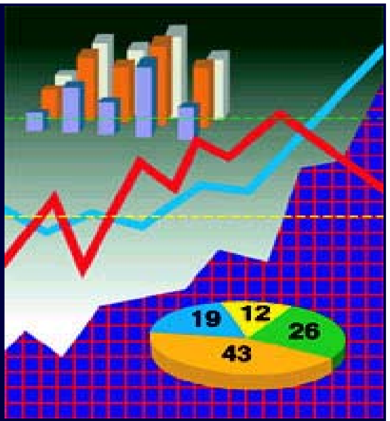


GLOBAL ELECTRONICS INDUSTRY

BUSINESS OUTLOOK

WALT CUSTER
CUSTER CONSULTING GROUP
www.custerconsulting.com
November 2001

Sponsored by Shipley

2000

Strong Equipment Demand

- Telecom
- Internet Infrastructure/Dot.coms
- Semiconductor Fab
- Cell Phones
- Industrial Electronics

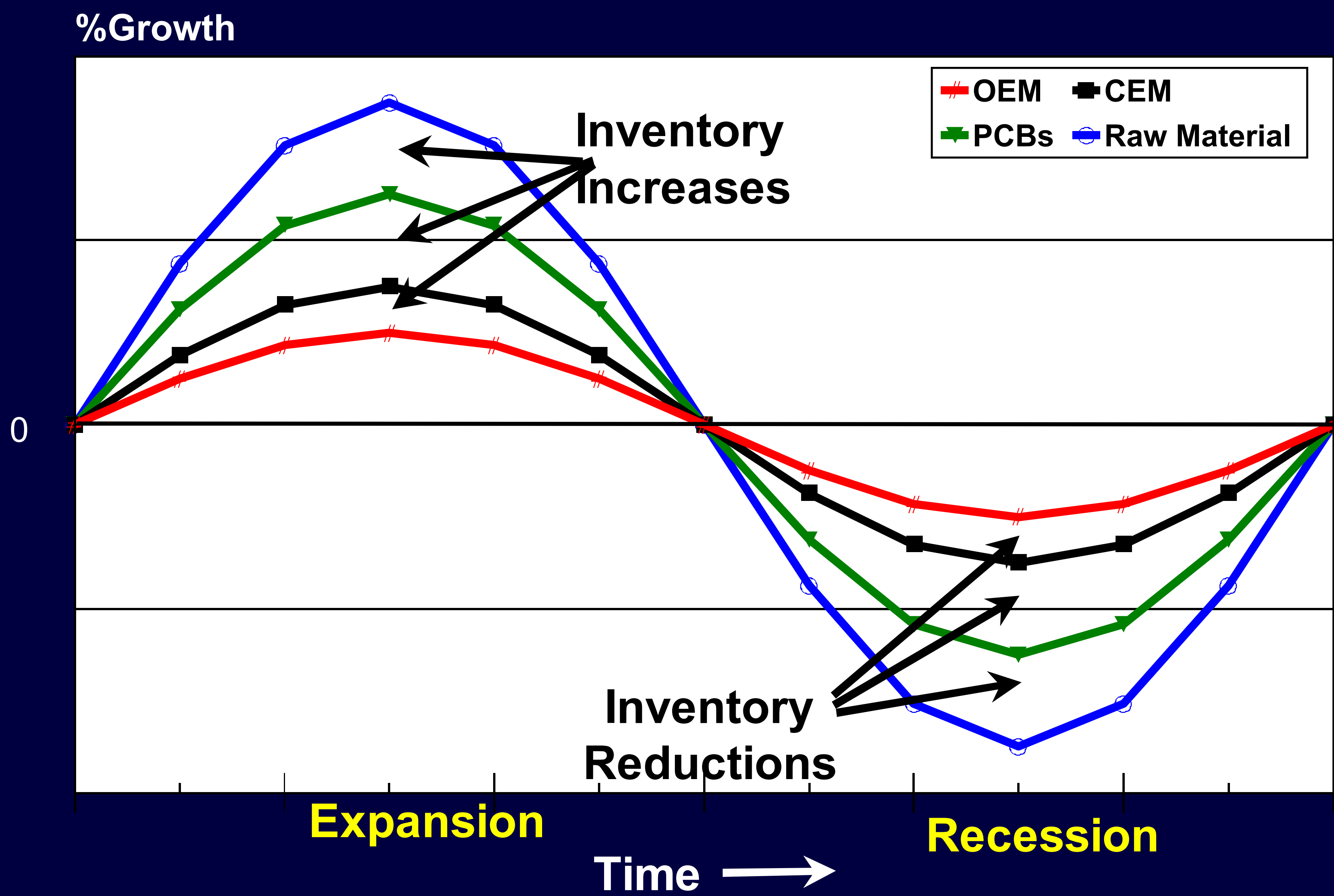
Shortages & Capacity Fears

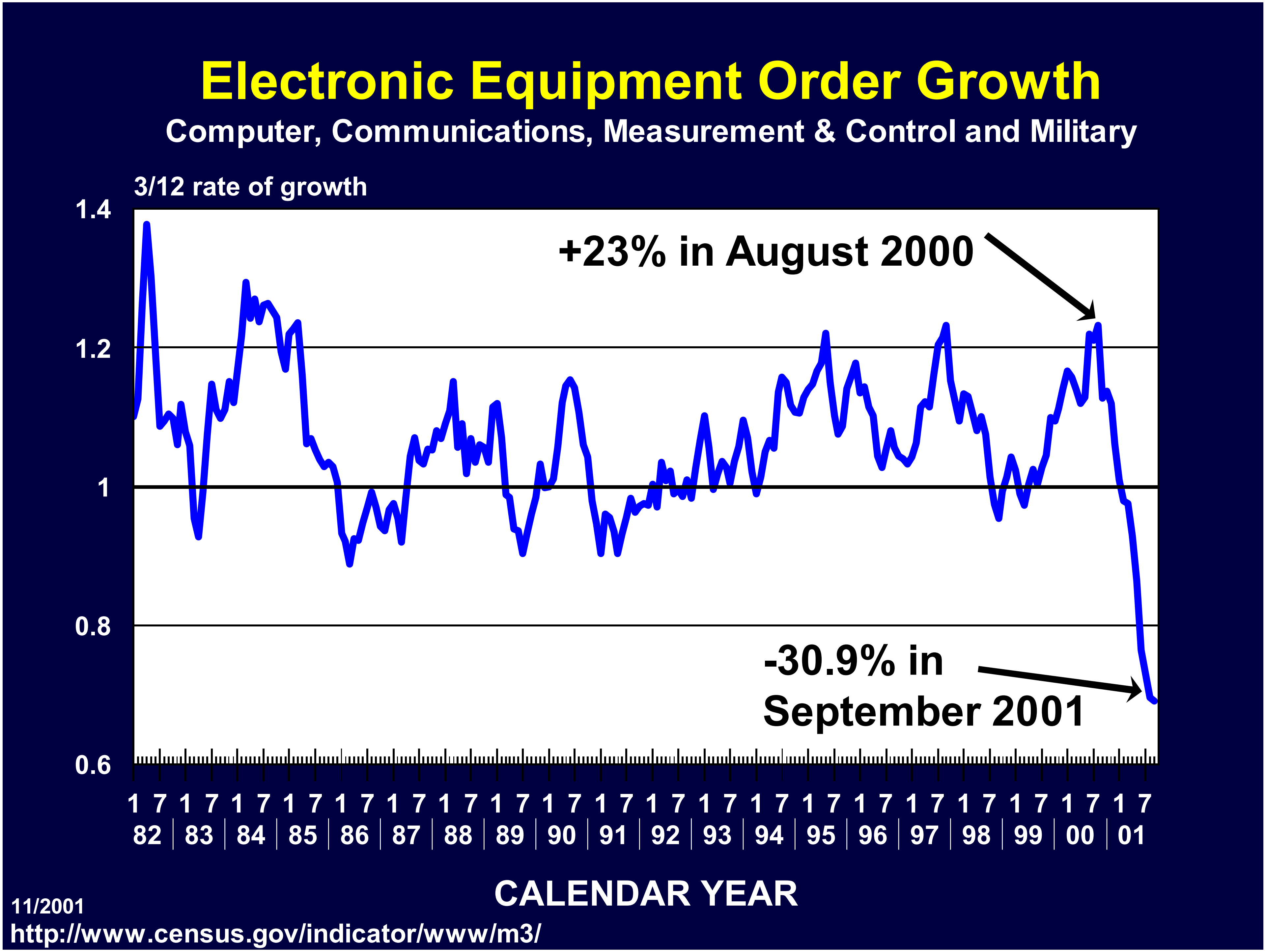
Double / Over-ordering Components

Inventory Builds - including CEMs

BUSINESS CYCLE

SUPPLY CHAIN EFFECT





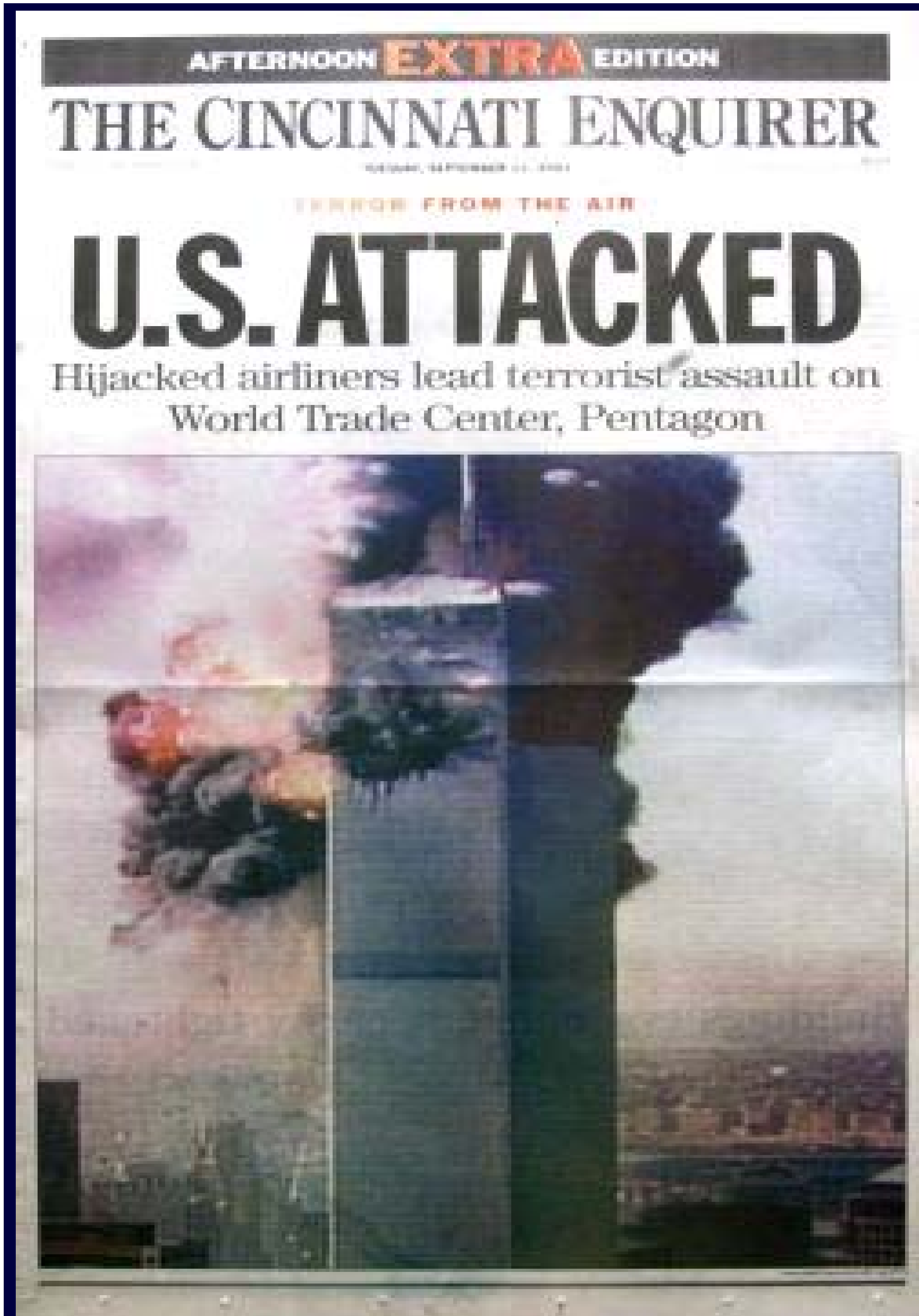
Electronic Equipment Order Growth
Computer, Communications, Measurement & Control and Military
3/12 rate of growth
1.4
1.2
1
0.8
0.6
+23% in August 2000
-30.9% in
September 2001
1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7
82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01
CALENDAR YEAR
11/2001
http://www.census.gov/indicator/www/m3/

