

IBM computer centers in West Germany—like this one near Stuttgart—were chief targets of East Germany's industrial spying program.

"It's a very original paper," says Bart Hobijn, a macroeconomist at Arizona State University in Tempe who was formerly with the U.S. Federal Reserve banks of San Francisco and New York. "Not only did they have access to the data, but they thought about it very creatively. They are in a sense ... going through the back door."

Historian Kristie Macrakis of the Georgia Institute of Technology in Atlanta, who has spent years studying Stasi databases—including the one used in the current study—agrees. "I was really excited that someone crunched these numbers," she says. "They basically quantified what I did [already] in a qualitative way." Macrakis, who has argued that East German industrial espionage was ultimately a failure, says the next step is to look at how the stolen technology was integrated into individual East German firms.

Hobijn says the paper could also be instructive for countries and companies currently engaged in industrial espionage. "If I were running a secret service, I'd like to know what the return is on my effort." According to the new study, the payoff may have been as high as €4.6 billion for East Germany in 1988, compared with annual spying expenditures of about €6.4 million. Espionage "has a substantial effect," Hobijn says.

But there's a hidden cost, Meyersson says. Espionage seems to "eat up" investment in R&D. For example, the authors' model showed that increases in industrial espionage significantly reduced patent applications, a key proxy for R&D. "It's a way to keep up," Meyersson says. "It's not a strategy to become a world leader."

That's what played out in East Germany, Macrakis says. Despite early successes, including the "reinvention" of polyurethane and the reverse engineering of the "must-have" mainframe computer of the 1960s, the IBM 360, industrial espionage hit a wall in the late 1970s and 1980s. That's because a new focus on advanced computing—such as the country's quest to create a 1-megabyte memory chip—required vastly greater investments in human intelligence and embargoed goods. Easy access to secrets had, over time, discouraged both state and private investment in research and development. "East Germany collapsed," she says. "Maybe they caught up a little bit, but in the end the whole computing thing [at least] was a fiasco."

Perhaps physicist-turned-spy Rehder would have agreed. In a cryptic comment to his case officer, he once asked: "I'm giving you the best technology available, why can't you use it?" ■

## SCIENTIFIC MISCONDUCT

# China cracks down on fraud

More than 400 authors face punishment for peer-review scam

By Dennis Normile

A massive peer-review fraud has triggered a tough response from the Chinese government. Officials last week announced that more than 400 authors on some 100 now-retracted papers will face disciplinary action. Some institutions have barred the scientists from pursuing their research—at least temporarily—and have imposed other penalties, including canceling promotions, honors, and grants. Government ministries have also announced new "zero tolerance" policies aimed at stamping out research fraud. "We should eradicate the problem from its roots," said He Defang, director of the Ministry of Science and Technology's (MOST's) regulatory division in Beijing.

Although China has previously cracked down on scientific misconduct—a chronic problem (*Science*, 29 November 2013, p. 1035)—these penalties "are the harshest ever," says Chen Bikun, an information scientist at the Nanjing University of Science and Technology in China.

MOST's 27 July announcement marked the culmination of an investigation into the mass retraction this past April of 107 papers by Chinese authors in a single journal, *Tumor Biology*. The papers, published between 2012 and 2016, were pulled after editors found "strong reason to believe that the peer review process was compromised," Editor-in-Chief Torgny Stigbrand, of Umeå University in Sweden, wrote on 20 April on the website of the publisher Springer. (Springer, an arm of Springer Nature, published *Tumor Biology* until December 2016; the journal is now operated by SAGE Publications.)

Investigators say the authors engaged in an all-too-common scam. *Tumor Biology* allowed submitting authors to nominate reviewers. The Chinese authors suggested "experts" and provided email addresses that routed messages from the journal back to the researchers themselves, or to accomplices, who wrote glowing reviews.

The MOST investigation focused on 101 papers. Investigators concluded that for 95 of them third party agencies had provided phony experts or false reviews. In six cases, one or more of the authors perpetrated the fraud. Overall, 80 of the papers reported actual research results, investigators found. But nine were fraudulent, and 12 had been purchased outright from third

parties by the supposed authors. The remaining six papers have various other problems or are still under investigation.

Investigators linked 521 academics and physicians to the 107 papers. Just 11 were cleared of misconduct, and 24 were put on a watch list. Of the rest, 172 were deemed to carry full or partial responsibility for fraud. Another 314 were judged to have not participated in the scam, but to bear some responsibility for appearing as co-authors without making sure their colleagues were behaving appropriately.

An array of major agencies—including the Ministry of Education and the China Association for Science and Technology—joined MOST's investigation. The punishments are being decided by institutions on a case-by-case basis. The agencies are also calling on institutions to formulate more stringent rules to guard against fraud.

The inquiry was "much more thorough and open" than in previous cases, says Yu Yao, a geneticist at Fudan University in Shanghai, China. And the severe punishments have grabbed the attention of researchers, Chen says. Many Chinese scientists are "deeply shocked," he says, and have vowed to be "more conscientious and careful" in collaborating with other authors. Some question the call to discipline co-authors unknowingly caught in deception, however. "If an author provides reliable data for the paper and is not involved in fraud, the author should be warned, but not be punished," Yu says.

The journal and its sponsoring society should also take some of the blame, Chen believes. He and others note that *Tumor Biology*, which is owned by the International Society of Oncology and BioMarkers, has a history of problems, including a past mass retraction of 25 papers for peer-review problems and appointing scientists to its editorial board without their knowledge. A SAGE spokesperson says the publisher plans "a complete overhaul of the editorial structure and peer-review practices of the journal, specifically the use of preferred reviewers."

In general, the government's response is drawing support. Zhu Yong-Guan, a biogeochemist at the Institute of Urban Environment in Xiamen, China, says the episode "reminds us that 'zero tolerance' toward academic dishonesty needs further strengthening, and the actions by the Chinese government are very timely." ■

# Science

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