrats on the committee were from Southern or Border states. The attitude of the committee toward the military has been friendly and uncritical, and a small group of members with a questioning attitude to the Pentagon has had little influence. Chairmen and senior members of the committee have wielded effective control over the committee; testimony to their reaction to the new rules can be read in the fact that subcommittee assignments have not been announced yet. Until now, the major subcommittees in Armed Services have not been given names designating jurisdictional boundaries but rather were numbered 1 through 4. This made it possible for a chairman to assign legislation as he judged best and, critics say, make sure that those he regarded as the right people dealt with the sensitive issues. The new requirement that subcommittees be given specific jurisdictions would force changes in these arrangements.

It may seem that the ins and outs of subcommittee politics should be of interest mainly to congressologists, but it has been attention to such minutiae that, cumulatively, has enabled a doughty minority to dominate Congress as administrations came and went. The hegemony of Southern Democrats in the House is noticeably declining, and the subcommittee bill of rights is likely to give further impetus to that decline.

The agenda for reform in the House includes other proposals to make more publicly visible changes, such as reducing secrecy in committee operations, revising the closed rule under which debate and amendment of legislation is limited on the floor, and creating a Democratic policy committee in the House. All these are expected to come up in the Democratic Caucus after the recess. The progress in reform in the House so far this year is generally attributed to cannier organization by the liberals and, more important, to the backing of Speaker Carl Albert (D–Okla.) and the House leadership machinery. How much further the leadership's commitment to reform extends is unclear. But the subcommittee bill of rights represents a solid if limited victory for the reformers. In fact, it is an ironic tribute that the surprise and chagrin of senior members at what happened, may, according to one pro-reform observer, be sharp enough "to break the back of reform" in this session.—JOHN WALSH

Technology and the Trade Crisis: Salvation Through a New Policy?

At a time when slashes in parts of the proposed 1974 federal research budget have much of the scientific and technical community wondering whether the Nixon Administration has any serious interest in science and technology, it may be premature to hold out the hope that the President's second term may produce a comprehensive technology policy for the country. Yet that seems to be exactly what at least one government official is advocating these days. Citing the recent historic trade deficit for commercial trade alone which totaled $8 billion in 1972, a Commerce Department economist, Michael Boretsky, believes that improving U.S. high technology is the key to overcoming the trend towards ever greater trade deficits. And he has what he says is a new economic theory to prove it.

Boretsky is trying to get other officials and outside economists to buy the theory that among other myriad factors affecting the international trade balance is the relative technological "know how" among nations. Most economists see classic monetary and fiscal factors—such as the two devaluations of the dollar—as key determinants in foreign trade. Devaluation, as well as import quotas, surcharges and so forth, are generally viewed as the chief means of altering export-import balances. Boretsky, however, in a yet-unpublished paper and in a recent interview with *Science*, argued that only by improving U.S. "know-how" in advanced technology, relative to that of other countries, will the country achieve a sound trade surplus position for the long term.

Boretsky is a Ukranian-born economist, with a background in industrial engineering as well, who describes his role in Commerce as that of "an idea man." However, some of his past work has found its way into key Administration officials' testimony to Congress and other public statements, to a greater extent than his small, two-man office on the fifth floor of the department's main building would imply.

In 1970, Boretsky analyzed the growing U.S. trade deficits in terms of four categories of imports and exports: technology-intensive products; non-technology-intensive products; minerals, raw materials, and unprocessed fuels; and agricultural products. He found that the technology-intensive trade surplus—which since the 1950's had made up for deficits in the other categories—was shrinking despite a lower rate of inflation in the U.S. than in other countries. Boretsky thus identified the U.S. lag in high-technology products, including electronics, chemicals, automobiles, and the like, by comparison with Japan, West Germany, and other industrialized nations, as a principal factor in the deteriorating balance of trade. His thesis was picked up by Maurice H. Stans and other high Administration officials, and may have

formed the basis for last year's technology initiatives study by the White House (*Science*, 2 April and 27 August 1971).