INDUSTRIAL PRODUCTION - WORLD

% CHANGE vs ONE YEAR EARLIER

BRITAIN	-2.3 Aug
FRANCE	+1.5 Aug
GERMANY	-1.0 Aug
ITALY	-1.4 Aug
NETHERLANDS	-2.2 Aug
SPAIN	+2.8 Aug
EURO area	+0.4 Aug
RUSSIA	+3.8 Sep
CANADA	-3.2 Aug
USA	-5.8 Sep
CHINA	+9.5 Sep
MALAYSIA	-7.3 Aug
SINGAPORE	-22.3 Sep
S KOREA	+5.1 Sep
TAIWAN	-14.1 Sep
THAILAND	-1.8 Sep
JAPAN	-12.7 Sep

Economist 11/2001 http://www.economist.com


AFTERNOON EXTRA EDITION

THE CINCINNATI ENQUIRER

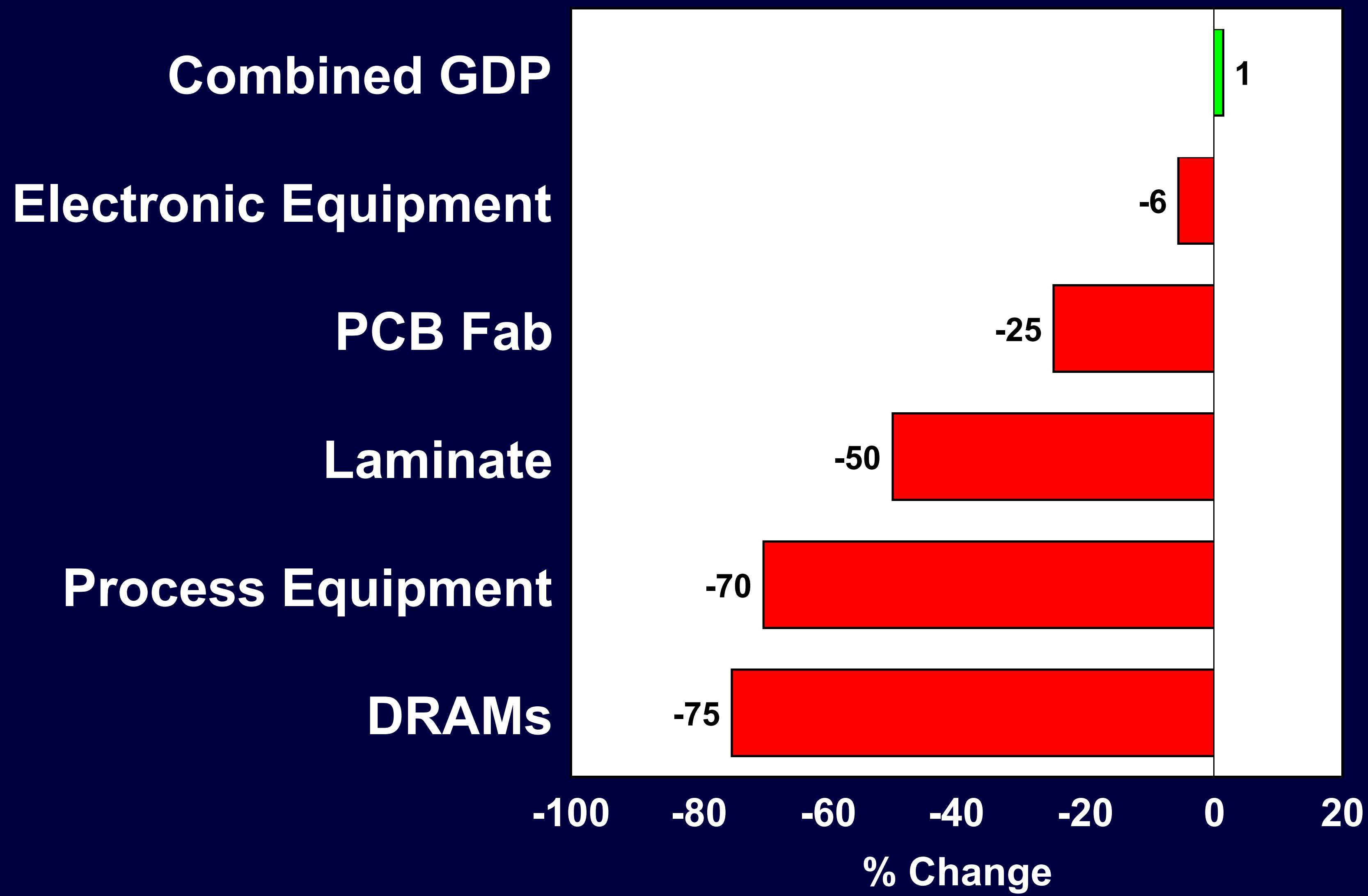
FROM THE AIR

U.S. ATTACKED

Hijacked airliners lead terrorist assault on World Trade Center, Pentagon

Impact of September 11 ?

