

CMP Outlook: Looking for a Better 2002

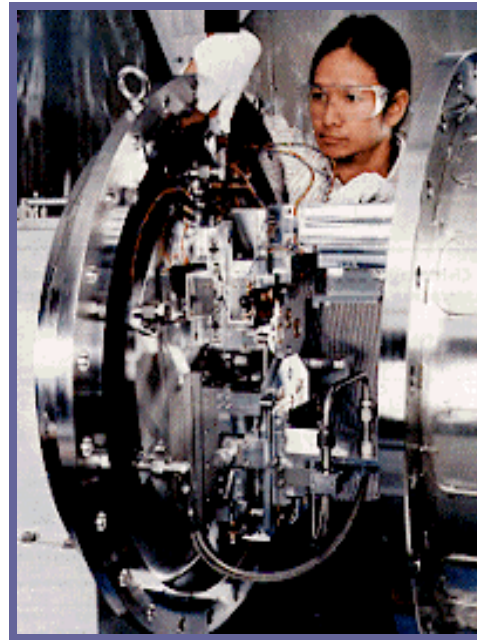


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You Can Have The Greatest CMP Tool....



...*The Brightest Engineers*



...The Biggest R&D Budget



...The Best Sales Team



...But Without A Strong Economy



....Sales Are In The Toilet



...And Pink Slips Are Passed Out



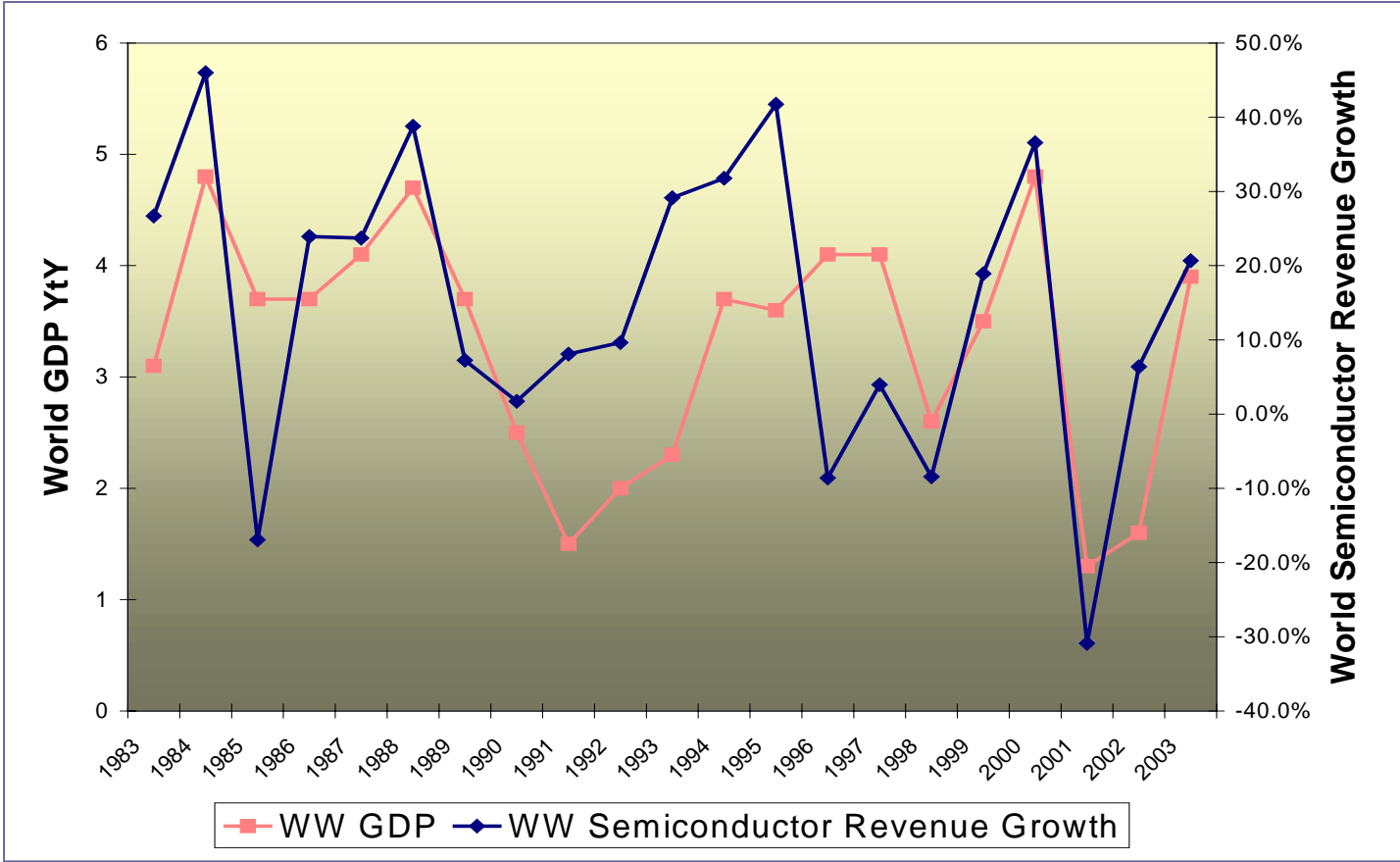
IT HAPPENED IN 2001

CAN IT HAPPEN IN 2002?

The Economy Has a Strong Hold on Technology

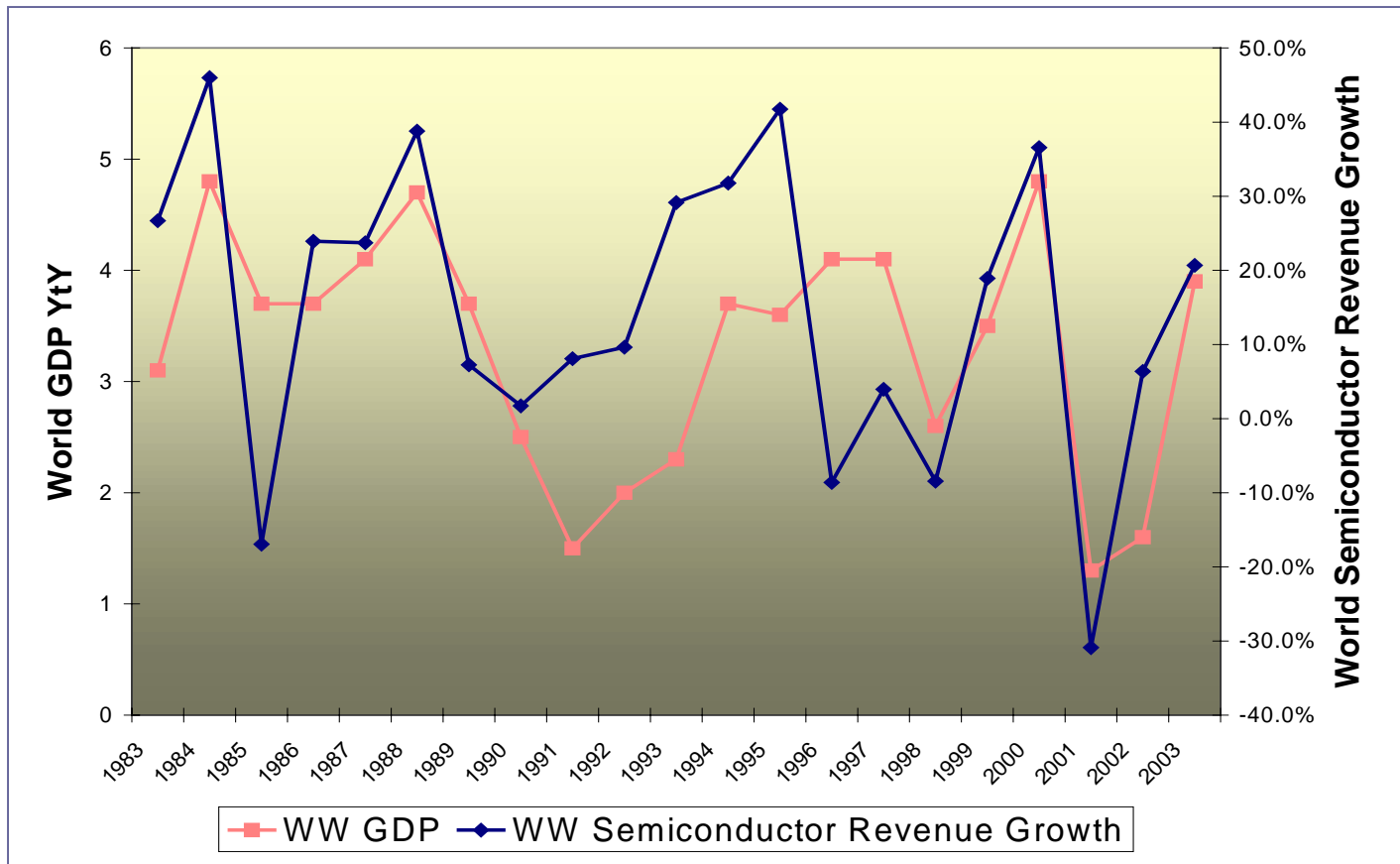


Worldwide GDP is Tied to Semiconductor Orders

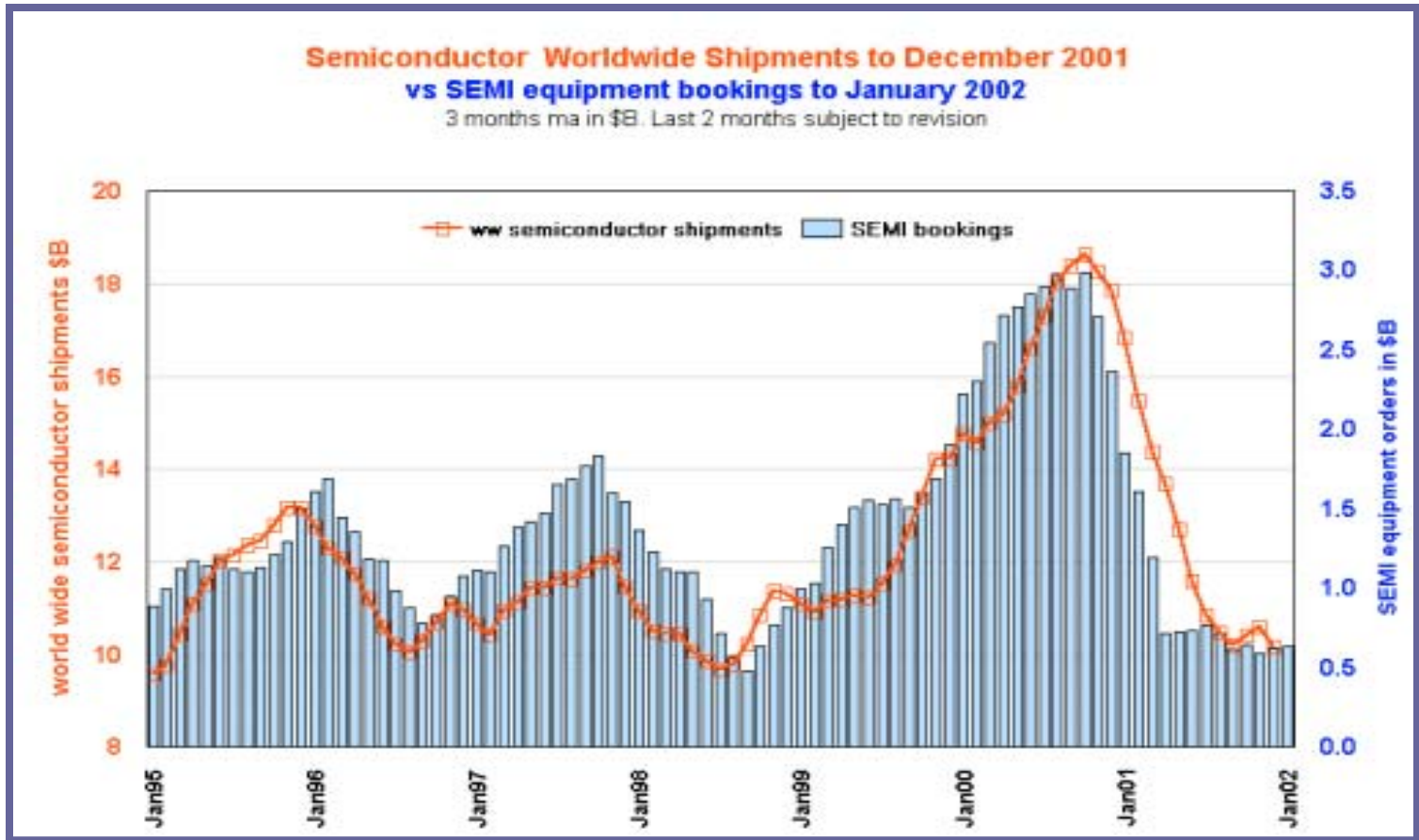


**WHY SUCH A HUGE
DOWNTURN IN 2001?**

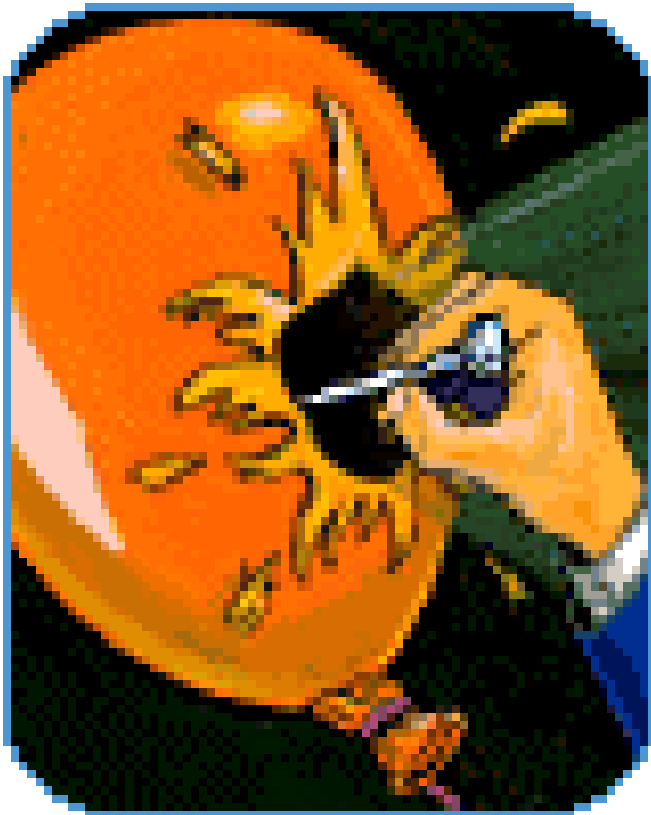
Not Only A Sharp Drop In Semiconductor Orders



But A Simultaneous Drop In Semis and Equipment



One Key Factor -- The Burst In The Internet Bubble



- **Inverse wealth effect - Nearly \$1 trillion**
- **Irrational exuberance of spending associated with the dot commers**
- **Stock analysts with their interpretation of the “new economy” and demise of the “old economy**

The Day The "New Economy" Died



Excessively Optimistic Forecasts Part 1...