Now, Boretsky says that the 1971 and 1972 trade data have borne him out. Between 1965 and 1971, U.S. merchandise trade moved from a $6.1 billion surplus to a $1.5 billion deficit—or a shift of $7.6 billion. But in 1972, it shrank by another $4.4 billion to a $5.9 billion deficit. Calculated for commercial transactions alone, the trade deficit for 1972 is an even higher figure of $8 billion. And the most dramatic changes have come in the category of high-technology imports, which have been increasing, and exports, which have suffered a relative decline (see chart).

Boretsky's new theory is that advanced technology plays a much larger role in the economy than import-export figures indicate or than conventional economics has usually assumed. Most economists, he says, from Ricardo on down, have assumed that technology affects trade only insofar as it can make some industries produce more goods more cheaply, making their prices more competitive. But Boretsky says that technology influences trade and the economy generally in other important, but less direct, ways. A country's overall "technological know-how," he says, in terms of quality and scope, is a strong determinant of international trade posture. For example, he says, the United States at present has a unique capability to build Boeing 747's. So long as they are built only in this country, the related jobs, skilled manpower, and management resources indirectly aid the U.S. international competitive position. This is not the case if Boeing licenses a foreign company to build the 747, Boretsky argues, because this proliferates the number of countries in the world with this special capability.

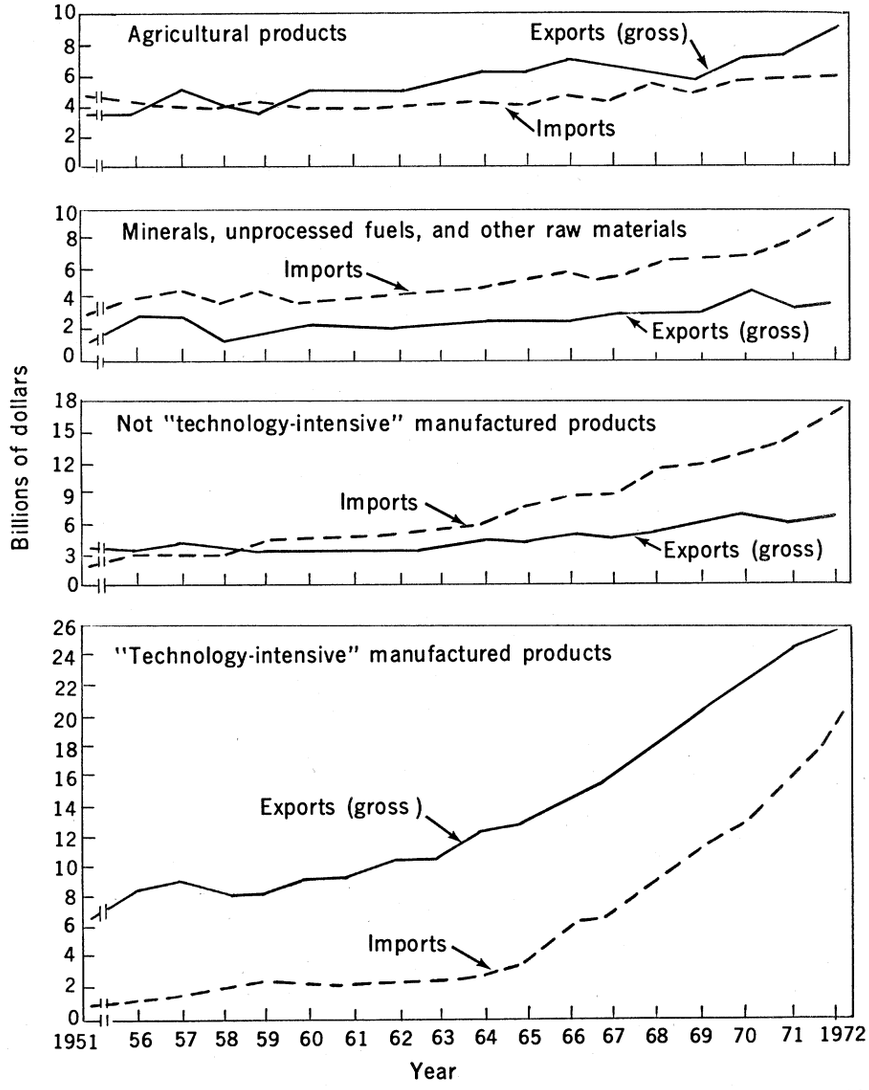
But Boretsky does not think that an advanced technology capability, as in the production of Boeing 747's, is a permanent advantage. He points out that the Japanese competitive advantage in world markets for electronic devices has gained considerably since 1957, when Japanese products were not, so to speak, worth a dime. Japan's rapidly advancing "know-how" in electronics and automobiles, according to Boretsky, has resulted in non-price-related gains for Japanese international trade.