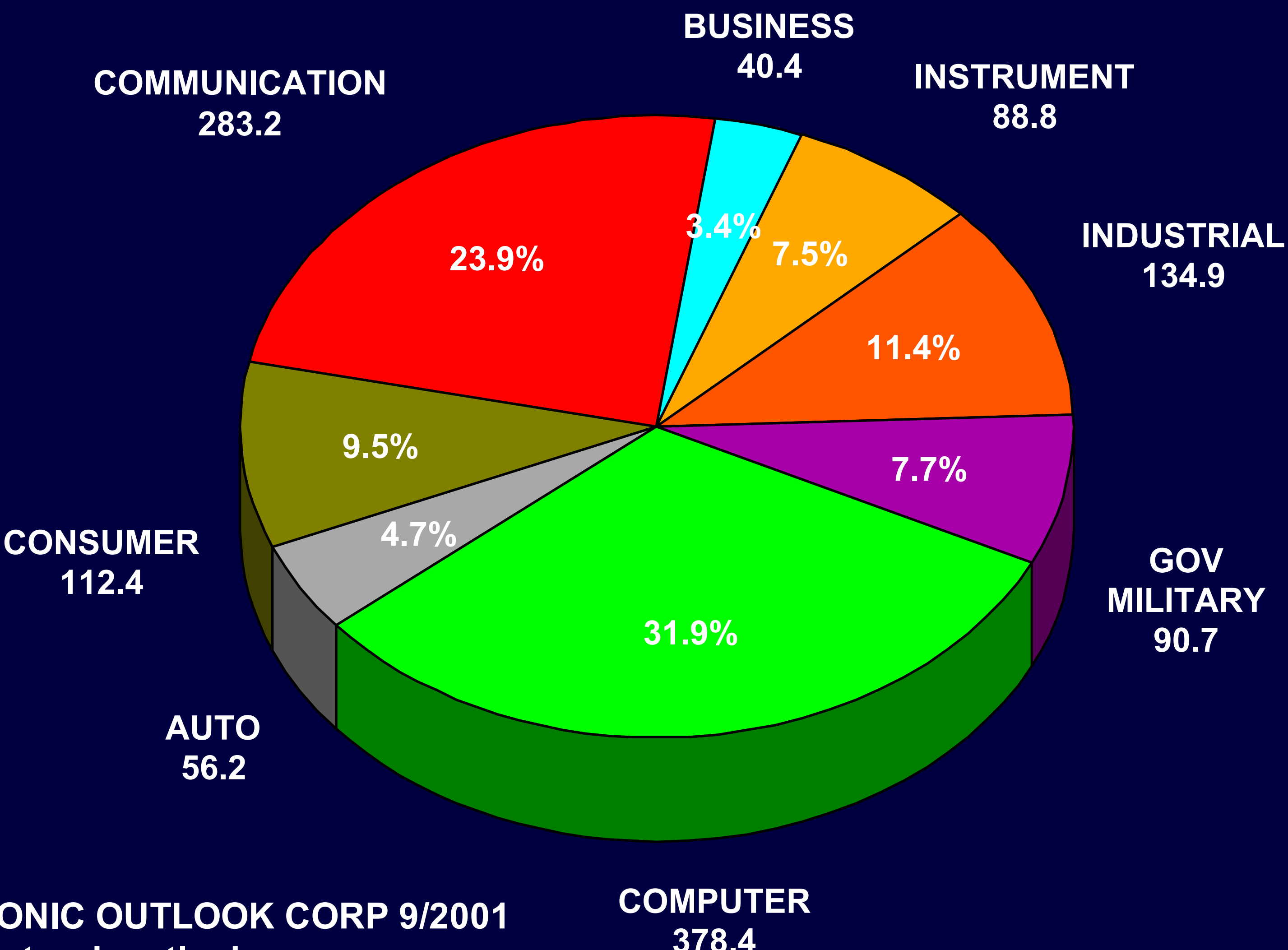
Global Impact
2001 vs 2000



Electronic Equipment

ELECTRONIC EQUIPMENT PRODUCTION

WORLD - 2000 ESTIMATE ($B)