Dateline October 9, 2000

Worldwide Semiconductor Forecast (Millions of U.S. Dollars)

	1999	2000	2001	2002	2003	2004
Total Market	169,136	231,601	295,180	336,150	320,930	339,545
Growth (%)	21.7	36.9	27.5	13.9	-4.5	5.8

Source: XXXXXXXX (October 2000)

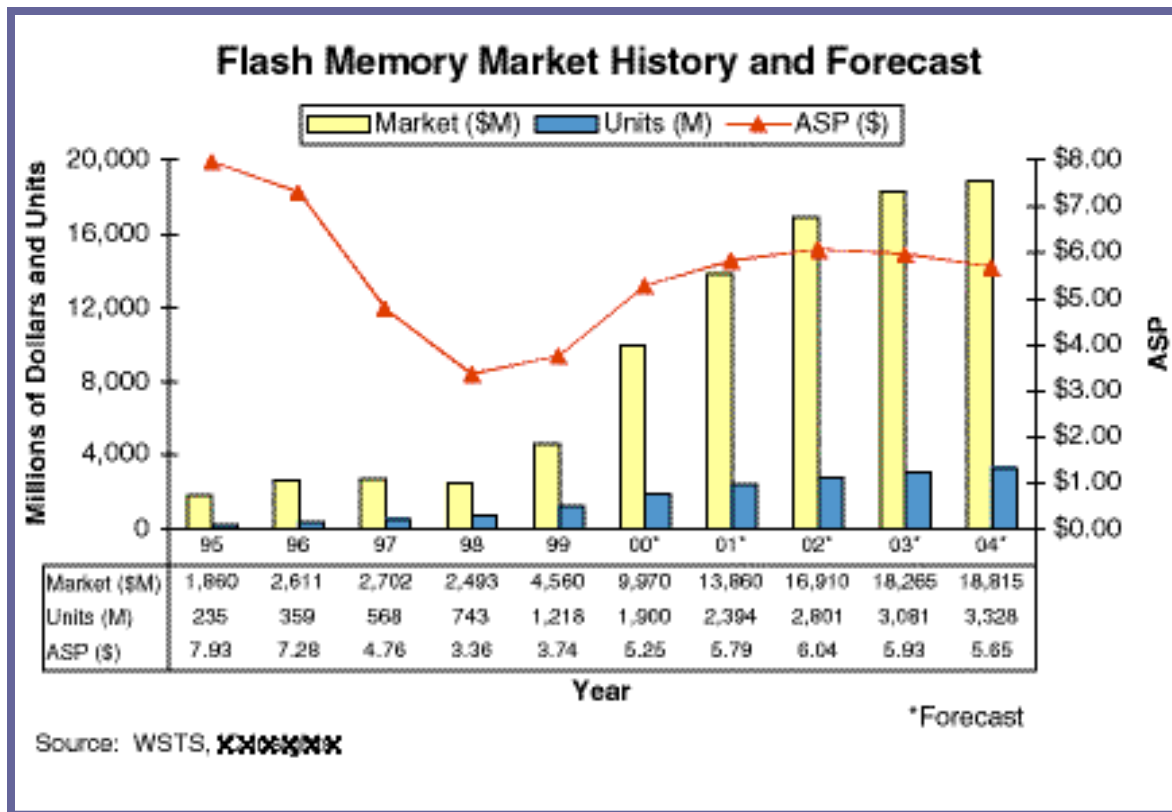
"Near-term spot pricing is reacting to inventory building and should not be confused with the overall industry supply/demand picture. Stronger demand and some product allocation in late 2000 will result in higher prices for DRAM, flash and some SRAM densities has forced lead times out beyond 20 weeks."

Dateline August 24, 2000

XXX is predicting a shortage of DRAM production capacity will start in the third quarter of 2000 and last until the second quarter of 2002, eventually giving way to another memory glut in the third quarter of that year.

Semiconductor revenues are now expected to increase 44% in 2000 and 45% in 2001, according to XXX preliminary outlook.

Excessively Optimistic Forecasts Part 2...



...Giving Rise To Excessive Inventories of Chips

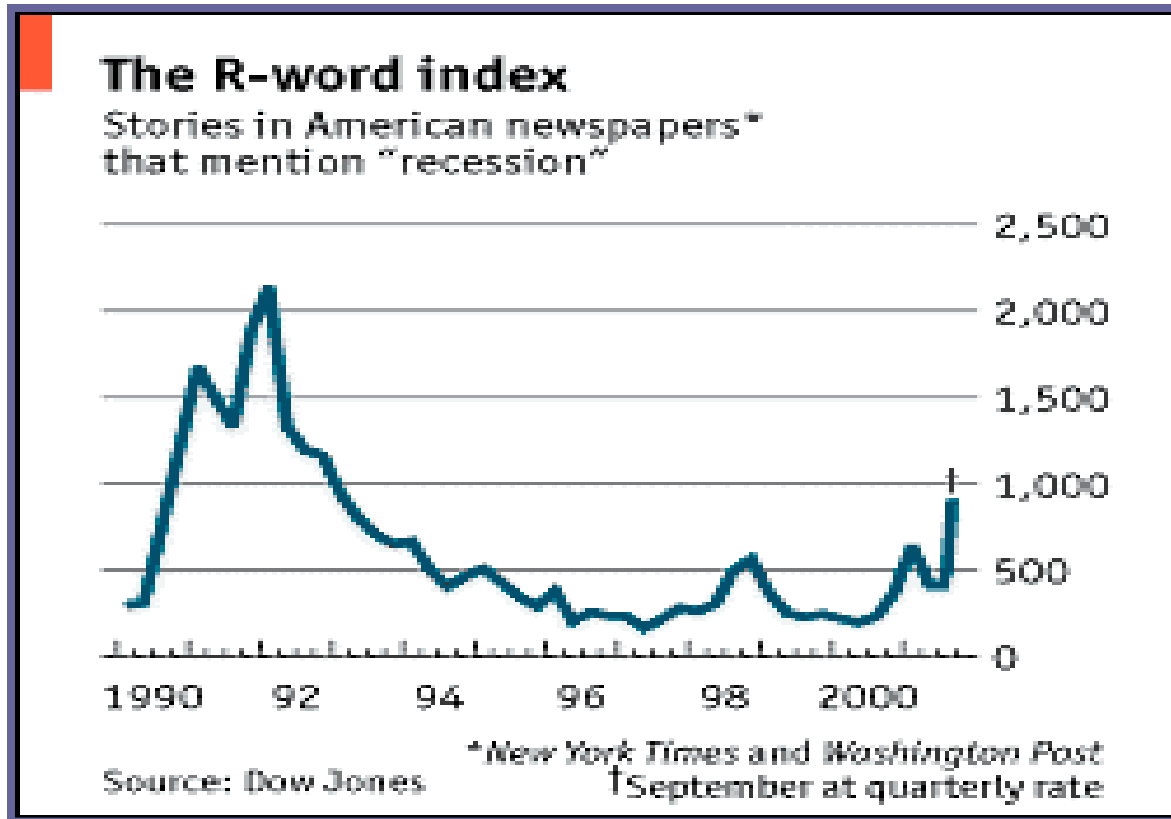
Dateline March 21, 2001

About \$8 billion in excess inventory; 60% of the excess inventory held by contract systems manufacturers was in the networking and telecom sector.

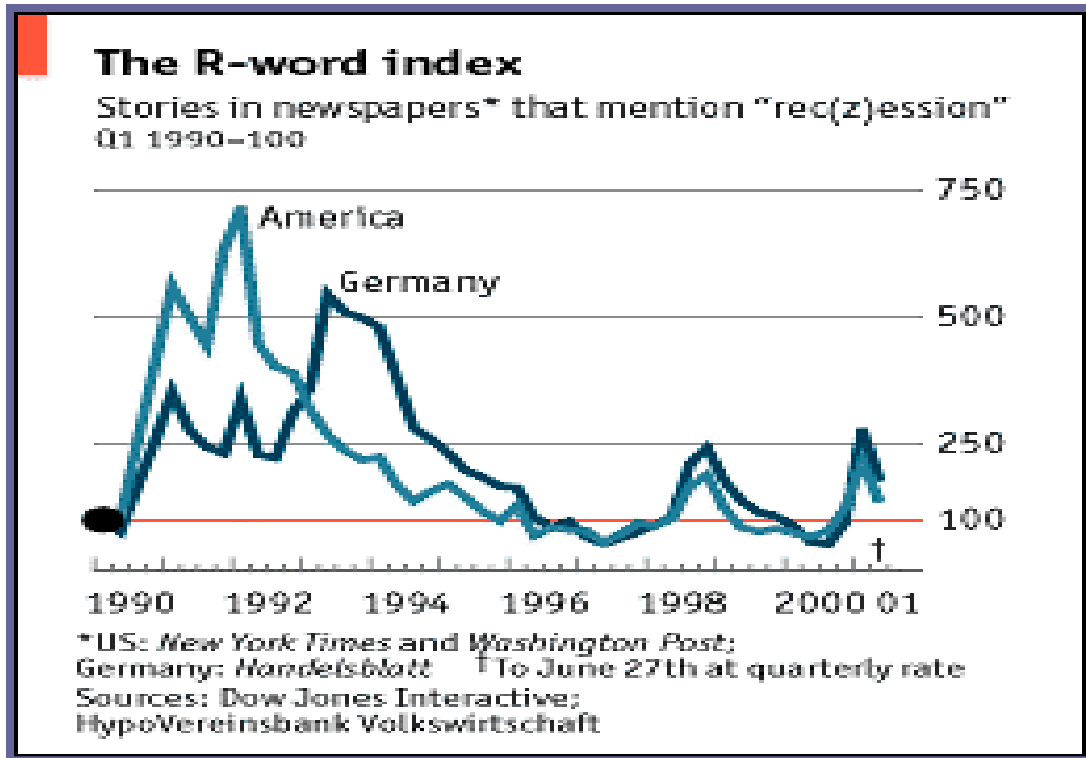
Dateline November 27, 2001

'Effective' excess inventory could be as high as \$7.4 billion at the moment

Then The Talk of a U.S. Recession



Followed By One In Germany



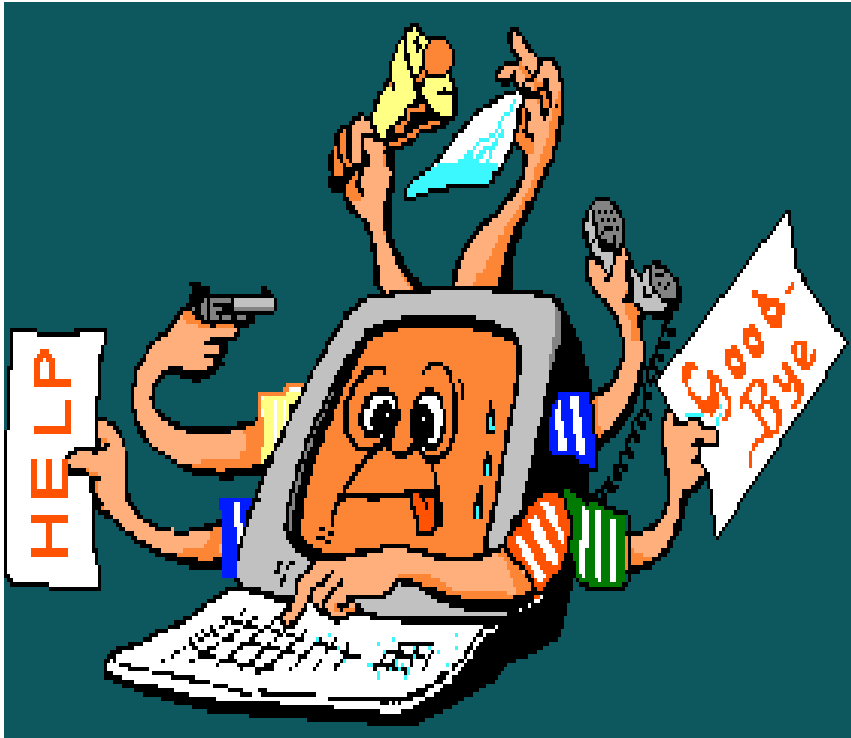
Leading To Huge Layoffs

Motorola	48,400	Dell Computer	5,700
Nortel Networks	48,000	Siemens	5,500
Lucent Technologies	46,000	Intel	5,000
Soletron	20,850	Alcatel	4,800
JDS Uniphase	16,000	Applied Materials	4,700
Xerox+A47	13,600	Sun Microsystems	4,300
WorldCom	11,550	Emerson Electric	4,000
Qwest Communications	11,000	Cable & Wireless	4,000
ADC Telecom	9,600	BellSouth	3,000
Compaq Computer	9,000	TRW	3,000
Ericsson	9,000	Avaya Inc.	3,000
Cisco Systems	8,500	Polaroid	2,950
Agilent Technologies	8,000	Rockwell Collins	2,600
Unisys	8,000	IBM	2,500
Gateway	7,750	EMC Corp.	2,400
Hewlett-Packard	7,700	Standard Register	2,400
Corning	7,575	Tellabs	2,300
Verizon Communications	7,000	Teradyne	2,225
Philips Electronics	7,000	Lexmark International	2,200
Corning	6,575	TDK Corp.	2,000
3Com	6,500	Global Crossing	2,000
SBC Communications	6,500	Kemet	1,805
Eastman Kodak	6,500	Level 3 Communications	1,725
Sprint	6,000	Rockwell Automation	1,750
Agere Systems	6,000	McLeodUSA	1,600

That Continue Today



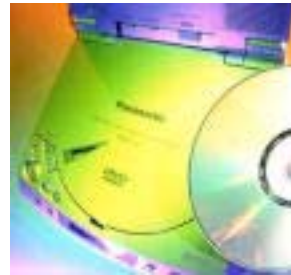
Every One A Consumer That Didn't Buy A PC



Or A Handsfree Cell Phone



Or Other Electronic Gadgets Using Semiconductors



And DotBombs Creating A Glut Of Networking Equipment

- Market awash with state-of-the-art gear at dirt-cheap prices.
- Internet routers, which sort and direct data traffic, dumped for less than 10% of their original price on the used market.
- Continues today - Enron can expect to get between \$1.5 million and \$2.7 million for gear it originally bought for \$30 million.

Making The Economy and IC Industry Worse Off



Recession? What Recession

- Market psychology more than fundamentals drove technology share prices up so rapidly in 1998 and 1999.
- Psychology turned sharply negative in 2000 after the dot.com collapse.
- Can economic fears can become self-fulfilling prophecies?
- The National Bureau of Economic Research declared last November that the nation was in a recession that had begun the previous March.
- So the recession, it turns out, was over before we even knew it had begun: The economy apparently began growing again last quarter just as it was officially declared to be shrinking.

