



## Busting the Chip Cartel

U.S. antitrust prosecutors sent 15 executives from four companies to jail for price fixing of memory chips. There was a rub: The collusion failed.

By Karen Gullo and David Dietz Bloomberg Markets June 2008

Ken Heller knew his company might have crossed the line. The sales executive for Hynix Semiconductor Inc. and his co-workers had been collaborating for years with rival companies around the world to fix the prices of memory chips, fingernail-sized semiconductors used in tens of millions of personal computers. In March 2001, Heller tried to hide what was going on. "Just fyi, pls consider NEVER making statement in e-mail that you spoke with competition," he wrote in an e-mail to one of his salesmen. "Lawyers love these babies."

They do--and they did. Starting in 2002, U.S. Justice Department antitrust prosecutors unearthed Heller's e-mail, along with scores of others showing a vast price-fixing cartel among leading chip producers in Japan, South Korea, Germany and the U.S.

Since then, 15 officials at four companies have been sentenced to as much as 14 months in prison for violating the Sherman Antitrust Act by colluding on prices for dynamic random-access memory, or DRAM, chips. That's the most convictions won in any single international cartel case since the U.S. first made conspiring to rig prices a crime in 1890. Heller, who agreed to cooperate with investigators, wasn't prosecuted. Four chipmakers pleaded guilty and agreed to pay \$732.7 million in criminal penalties for violating the Sherman Act. The companies included the two biggest, both based in South Korea: Samsung Electronics Co., located in Suwon, and Hynix, located in Ichon. A judge also fined Tokyo-based Elpida Memory Inc., Japan's largest maker of computer memory chips, and Neubiberg, Germany-based Infineon Technologies AG, Europe's second-biggest semiconductor maker.

The case is far from closed. It's morphed into something even bigger. Prosecutors are now investigating possible price rigging of other components in everyday products in communications and entertainment: personal computers, mobile phones, music players, cameras and monitors for PCs and televisions. Investigators on three continents have joined U.S. prosecutors in the probes, which involve some of the same companies busted in the chip cartel, according to firms that received Justice Department subpoenas or inquiries.

"The DRAM case is the first significant cartel case of the Internet age," says Robert Lande, a lawyer who specialized in anti-competitive practices at the Federal Trade Commission from 1978 to '84 and is now a law professor at the University of Baltimore. "If the investigation shows that the price fixing also involved other important, related products, the amount of commerce affected overall would be not only the largest for an illegal private cartel in world history; it would also be staggering in magnitude, almost beyond belief."

All told, investigators are probing possible collusion in the pricing of electronic parts with an annual value of about \$159.6 billion, says John Connor, professor of industrial economics at Purdue University and a researcher of cartels. Sharing prices of memory chips would logically spill over to other electronics parts at technology firms, Connor says. "It's like a virus that spreads from one division of a company to another," he says.

While price fixing may be contagious, it's not necessarily effective. For all of the time and effort executives used in colluding to raise or stabilize chip prices, they couldn't get the job done.

The \$31.3 billion DRAM chip industry has been fighting a losing battle against falling prices for two decades. In the 1980s, 10 companies dominated the DRAM market, leading to price wars and oversupply in an industry with billions of dollars in research and development costs and razor-slim profit margins. Starting in the early 1990s, U.S. companies complained to the International Trade Commission that Asian chipmakers had been dumping millions of DRAM chips into the U.S., saturating the market and causing prices to plunge. Santa Clara, California-based Intel Corp., the world's largest semiconductor maker and the first to produce DRAM chips in 1969, stopped making them altogether in 1986, as losses grew. Nine other U.S. companies also stopped making chips in the 1980s and '90s.

Today, five companies control 80 percent of the market. Four of those companies might have felt that they had no choice other than trying to rig prices, says Jim McGregor, principal analyst at Scottsdale, Arizona-based consumer electronics research firm In-Stat. And the collusion effort was inevitably futile, McGregor says. It was like trying to get in the way of a

train, he says. Chips are almost identical, so they're priced as if they are commodities. "It's the definition of a commodity product, just like something you'd find in a grocery store," McGregor says.

The DRAM conspiracy, which began in the late 1990s, was as brazen as it was extensive, investigators found. It involved at least six companies, including Boise, Idaho-based Micron Technology Inc., the largest U.S. producer of memory chips. More than 100 rivals, from sales representatives to subsidiary heads, swapped secret information, court records show. They communicated in e-mails, during telephone calls, on golf courses in California's Silicon Valley, in restaurants from Seoul to Durham, North Carolina, and in each other's offices. Conspirators sometimes knew through e-mails how rivals planned to price chips an hour before buyers asked for bids, evidence seized by the government shows. Some collaborators set up Internet chat rooms to swap secret information, court documents show.