ELECTRONIC OUTLOOK CORP 9/2001
www.electronicoutlook.com

TOTAL $1,185 B

"Post-September 11" Growth Markets

MILITARY ELECTRONICS

VIDEO & TELECONFERENCING

MOBILE (incl SATELLITE) PHONES

COMPUTERS - INTELLIGENCE GATHERING & STORAGE

BIOMETRICS - FINGERPRINT, RETINAL, VOICE, FACIAL RECOGNITION

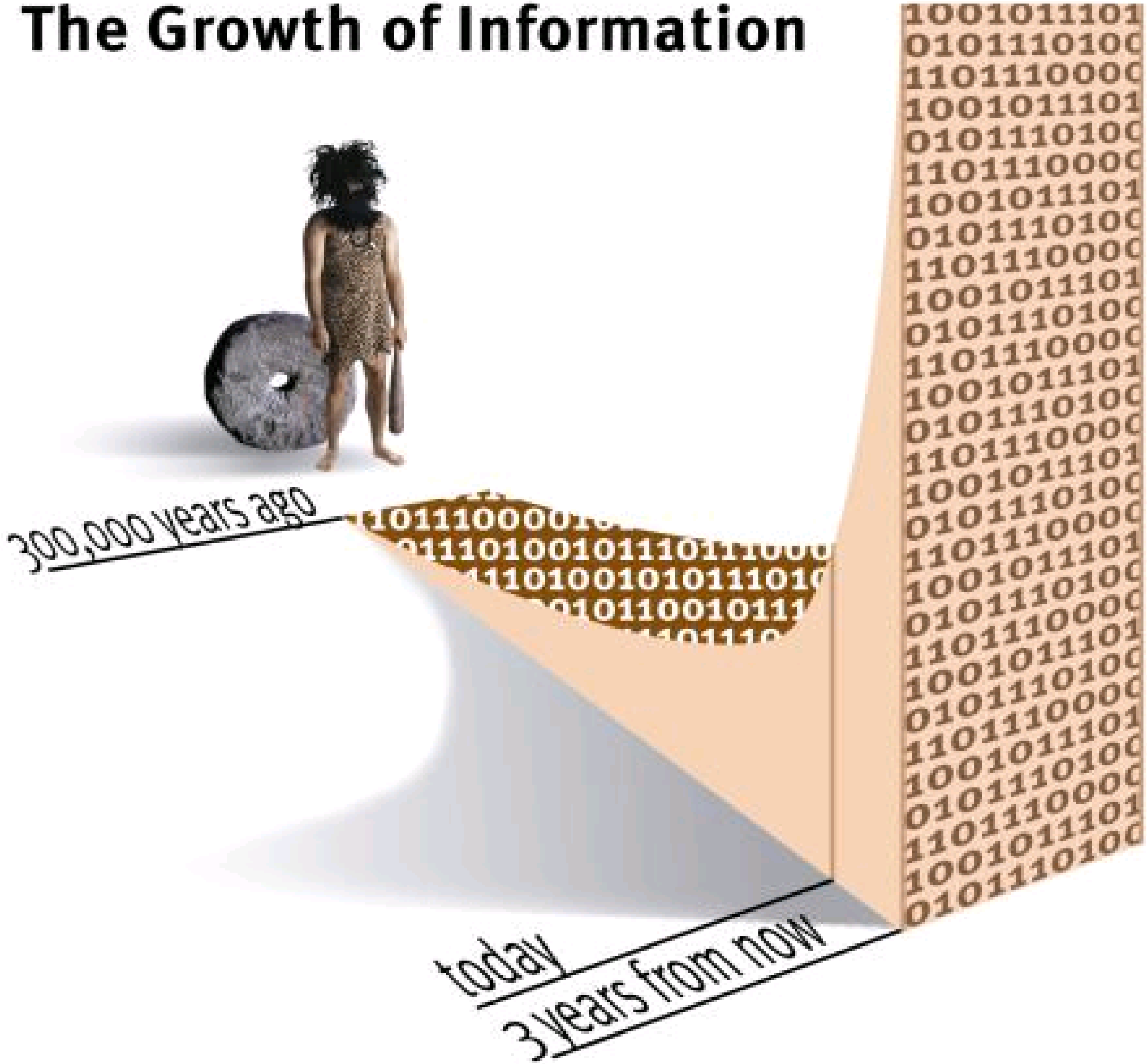
SMART / PERSONAL IDENTIFICATION CARDS

SECURITY ENHANCED INTERNET EQUIPMENT - ROUTERS, SWITCHES & HUBS

SAFETY & SURVEILLANCE - SCANNERS, DETECTION, ETC

PUBLIC HEALTH MONITORS

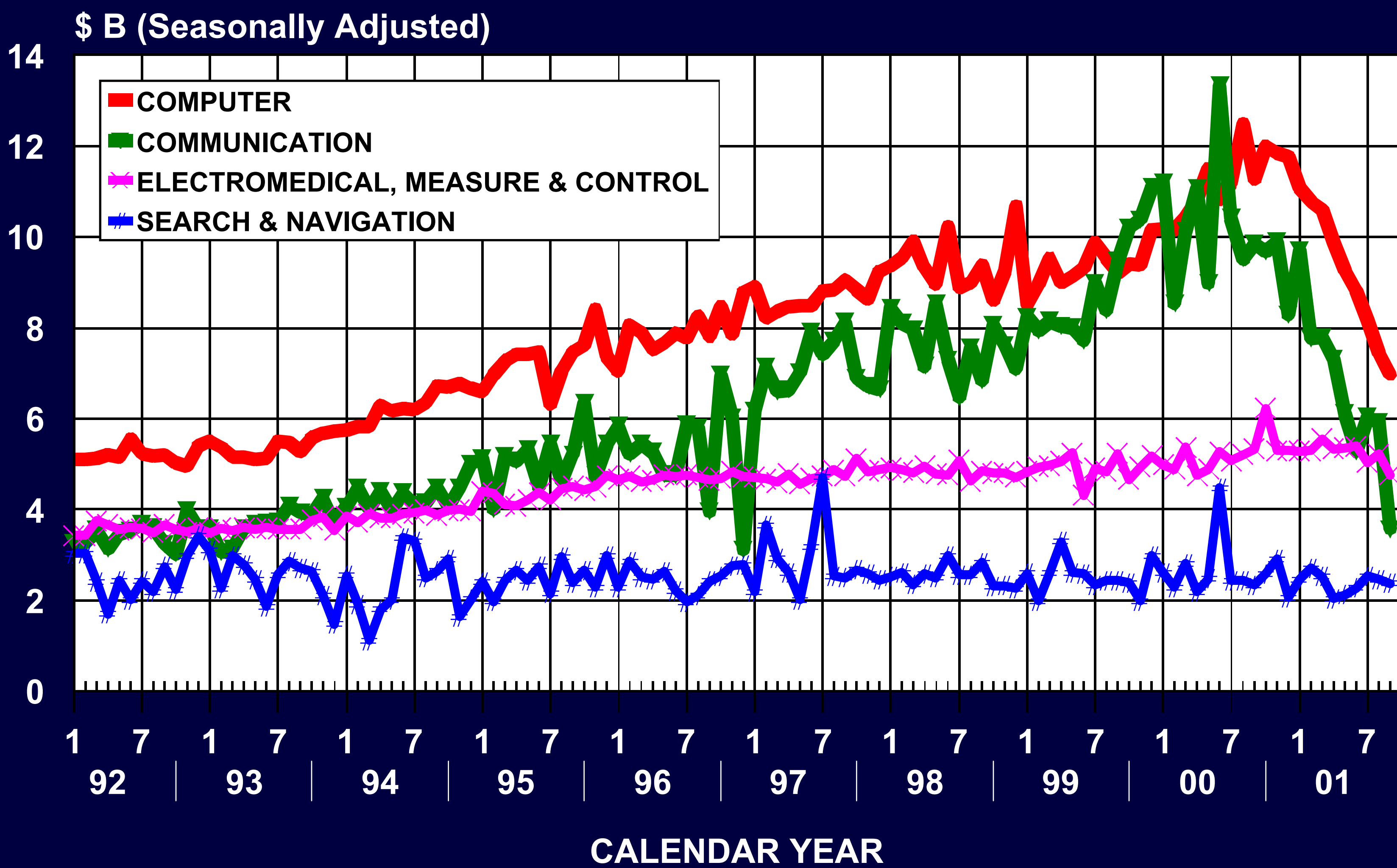