But The Warning Signs Were There

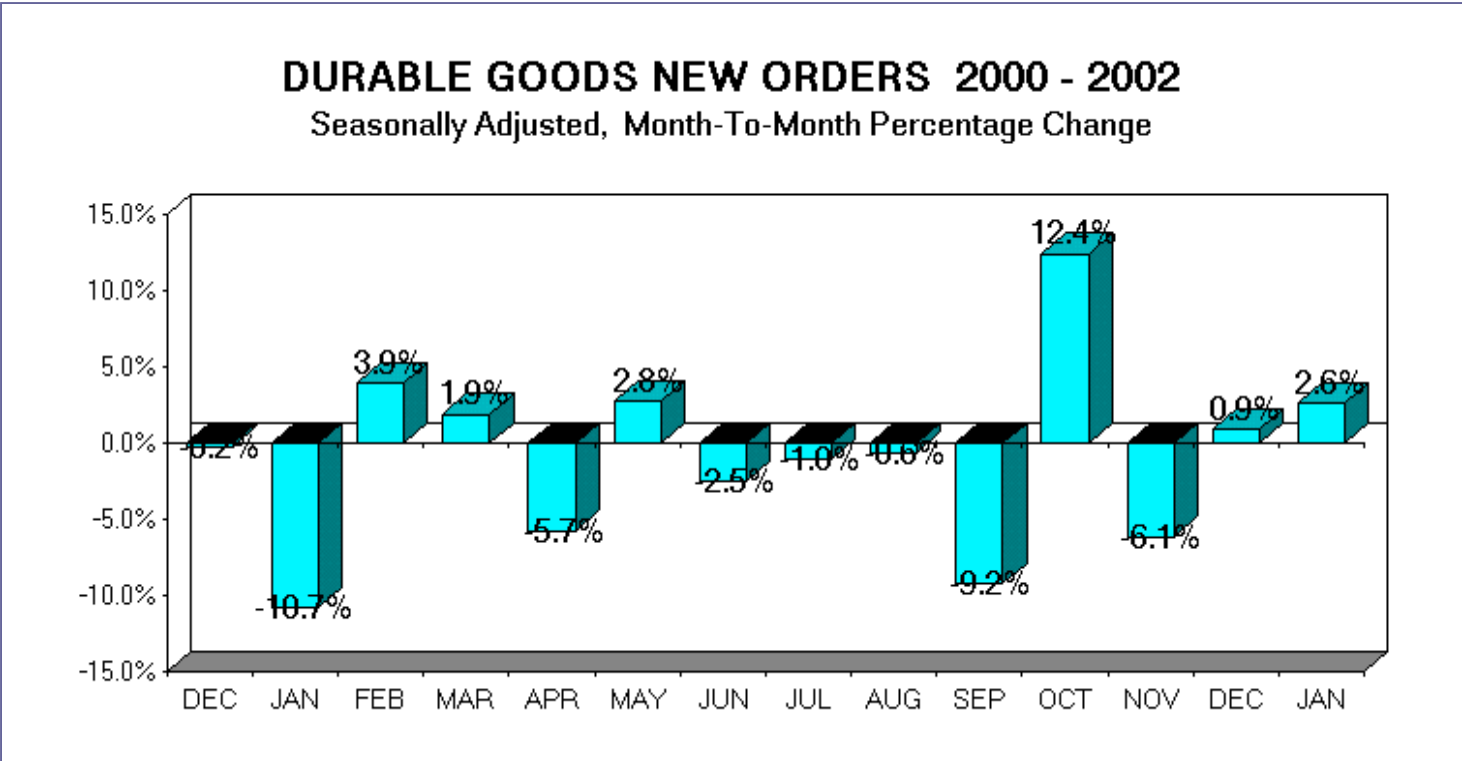
- Inverted Yield Curve - Short-term interest rates higher than bond rates. 8 of 9 past recessions.
- Sky Rocketing Oil - Price increase equivalent to \$100 billion tax increase led industry and consumers to stop spending.
- Credit Crunch - In mid-2000, borrowing from banks at \$4.6 trillion, Household debt to \$7 trillion. Fear of loses led banks to stop borrowing and VC money to dry up.

Better Signs Ahead

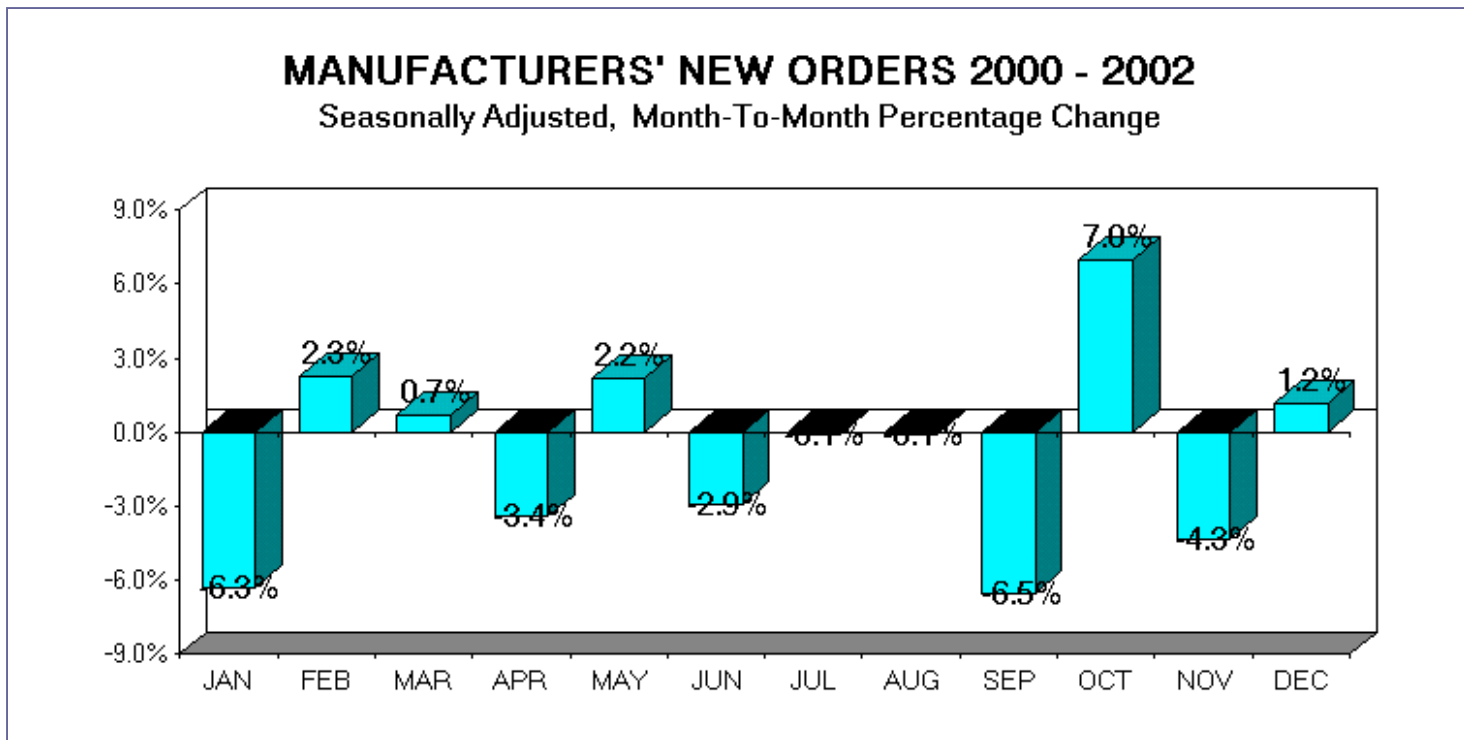


Maybe he has a
reason to be
smiling!