Paul Palonsky, a chip salesman who worked his way up at Hynix to become the Korean company's account manager for International Business Machines Corp. in 1998, told prosecutors his bosses seemed obsessed with learning how competitors were pricing chips. "There were direct requests for competitor information from the Korean management," according to a 2005 Justice Department summary of the interview with Palonsky, now 45. "There was a pervasive thirst for this kind of information in the Hynix culture."

Samsung Electronics, the world's largest memory chip maker, shared the appetite. "Got a telephone call from Samsung guys," Chung Chae Kyun, Hynix's global director of major accounts, said in a message to subordinates, including Heller and Palonsky, in August 1998. "They will coordinate with Japanese suppliers, asking them to raise, or at least not to lower from August prices." Heller and Palonsky didn't respond to requests for interviews.

In November 1999, Samsung stepped up pressure on its employees to collaborate with rivals, according to court records. Company officials developed a PowerPoint presentation encouraging sales representatives to ask competitors for prices, according to court documents.

Some Samsung employees saw no limits to what they could do in talking with rivals. Micron sales representative James Alt told his bosses he was at a funeral for a customer when a Samsung sales representative asked him for Micron prices, according to a Micron summary of the conspiracy that was given to prosecutors. Alt didn't cooperate with Samsung, Micron told investigators. Samsung spokeswoman Chris Goodhart says the company and its employees declined to comment for this article. (See "Shadow Over Samsung," also in the June 2008 issue of Bloomberg Markets.)

Heller, 50, was more cautious in his approach to talking with rivals, worried that such actions violated antitrust laws. "I was concerned and fearful that there were price discussions that could be illegal," he testified in February at a criminal trial of one of his bosses, Gary Swanson.

"Heller always felt uncomfortable talking about pricing," federal investigators wrote in a summary of their interview with the Dover Plains, New York, sales manager. "Heller knew that he was in a gray area."

His anxiety didn't stop Heller from crossing the line himself, court documents show. He met most often with Tom Treventi, an Infineon sales representative. They had much to share besides an interest in golf, Heller told prosecutors. Heller oversaw salespeople who dealt with Armonk, New York-based IBM, an account that Treventi handled.

On March 2, 1999, a windy day in New York's Hudson Valley, Heller and Treventi, 47, got together for lunch at Michael's, a bar frequented by dart throwers and pool players in Fishkill, which is about 80 miles (129 kilometers) north of Manhattan and about 30 miles from IBM's chip procurement center in Somers. Heller didn't want anyone to know he was sharing secrets with a rival, so he misidentified his lunch partners, including a phony name, when he submitted an expense report for the \$32.22 tab, he told prosecutors.

"Did you discuss with Mr. Treventi how Hynix intended to price on upcoming customer negotiations with IBM?" prosecutor Niall Lynch asked Heller at the February trial.

"Yes," testified Heller, dressed in a gray suit and red, white and blue tie, his face showing no emotion.

"Now, did Mr. Treventi ever tell you that Infineon intended to raise prices?" the prosecutor asked.

"Yes," Heller said.

Treventi declined to comment.

As Heller and Treventi swapped information, Micron's Steven Thorsen and Samsung's Thomas Quinn traded secrets over the phone, court documents show. Combing telephone records, federal investigators counted 254 calls--as many as four a day--between the two from September 2001 to June '02.

"I'm talking to you more than my own guys," Quinn, who was based in San Jose, California, at one point told Thorsen, who worked at Micron's Boise headquarters, court records show.

Thorsen, 43, a former bank loan officer who had been at Micron since 1988, was in a position to help Quinn. He ran the sale of chips to Micron's top customers, including computer maker Apple Computer Inc., and had the final say on pricing. Quinn,

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Thorsen told investigators his chats with Quinn gradually made him uncomfortable. While he didn't think they were illegal, talking to a competitor about company secrets bothered him. The two turned to speaking in codes about customers. IBM was "Raleigh" because the company has an assembly plant in the North Carolina city, and Palo Alto, California-based Hewlett-Packard Co. was "Palo Alto."

"So through these conversations, did you come to have a mutual understanding on pricing of DRAM to the core accounts?" prosecutor Lynch asked Thorsen.

"Yeah," Thorsen said. "We came to have a mutual understanding of the range, a range of prices or--first of all, an intention whether we intended to try to raise prices or lower them. But, second of all, a range in which we would negotiate pricing."

The prosecutor asked, "Now, were there instances when you spoke to Mr. Quinn and told him, 'We are going to raise prices?'"

"Yes."

Lynch asked, "And in response to those statements, did Mr. Quinn respond that Samsung would also raise prices?"

"In some instances, yes," Thorsen said.