The non-price related ways in which advanced technology influences economics are many. Conventional economics would, for example, say that the U.S. exports enriched uranium used in energy production in nuclear reactors because of lower cost. Boretsky says this is not so; the U.S. exports it because we have the "know-how" in enrichment processes that nobody else except the U.S.S.R. has.

Since advanced technology plays such a large role, in Boretsky's view, the government must intervene to some extent, not only to increase R & D spending directly, but, in his words, "to keep American technological know-how at home for a while."

Boretsky proposes that the Administration establish a new office, in the Commerce Department or in the White House, to do "concerted planning" to help rescue advanced technology industries. Two principal subjects for study and policy recommendation would be scientific and technical manpower and the state of the art of U.S. technologies relative to those in other advanced nations. Boretsky has concluded that some form of limited scientific manpower planning is necessary, for example, to avoid repeating the errors of the 1960's, when the allure of space program technology wooed many of the best scientists and engineers—and those who were beginning their training —away from nonspace industries. The comparative scarcity of the best people deprived these industries of a "steady flow of technological innovation," which otherwise might have occurred.

The office would also make an inventory of the rate of our country's technological advance relative to other countries on an industry-by-industry basis. Working backward from data on productivity, applications for patents



According to one government economist, the closing difference between U.S. high technology imports and exports, if it continues unchecked, will be a crucial determinant in future unfavorable U.S. trade balances. A new technology policy, he says, is needed for the country.

and patents awarded, and manufacturing licenses that American companies grant abroad, Boretsky claims it is possible to gauge and even quantify the state of the art for a given technology. Now, he says, this is done only on an ad hoc, "impressionistic" basis. The government should also look into a range of other actions: examination of the patent laws (the courts have been frequently ruling in favor of challengers, thus threatening the patent system as a whole); tax incentives in the form of rebates for increased investment in R & D (past tax incentive proposals have been opposed by the Treasury Department); a lowering of interest rates to facilitate venture investments in new, technology-oriented enterprises; a study of regulatory postures (such as the Interstate Commerce Commission's relatively low shipping rates for railroad freight, which, Boretsky thinks, indirectly curtailed railroad modernization by depriving them of revenues while truck lines and air carriers flourished). Finally, a government moving to assist private industry's technological advance should bring its own procurement policies, such as its purchase of computers, into line so as to buy things which involve the latest advances.

Some of the Ukranian economist's suggestions are anything but new. Tax incentives, for example, have been suggested in the past as a means of stimulating research investment, but, apparently, the Treasury Department has opposed them. As one outside economist said, "If you roll back taxes in one place you've got to raise them in another."

Lawrence Krause, a Brookings Institution economist, is skeptical of the whole government-policy package as being too indirect. He says he favors supporting R & D for simpler reasons, such as to solve air and water pollution problems. Krause thinks Boretsky's thesis amounts to "doing an indirect thing by an indirect method. Then you won't necessarily get a direct response." If you have a balance of payments problem, Krause says, "you devalue the currency."