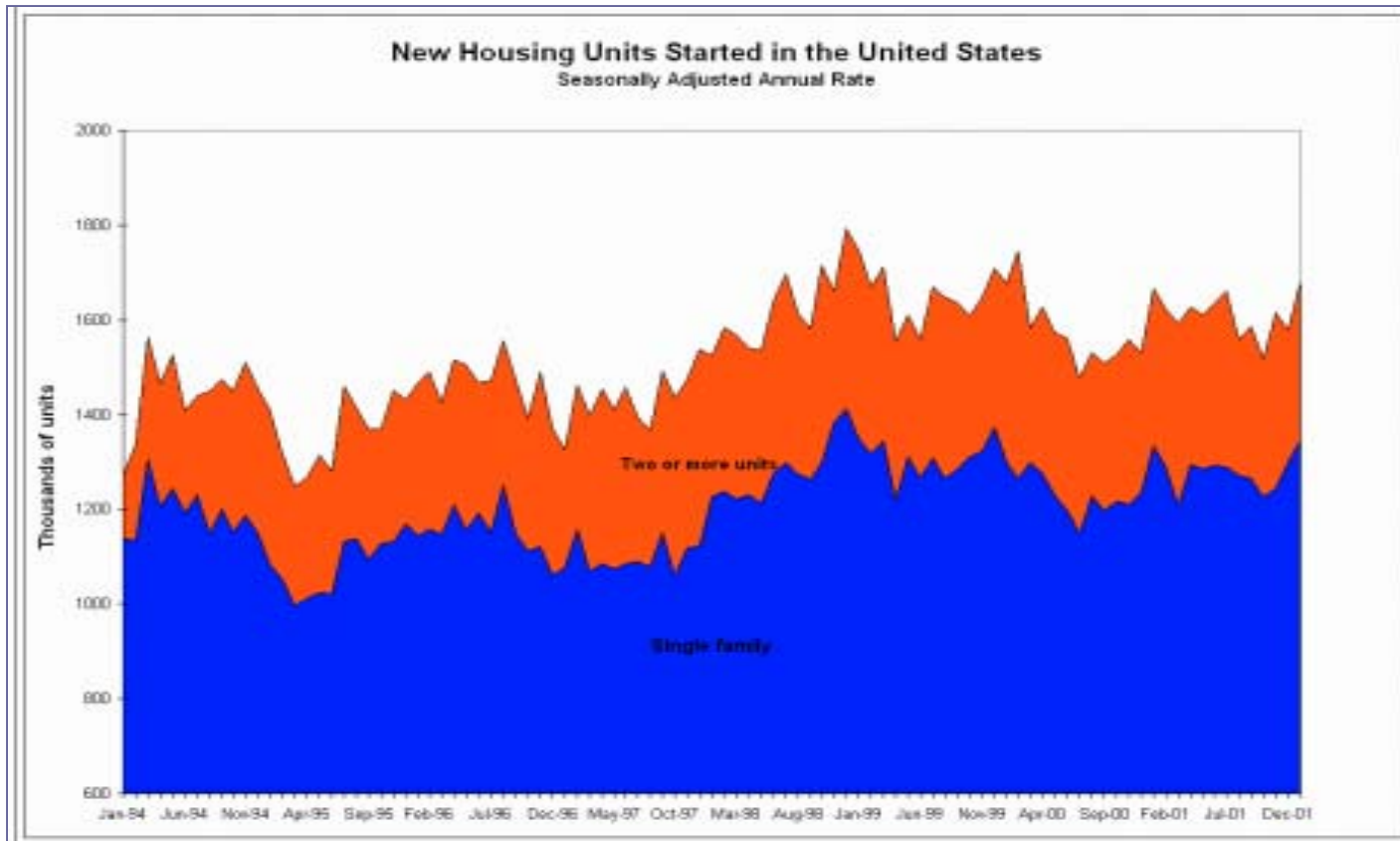
Durable Goods Orders Are Up



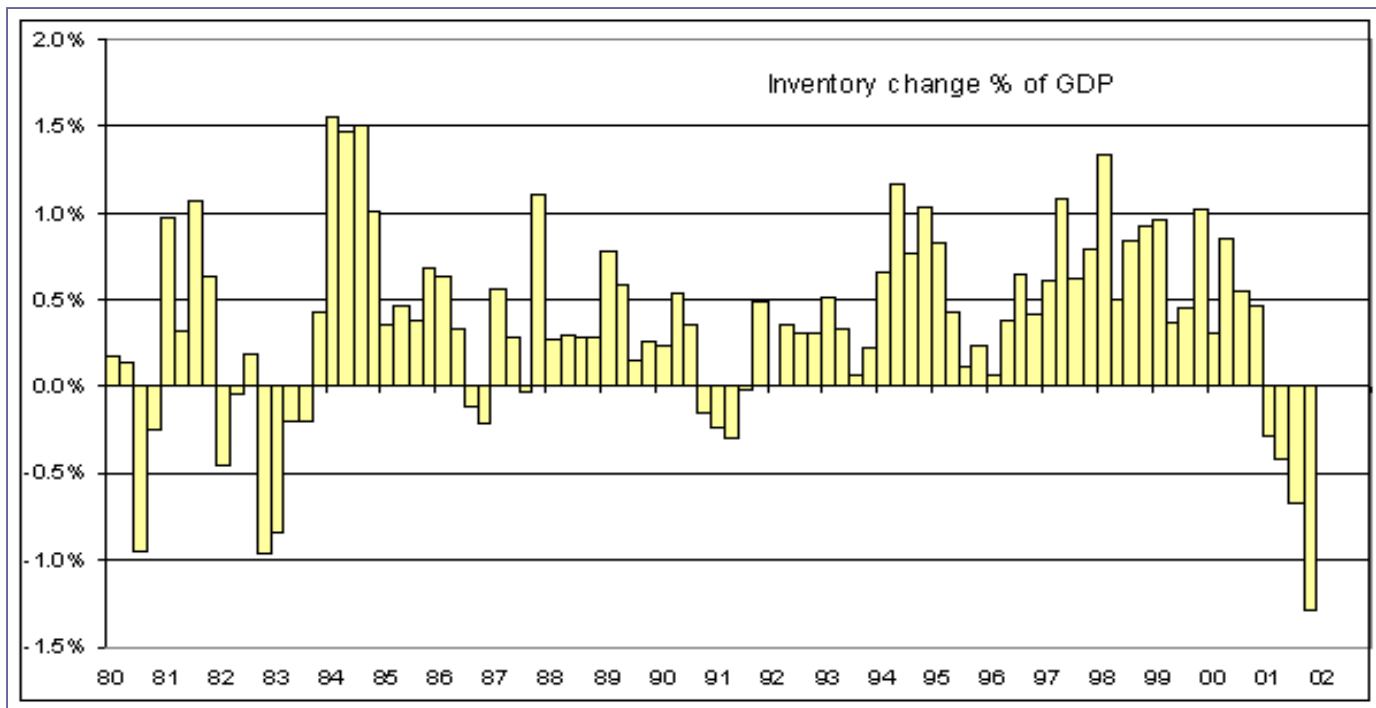
Manufacturers' New Orders Are Up



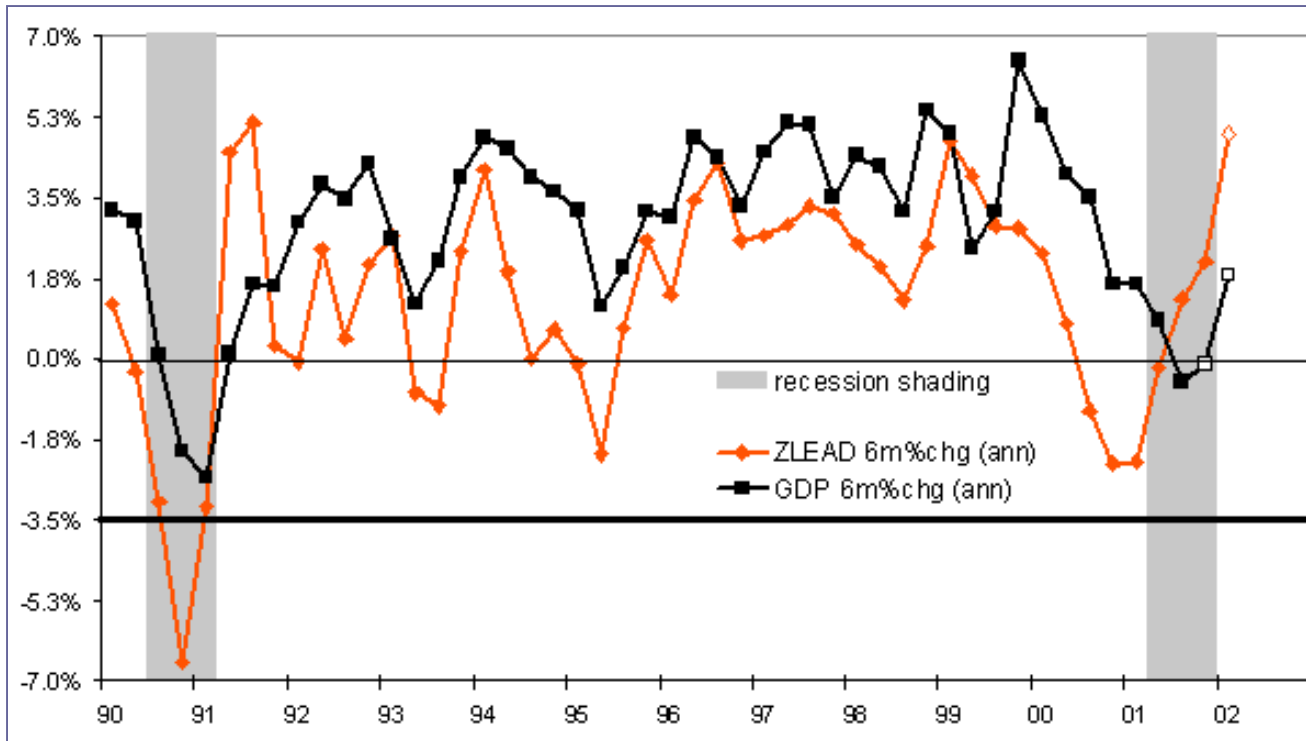
Housing Starts Are Up



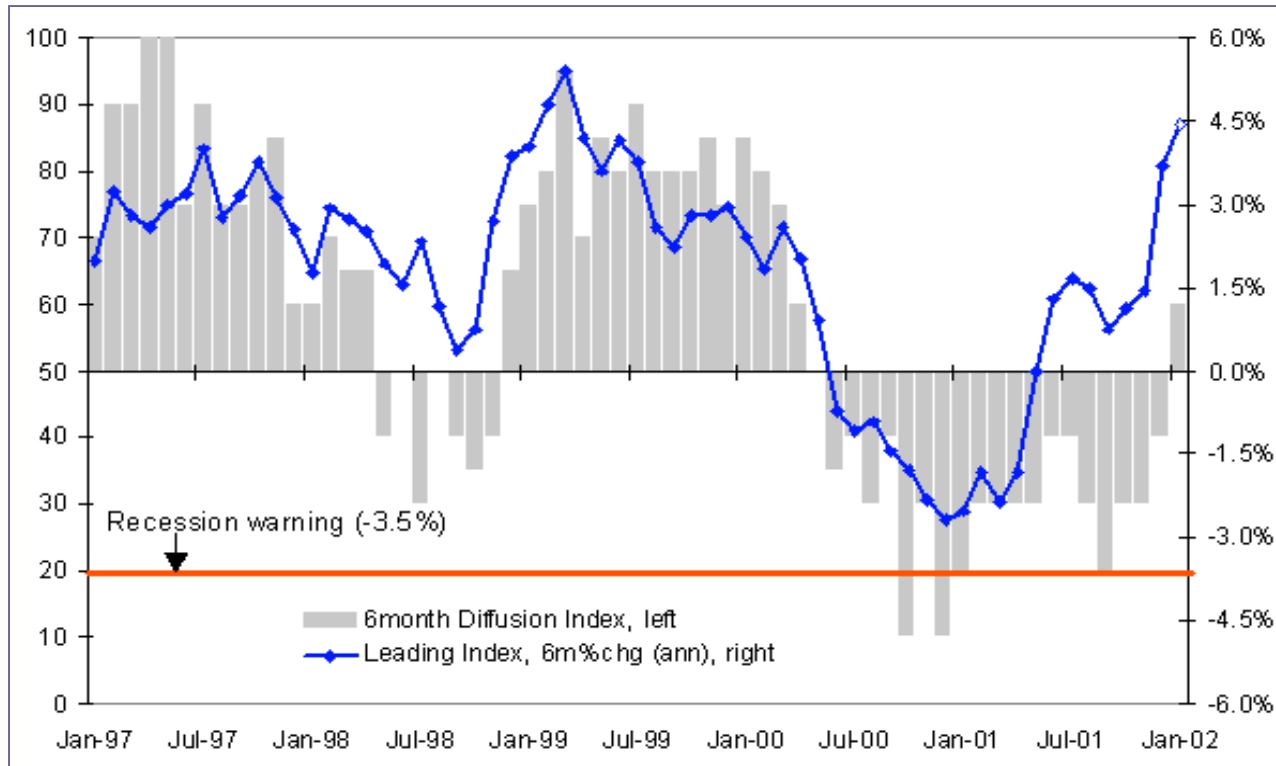
Inventories Are Down



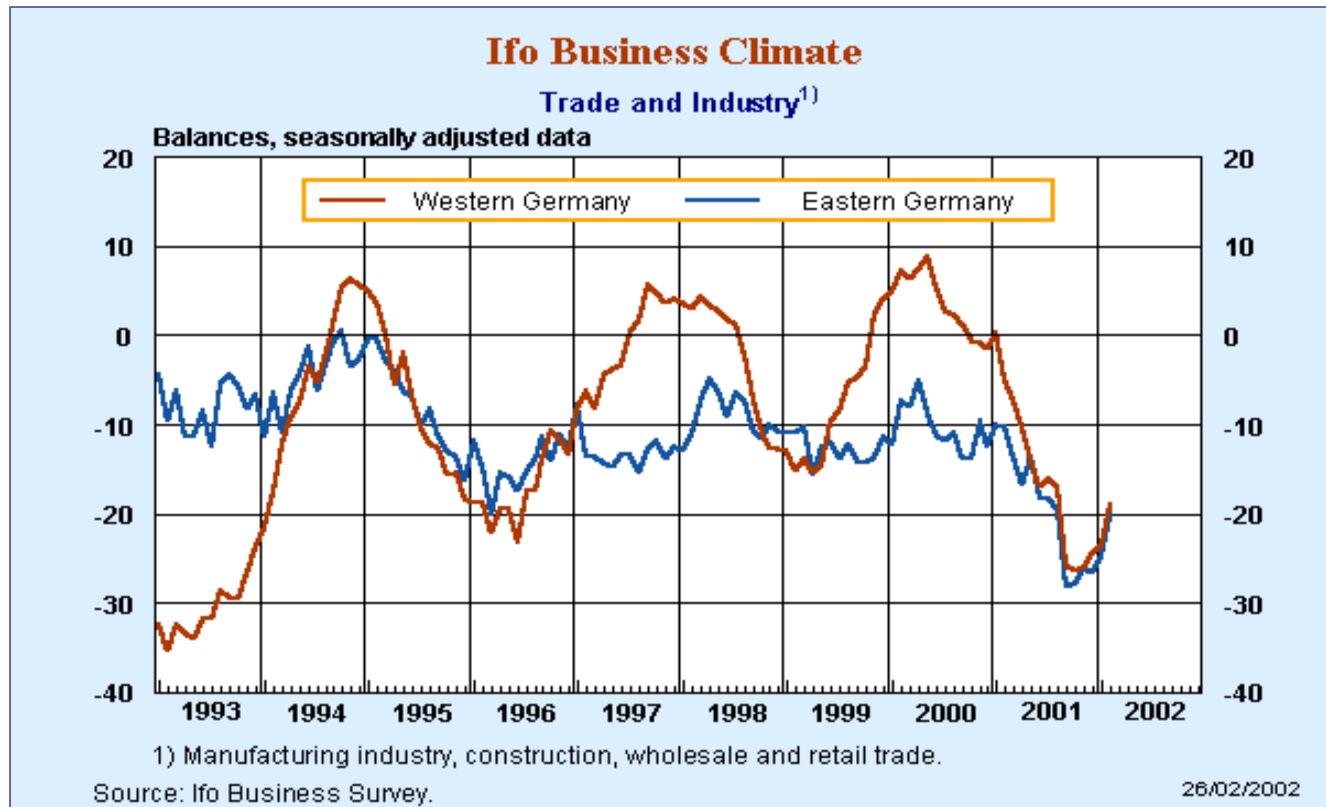
Leading Indicators Are Up



Other Leading Indicators are Up



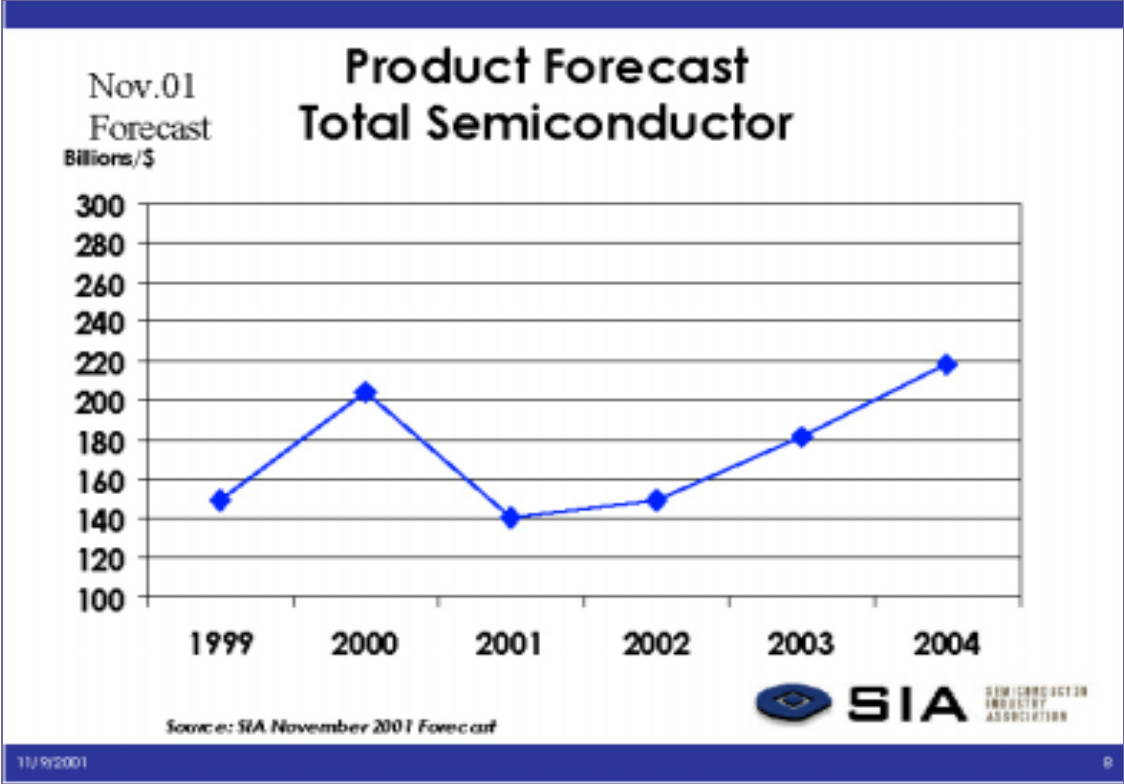
Business Conditions in Germany Are Up



There Are Positive Signs For The IC and CMP Businesses



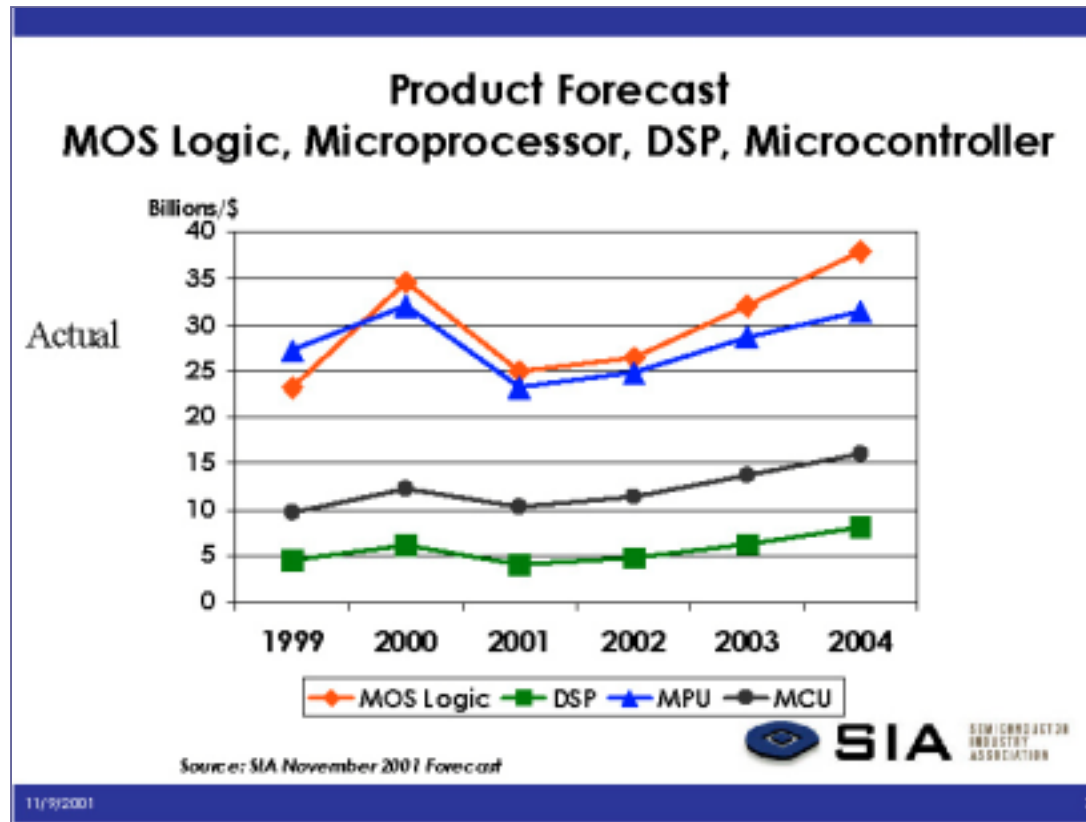
The Semiconductor Industry Has Turned The Corner