Micron spokesman Daniel Francisco says the company cooperated with prosecutors. The company's employees declined to comment, he says.

Sharing of secret information intensified in 2001--when Thorsen and Quinn telephoned each other routinely--as the semiconductor industry suffered its worst decline ever. Chip companies kept manufacturing levels high, wrongly anticipating that demand would remain strong. Instead, customers bought fewer memory chips as production shifted from desktop computers to laptops, says Bob Merritt, a DRAM analyst at Phoenix-based Semico Research Corp. Micron reported a \$625 million loss in fiscal 2001 as wholesale chip prices dropped to 12 cents per megabyte from \$1.20 a year earlier. Executives tried to stop the bleeding. "We were desperate," Suh Kun Chul, DRAM marketing manager at Hynix, testified at Swanson's trial. "We were desperate," he repeated. He didn't respond to requests for comment.

In May 2001, Park Sang Ho, 61, then co-president of Hynix, urged his sales force to talk to rivals, according to evidence at the Swanson trial. "Make efforts to cooperate with applicable regional competitors so that stable prices may be maintained," he told his staff on a conference call on May 8, 2001, according to a summary of Park's instructions introduced at Swanson's trial.

Park was aware that people at all levels of Hynix were talking to competitors, Kim Dae Soo, a Hynix senior vice president told Justice Department investigators in 2005. Kim pleaded guilty to price-fixing charges and was imprisoned for his role in the conspiracy. He declined to comment.

Park, now CEO of Seoul-based MagnaChip Semiconductor Ltd., declined to comment, according to MagnaChip spokeswoman Han Mijeong.

Also in 2001, companies in Korea, Taiwan and the U.S. discussed possible joint chip production cuts to raise demand and prices. Micron sales director Michael Sadler told the Swanson jury he spoke to rival firm executives who expressed interest in the plan. Sadler said Charles Kau, executive vice president for global marketing at Nanya Technology Corp., Taiwan's second-largest memory chip producer, told him his company would go along with cutbacks. Kau said he could convince his rivals in Taiwan to fall in line, Sadler testified. The Micron executive said he also met with two Hynix executives, Kim and Farhad Tabrizi, in Micron's downtown San Jose offices to discuss production cuts.

Kau and Tabrizi didn't respond to requests for comment.

In October 2001, Sadler shopped the production cuts proposal on a round-the-world visit with top executives of rival companies, he testified. In South Korea, he discussed the idea with Lee Yoon Woo, then Samsung Electronics' chief executive officer and now its vice chairman. In Munich, Sadler brought it up in a meeting with Ulrich Schumacher, then chairman of Infineon, Sadler testified. Schumacher is now president of Shanghai-based Grace Semiconductor Manufacturing Corp., China's second-largest producer of custom chips. Lee rejected the plan, and it went nowhere, Sadler testified at Swanson's trial.

San Francisco antitrust lawyer Joseph Alioto, who represents consumers in civil suits against the components companies, says it's disturbing that corporate leaders know their employees are fixing prices and don't get punished. "Chief executives never go to jail," he says. "They always have someone to take the fall."

Lee declined to comment, and Schumacher didn't respond to requests for an interview.

Sadler testified at the Swanson trial that he told Micron CEO Steven Appleton about his overseas trip to meet with top executives of rivals. Lawyers for chip buyers who filed civil suits against Micron and rivals for price fixing asked Appleton in a 2006 deposition why he didn't question whether Sadler's trip was proper.

"Now when he apprised you of his purpose in taking this trip, did you make any inquiry of anyone whether or not this comported with Micron's policies with respect to antitrust compliance?" asked Seattle attorney Anthony Shapiro, who represents companies including Internet Integration Inc. of Los Angeles. "No, I did not," said Appleton, 48, who's a stunt pilot and off-road auto racer in his spare time.

Appleton, in his 2006 deposition, said Sadler told him his 2001 trip was to investigate rumors that competitors might cut supply. The CEO said he didn't know of the DRAM conspiracy. He testified in the Swanson trial that he didn't know about the price-fixing conspiracy until after company executives received subpoenas. He said he wasn't subpoenaed.

Asked if he knew that Sadler's predecessor had talked to competing chipmakers about prices, Appleton said, "Well, we could have received information, if that's the question."

Appleton declined to comment.

In the fallout from the DRAM conspiracy, U.S. prosecutors charged 18 officials with price fixing under a beefed-up program to punish cartels by charging more offenders. In addition to Kim and Infineon's North American sales and marketing vice president for memory chips, T. Rudd Corwin, 13 other chip company officials went to prison. Rha Young Bae, a sales vice president at Samsung, is a fugitive. Samsung's Quinn was charged with price fixing and bid rigging, and he pleaded guilty in 2006. He served eight months in a Lompoc, California, federal prison in 2007. He declined to comment.