Krause also thinks that Boretsky's plans to keep American "know-how" at home smack of 18th-century mercantilism, and adds that the British failed in a similar move during the 19th century to keep their textile manufacturing technology to themselves in order to improve their trade balance.

Myron Tribus, a former Assistant Secretary of Commerce for Science and Technology now with the Xerox Corporation, says Boretsky has influenced his own thinking on these matters and sympathizes with his analysis. However, Tribus says that U.S. high-technology industries need to reform themselves as much as they need outside government action. Tribus points out that many American companies see themselves as competing with each other for domestic markets at home far more than they perceive that they are, together, competing for foreign markets. "In Japan, they know it's export or die."

Tribus favors some governmental interventions, however. "I believe that incentives are a good idea if they are applied with the knowledge of what you're dealing with. It will boil down to whose judgment you will choose when you decide which industry is in need of help."

When it appears, Boretsky's new paper will provoke discussions of this sort both in and outside of government. However, if he succeeds in convincing the higher-ups to follow this general direction, the Administration would not start to emphasize "quality of life" research and development nor more direct research funding per se; instead, the drive would be on innovation, productivity, and teaching American researchers to keep a weather eye out on their foreign competitors.

—DEBORAH SHAPLEY

APPOINTMENTS

Walter B. Waetjen, executive vice president, University of Maryland, to president, Cleveland State University. **Robert L. Hirsch**, acting director, controlled thermonuclear research division, U.S. Atomic Energy Commission, appointed director . . . . **William H. Moretz**, chairman, surgery department, Medical College of Georgia, to president of the college. . . . **Richard C. Kunkel**, associate professor of education, Ball State University, to chairman, education department, St. Louis University. . . . **Joseph R. Bianchine**, associate professor of medicine, Johns Hopkins University, to chairman, pharmacology department, Texas Tech University. . . . **Ralph Z. Levene**, associate professor of ophthalmology, New York University, to chairman, ophthalmology department, University of Alabama.

RECENT DEATHS

Loren D. Carlson, 57; associate dean for research development, School of Medicine, University of California, Davis; 12 December.

Willard C. Fleming, 73; former chancellor, Medical Center, University of California; 2 November.

Percy L. Gainey, 85; professor emeritus of bacteriology, Kansas State University; 30 October.

Richard E. Hibbard, 62; former vice president of academic affairs, University of Wisconsin, Eau Claire; 17 October.

William R. Hood, 51; professor of psychology, University of Oklahoma; 19 October.

William D. Johnston, Jr., 73; retired chief, international geology branch, U.S. Geological Survey; 4 November.

Clifford B. Jones, 67; president emeritus, Texas Tech University; 27 November.

Melvin L. Karon, 54; scientific associate, research and development division, Hunt-Wesson Foods, Inc.; 18 November.

Paul Meek, 75; chancellor emeritus, University of Tennessee, Martin; 2 November.

Raymond A. Peterson, 84; former professor of psychology, Mayville State College; 2 November.

William H. Rieman III, 73; professor emeritus of chemistry, Rutgers University; 29 October.

Lloyd K. Riggs, 84; former professor of physiological chemistry, Rutgers University College of Pharmacy; 28 October.

William F. Sayer, 82; professor emeritus of engineering, University of California, Los Angeles; 25 November.

Nicholas H. Serror, 76; former professor of biology, Providence College; 27 November.

Clement A. Smith, 58; professor of radiology, West Virginia University; 22 November.

Theodor Sorgenfrei, 57; professor of geology, Technical University of Denmark; 5 November.

Vivian L. Strickland, 93; professor emeritus of education, Kansas State University; 18 October.

William H. Vaughan, 73; former president, Morehead State University; 30 October.

Erratum: In the issue of 23 February 1973, an error appears on page 822. The resolution on Support for Population Research was not adopted by the AAAS Council. It was, instead, referred to the Board of Directors.