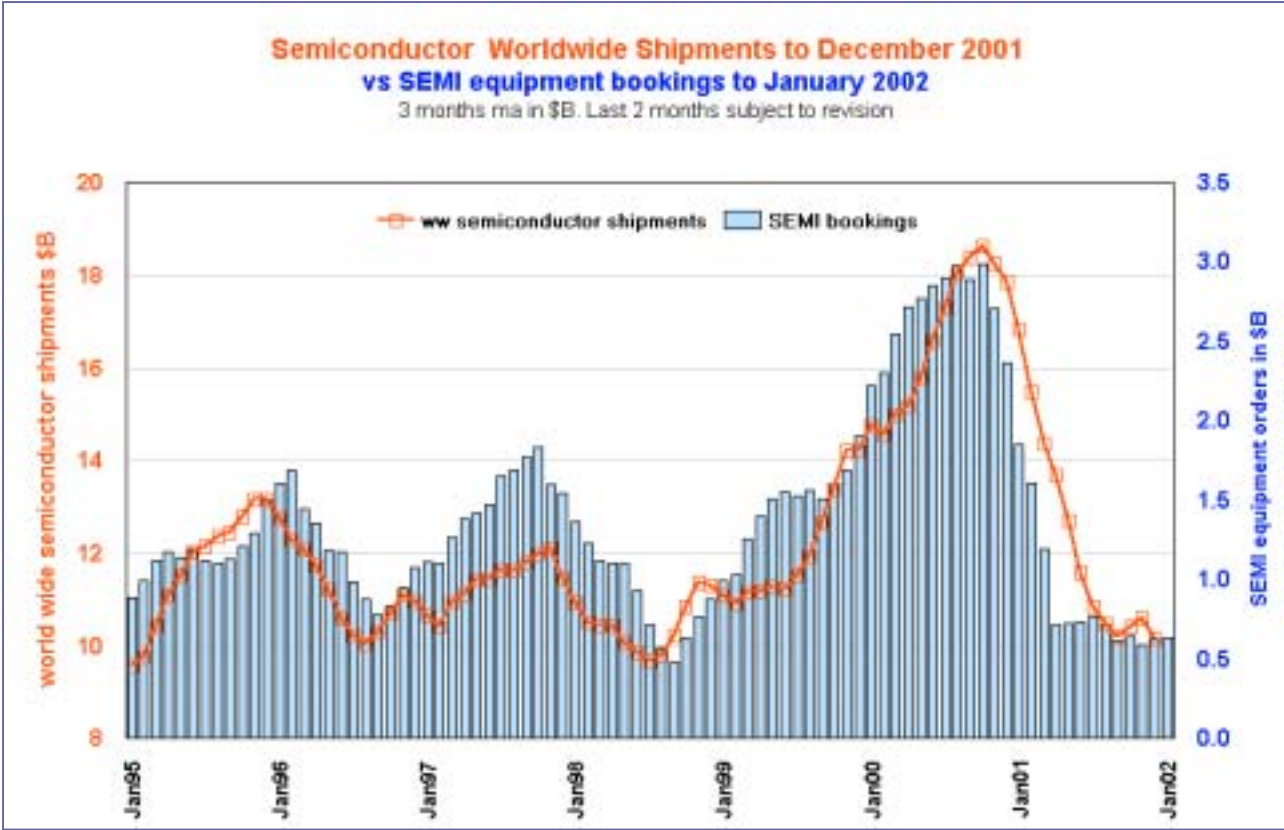
The Troubled DRAM And Flash Markets Are Up