Micron escaped penalty. The company took advantage of a federal amnesty program, which also benefited Thorsen and Sadler as employees. Begun in 1978 and expanded in '93, the program has offered immunity to price fixers who come forward, tell investigators everything they know about collusion and report their collaborators. "The amnesty program has resulted in scores of cartels being reported that otherwise would have gone undetected," says Gary Spratling, a former federal prosecutor who helped create the program. "Fifteen years ago, it would be, Let's hunker down and fight it."

Spratling, now a partner at San Francisco-based Gibson Dunn & Crutcher LLP, represented Micron when the company's managers went to the Justice Department at the start of the investigation in 2002 and told prosecutors what had happened. One of Micron's executives, Northeast sales manager Alfred Censullo, couldn't avoid prosecution. The government charged him with destroying price-fixing evidence, and he was sentenced in 2004 to two years probation and fined \$6,200. Censullo declined to comment.

Sun Microsystems Inc. in Santa Clara, California, other companies and 35 states representing consumers have sued to get money back from DRAM conspirators, including Hynix. Paul Liu, a Stanford University-educated economist, estimated in court papers that companies that filed civil suits paid up to \$4.8 billion extra for DRAM chips from 1999 to 2002. Liu was hired by the companies that sued.

So far, companies accused in civil suits of collusion in the pricing of DRAM chips have paid \$416 million in settlements, court records show.

Four Hynix sales executives above Heller pleaded guilty and were sentenced to prison. Swanson's case resulted in a hung jury. A judge then dismissed the charges at the government's request. Infineon's Treventi wasn't charged. Four of his superiors were accused of violating the Sherman Act. Infineon's Corwin pleaded guilty in 2004 and was sentenced to four months in prison. Hynix spokeswoman Park Seong Ae says the company accepts the rulings of the courts and will follow the law. Infineon provided extensive training against collusion for its employees after it settled with the Justice Department, says company spokesman Guenter Gaugler, who declined further comment.

Meanwhile, chip companies snared in the DRAM conspiracy have retained some of the executives who were convicted. At least five of the 15 imprisoned conspirators, including Hynix's Chung, who is also called C.K. Chung, and Suh, who goes by K.C. Suh, went back to work at their companies when they completed their sentences, according to their lawyers and court testimony. Chung didn't respond to requests for comment.

"If a company wants to hire a convicted felon, I guess they can do that," says Scott Hammond, deputy assistant attorney general for U.S. antitrust criminal enforcement in Washington. Park Seong Ae says Korean law and company regulations allow Hynix to keep the executives.

The worst isn't over for many employees of electronics part makers. The Justice Department investigation of possible price fixing in such markets as liquid-crystal-display screens, used in televisions and computers, and a faster type of chip known as static random-access memory might continue for at least another year, according to court records.

Samsung, which was fined \$300 million for conspiring in DRAM chips, is being probed for price collusion in widescreen television monitors; cathode ray tubes, used in older televisions and computers; and so-called flash chips, which are used to store pictures in digital cameras. The company has said it's cooperating with prosecutors.

University of San Francisco law professor Josh Davis says he wonders whether it's possible to break up cartels, even with amnesty programs. "If you add together the odds of being caught and what they ultimately would have to pay in terms of criminal and civil fines, it makes good business for these companies to continue to engage in this conduct," says Davis, who runs the university's center for law and ethics.

Even if the DRAM chip cartel failed to raise prices, it earned \$4.8 billion in revenue for chipmakers that paid a total of \$1 billion in fines and civil settlements, court records show.

Cartels can also take advantage of inconsistent enforcement, even in the face of more prosecutions by governments such as the European Union, the University of Baltimore's Lande says. In the past decade, South Korea has fined colluders \$231 million on average annually, Japan has levied \$42 million in penalties per year and Taiwan issued \$1.2 million in fines, Purdue's Connor says.

"If you can steal a dollar from Americans, a dollar from the Japanese, a dollar from the developing world and you have to give a quarter back to the U.S. and a quarter back to the EU, where is your disincentive to form a cartel?" Lande says.

For antitrust prosecutors, the toughest challenge is to combat cartel behavior. Conspirators in the DRAM case told investigators they had accepted collusion as part of the job and that employees who had information on what the competition was doing got ahead.

Hynix's Heller tried to stop collusion at his company after he learned of the federal investigation. "Heller realized how serious this investigation was when all the files were subpoenaed," investigators wrote. It was then that Heller told everyone at his company to stop talking to competitors. His advice came too late: Five Hynix executives were charged. Executives still have time to heed Heller's warnings. If they don't, they can expect federal prosecutors to be talking to their co-workers and reading their e-mails.

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