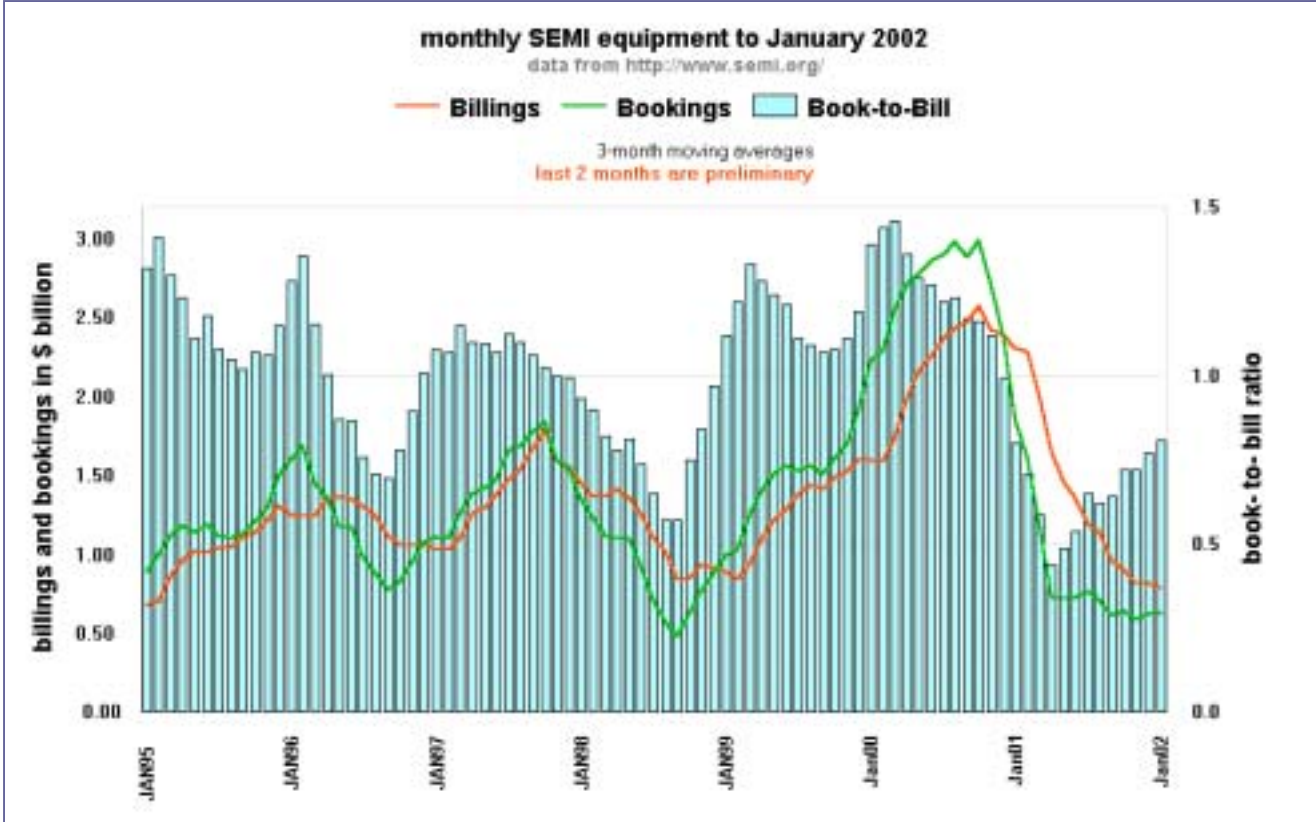
The IC Logic Market Is Up



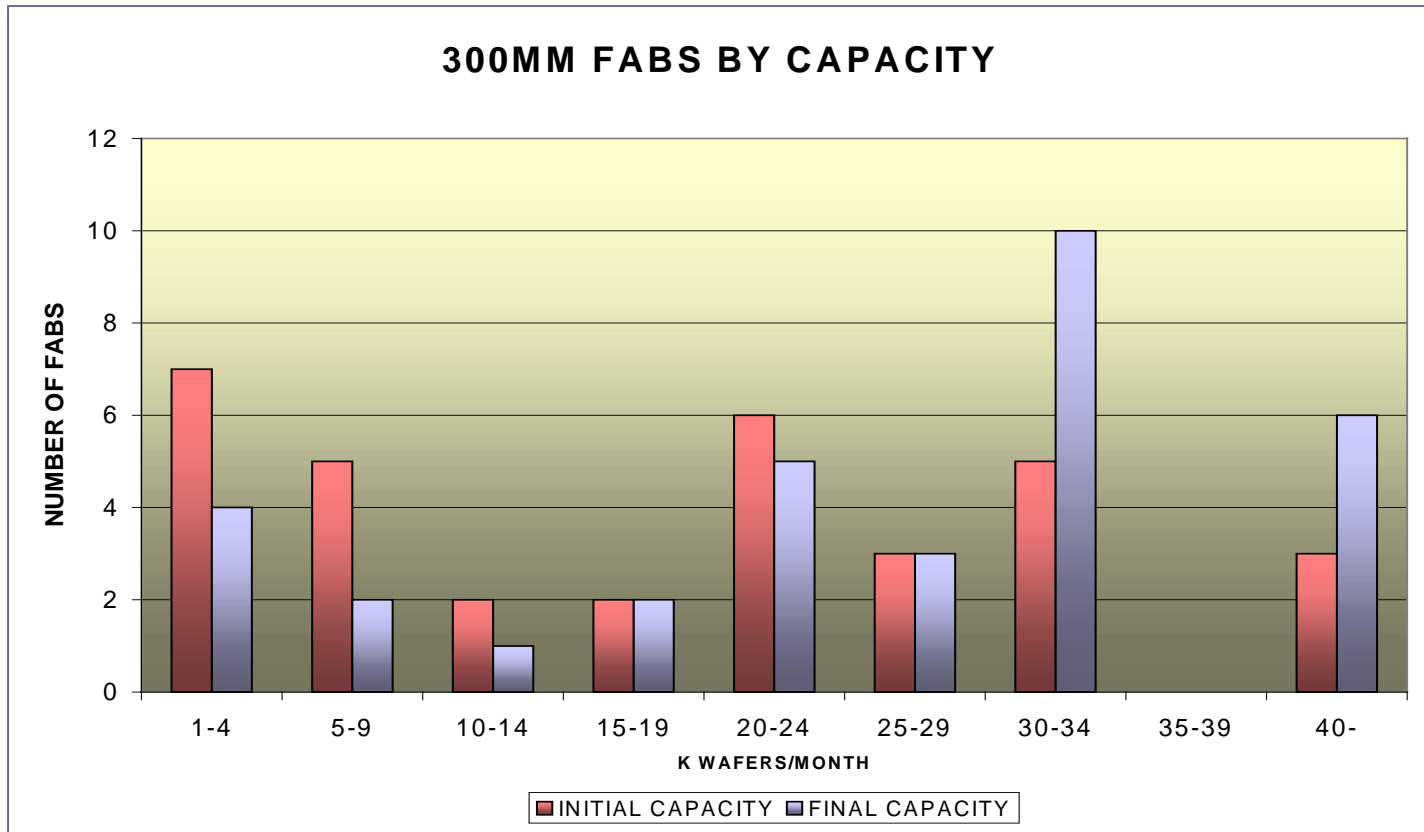
Semiconductor Equipment Bookings are Up



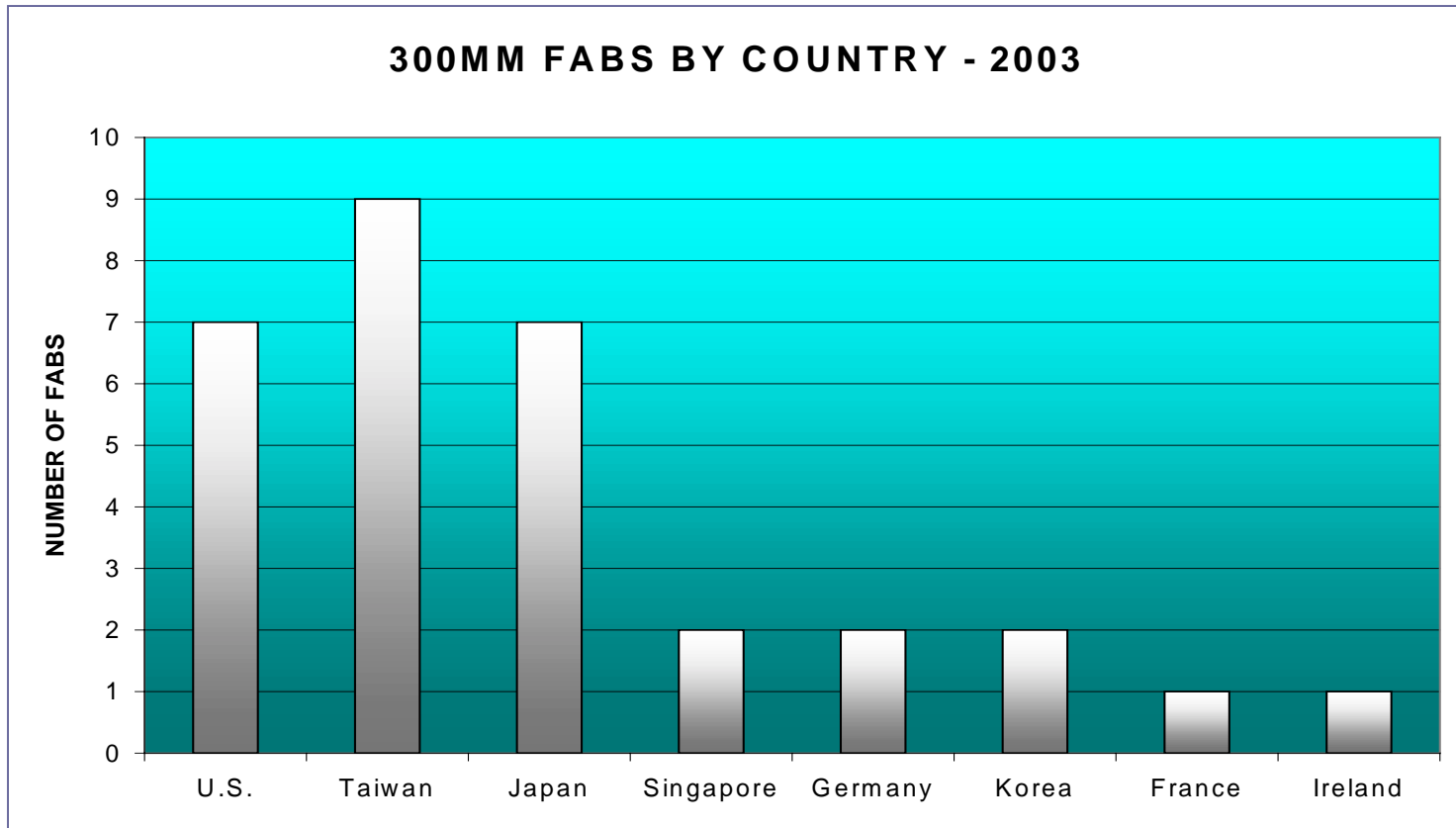
The Equipment Book-to-Bill Ratio Is Up



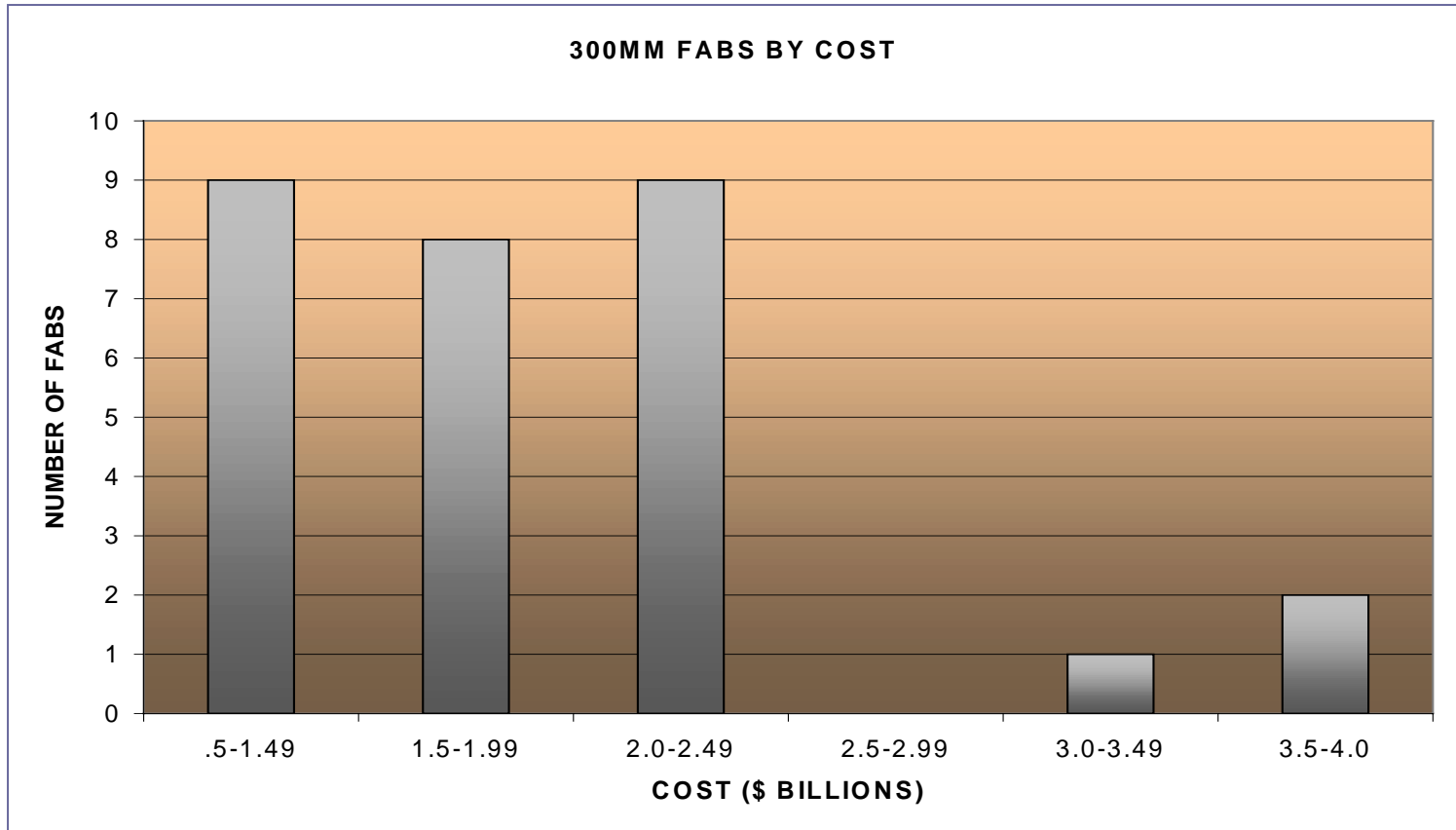
300mm Fabs A Key Driver



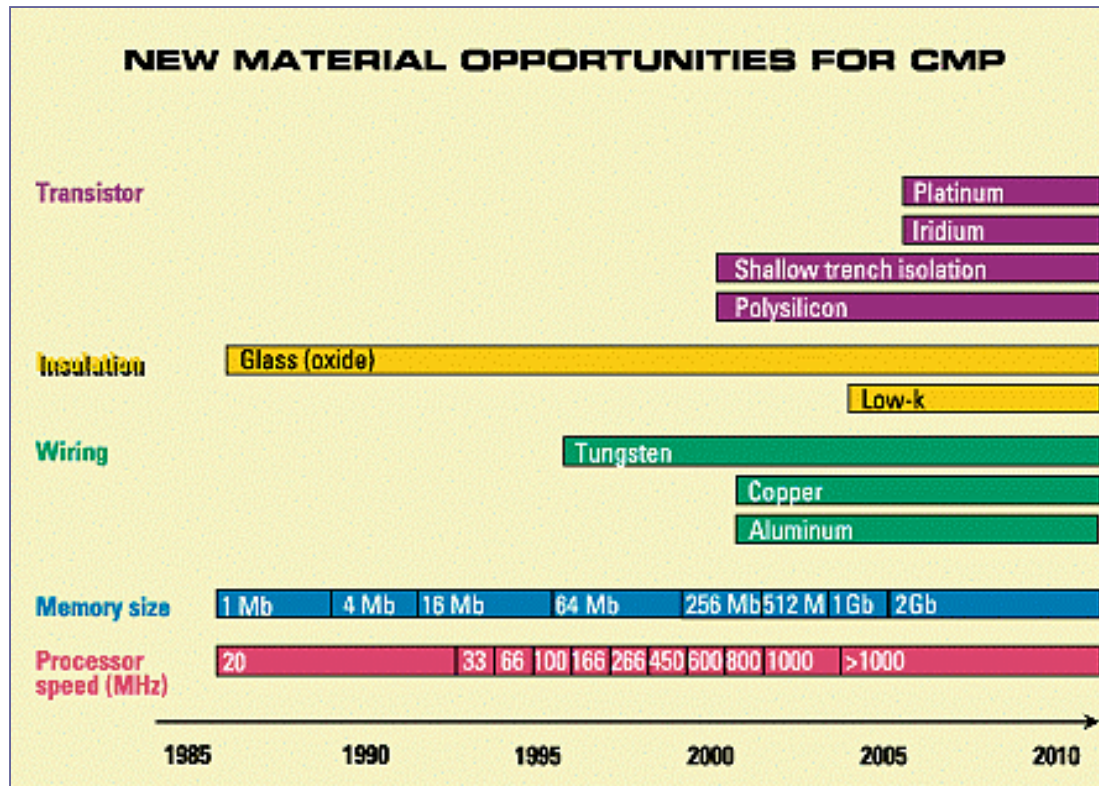
300mm Fabs A Key Driver



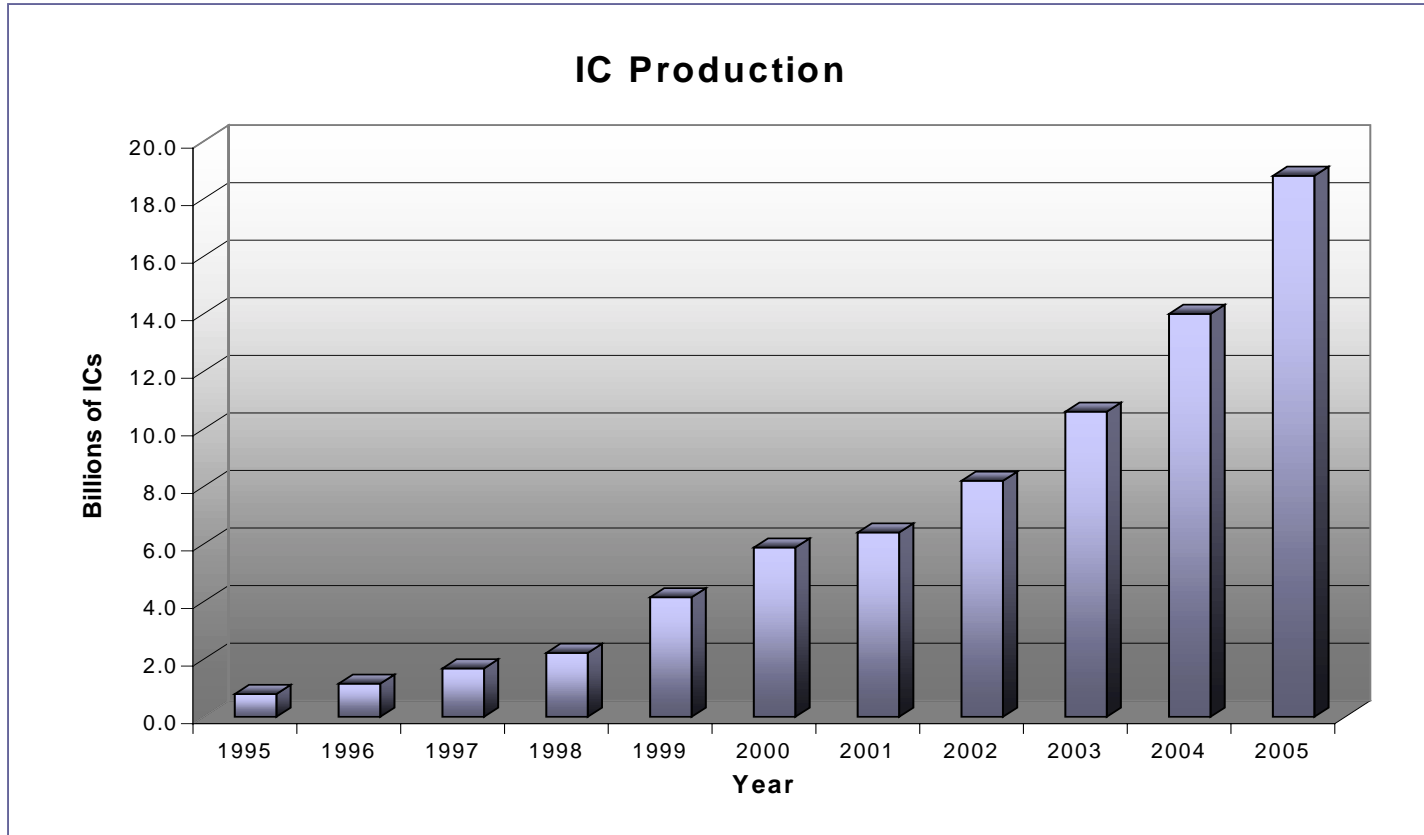
300mm Fabs A Key Driver



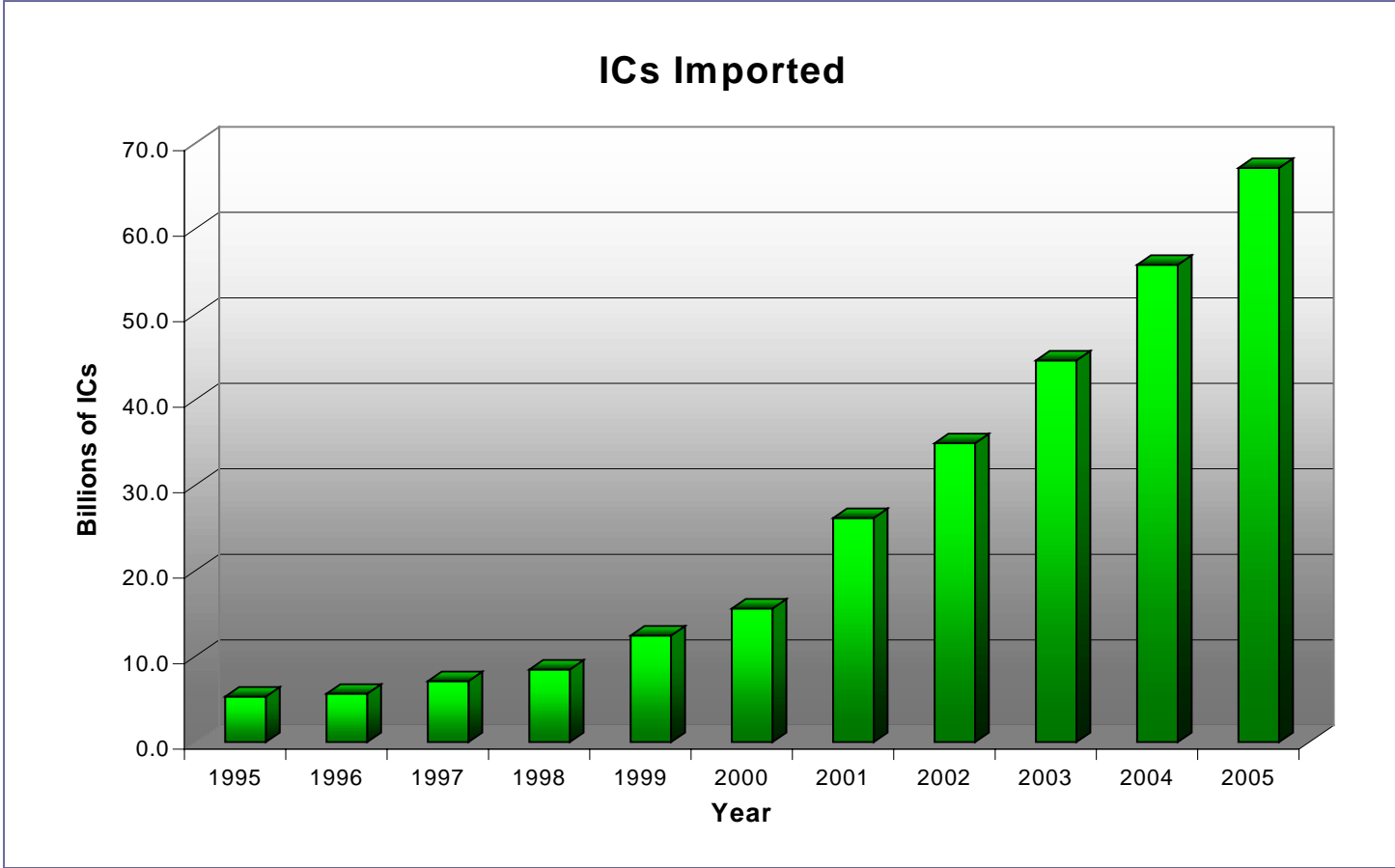
New Materials Present Opportunities



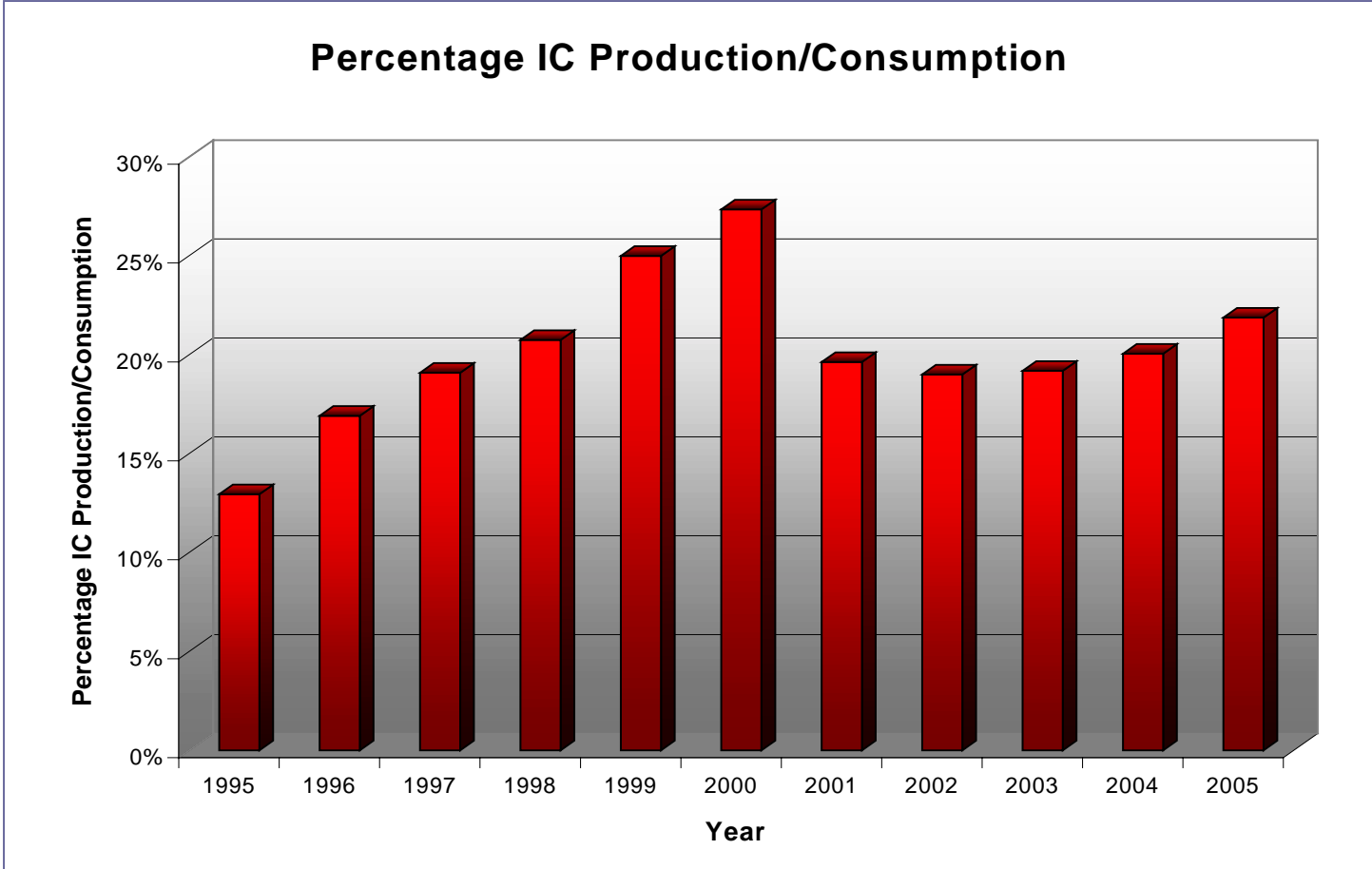
China Will Boost Market - Not For Production



But For Consumption of ICs



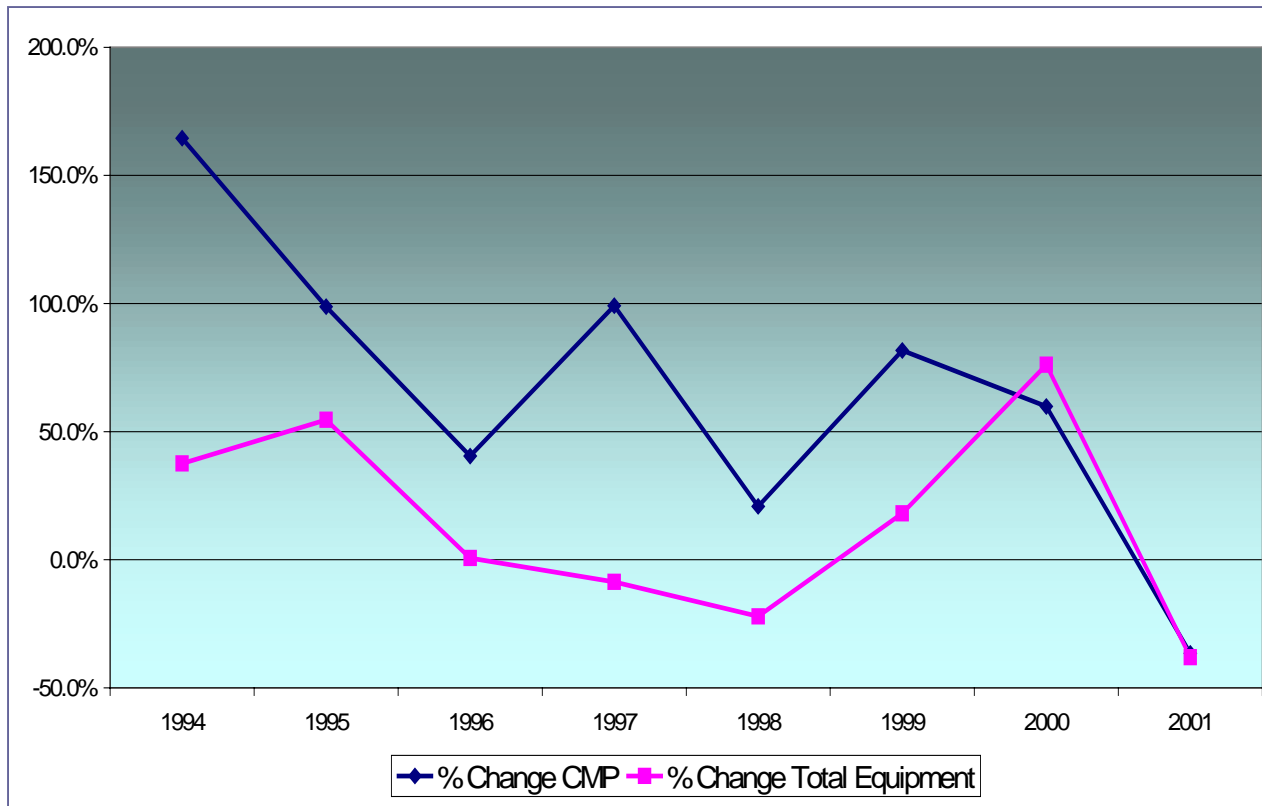
So It Must Import ICs To Meet 7-8% GDP Growth



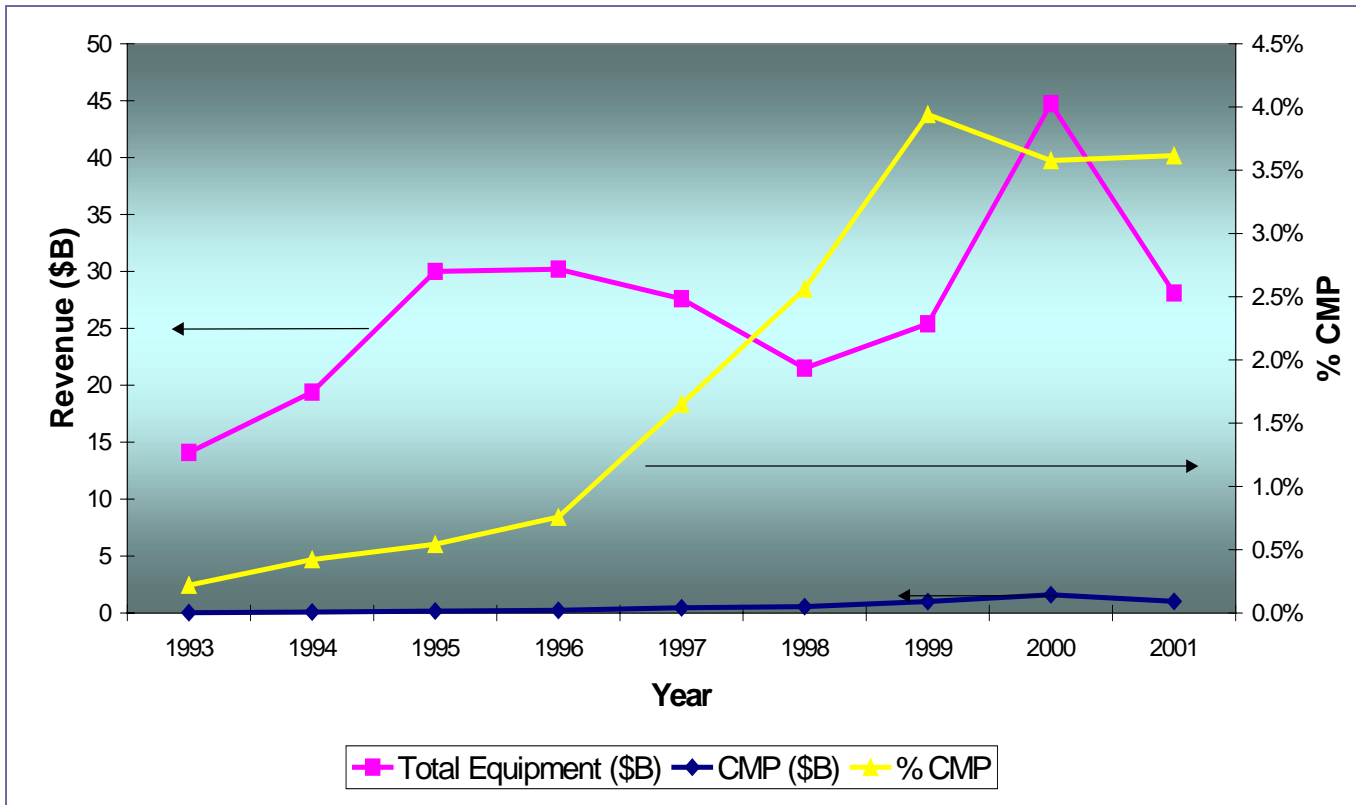
Wassenaar Arrangement

- Export licenses be issued for sub-0.30-micron technology to China
- Current limit is 0.25 microns with prospects for 0.18 microns in late 2002
- Would limit China to IC production on 200mm wafers
- Would minimize the need for CMP

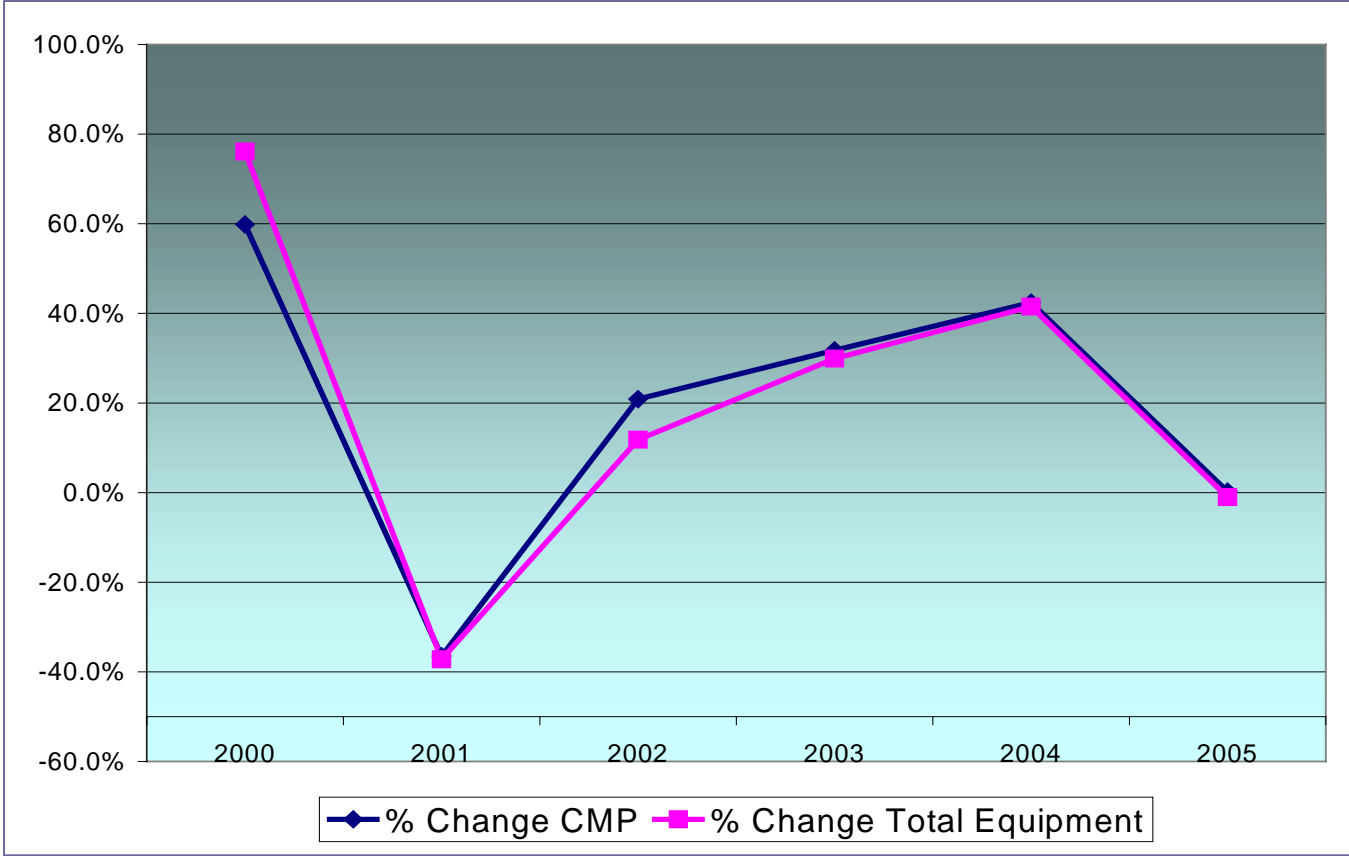
CMP Was Growing Faster Than Overall Equipment Market



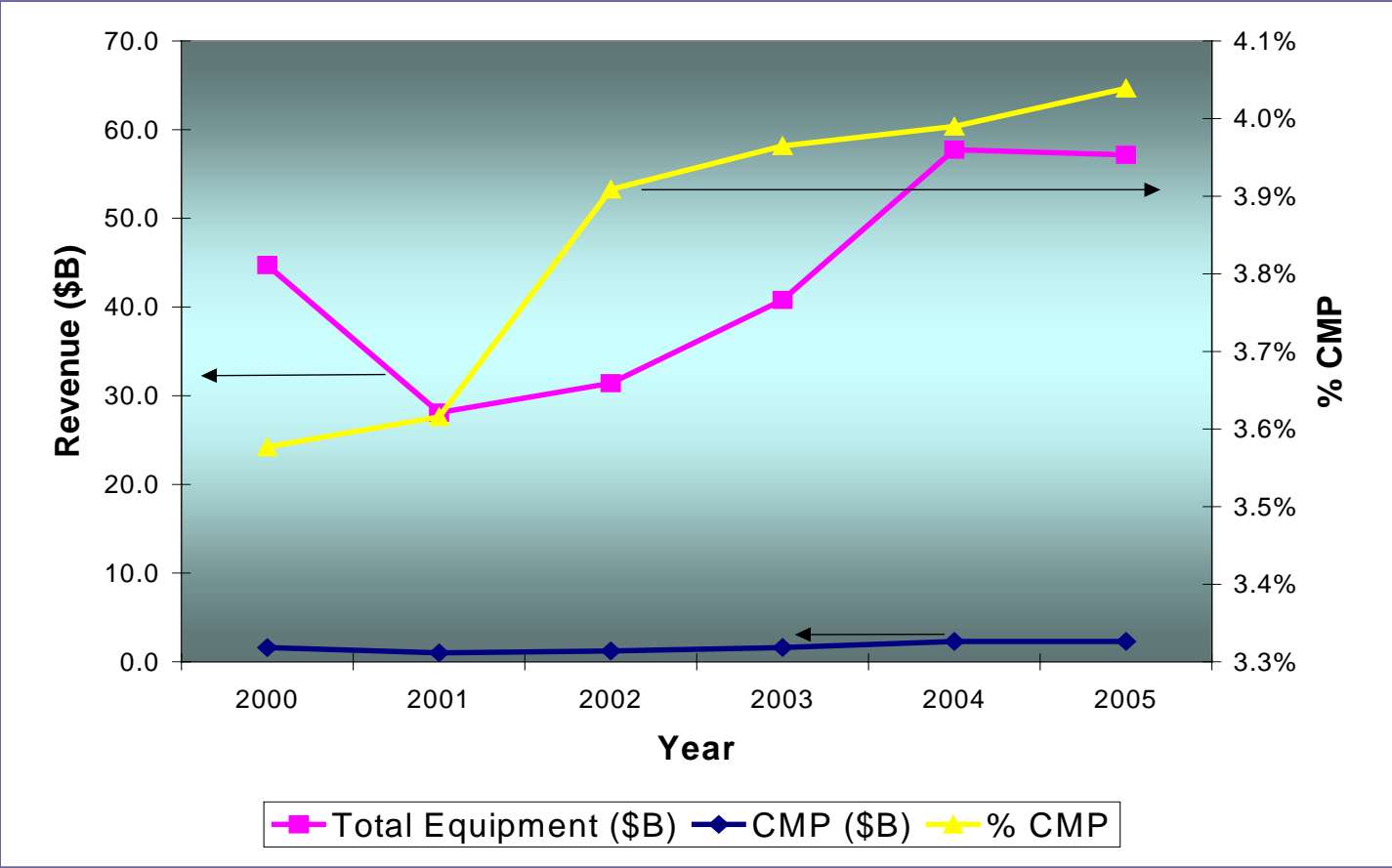
And Its Share of The Overall Equipment Was Growing



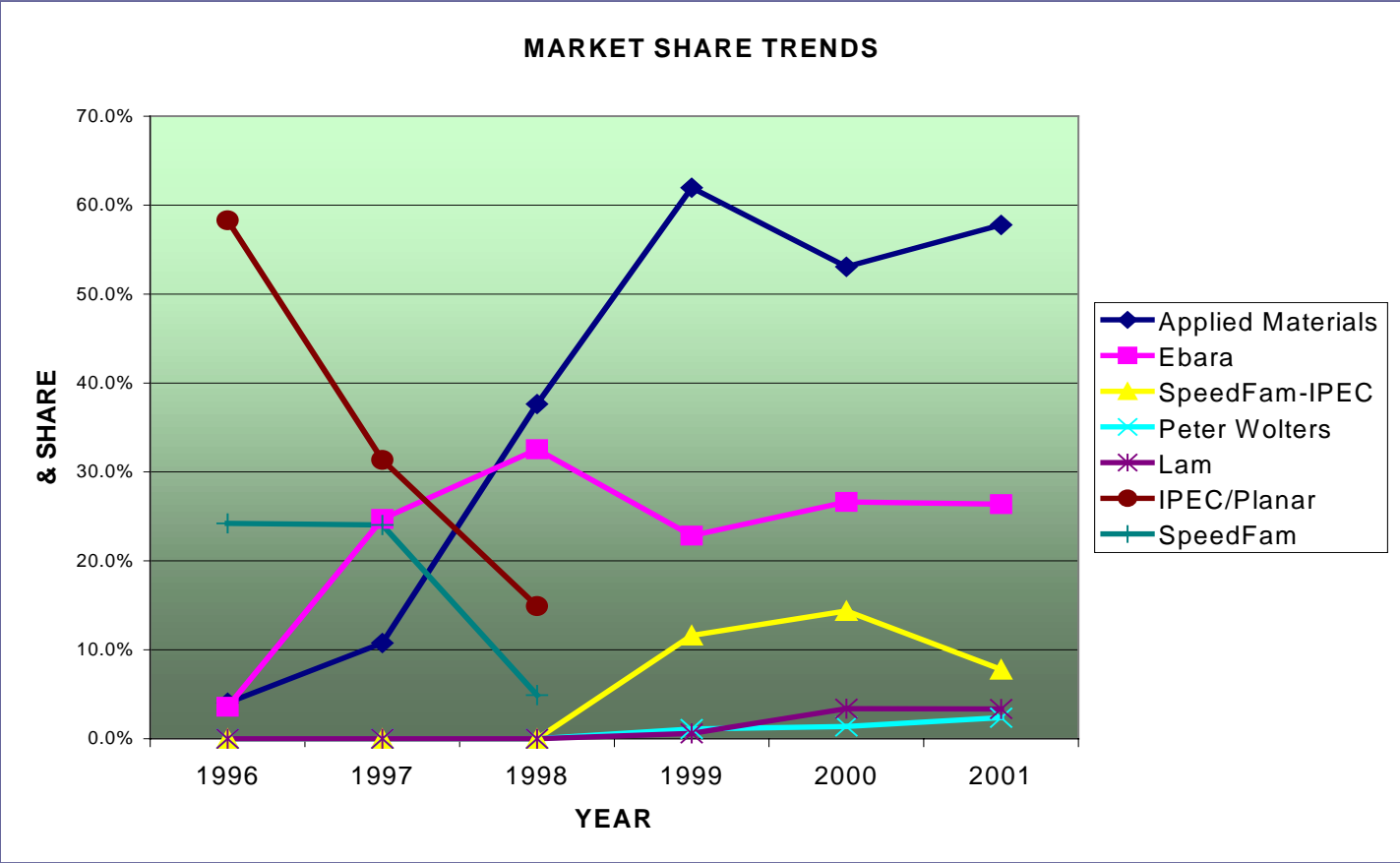
But It Has Become A Mainstream Tool



And Its Share of The Market Will Stay The Same



But Market Share Among Vendors Has Been Erratic



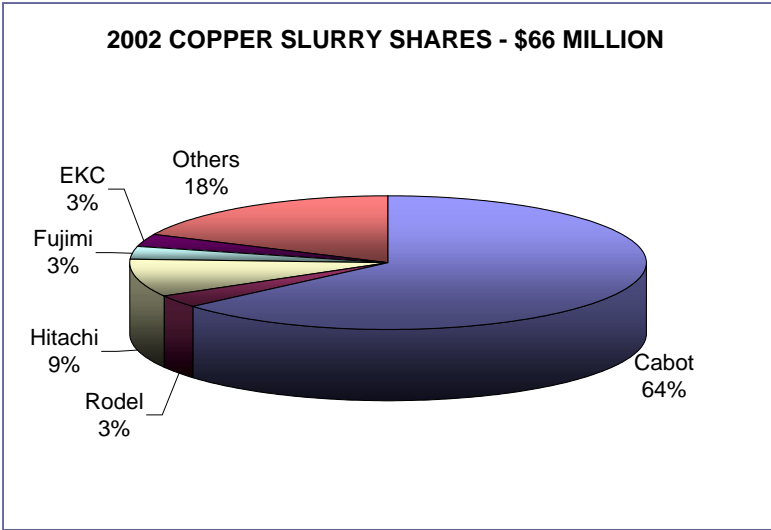
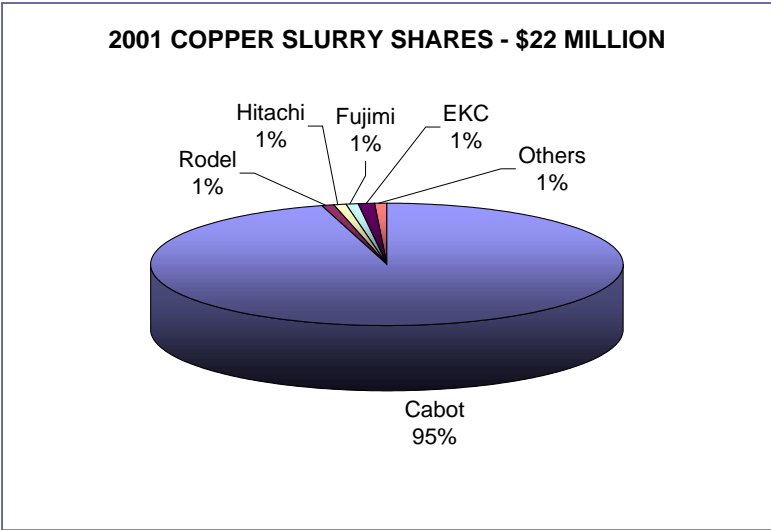
And What Will Be The Impact Of Alternative Methods?

- Spin Etch Planarization (SEP) is being pursued by SEZ
- ACM Research's current-controlled electroplating and electropolishing technologies

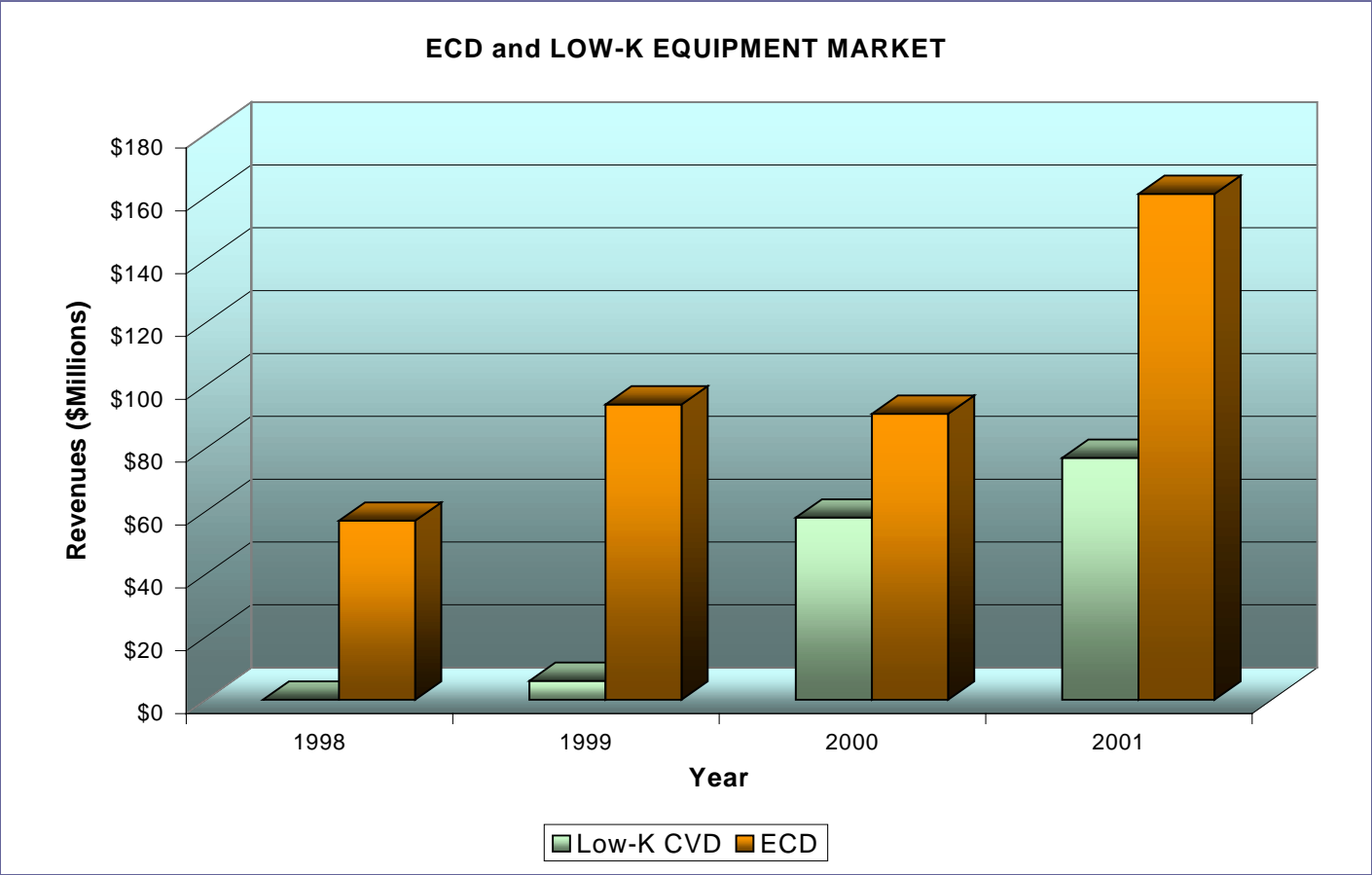
And More Problems For Slurry Suppliers

- 3M's slurry-free process
- Non-Slurry reactive liquid
 - o Every vendor is working on it
 - o Every user is working on it

Copper Has Planarized The Slurry Market



Final Slide That Reinforces Growth Of CMP Market



Technology Can Conversely Impact the Economy