The Growth of Information



Source: UC Berkeley study sponsored by EMC Corporation

US ELECTRONIC EQUIPMENT ORDERS

Monthly Data

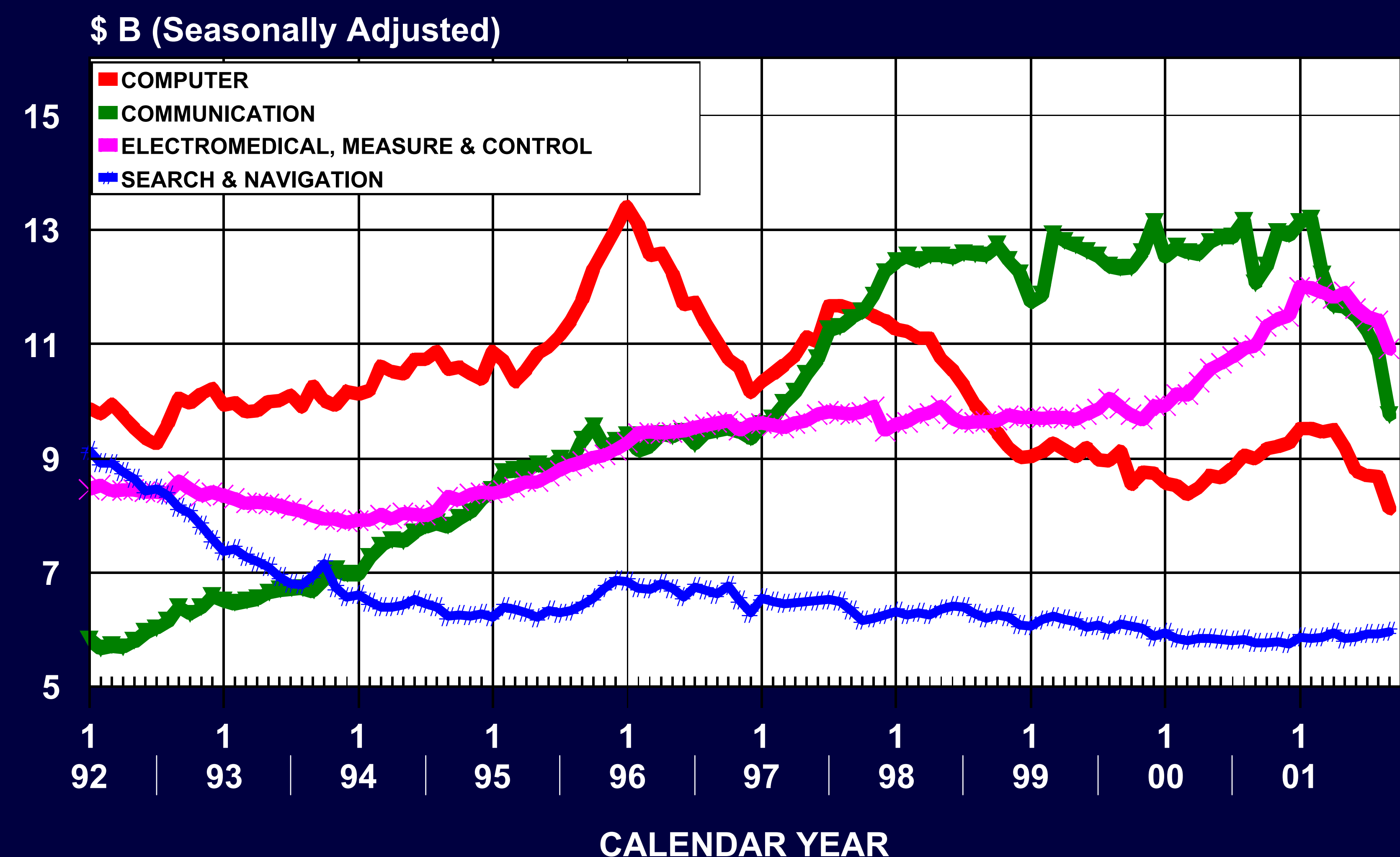


http://www.census.gov/indicator/www/m3/

11/2001

US ELECTRONIC EQUIPMENT INVENTORIES

Monthly Data

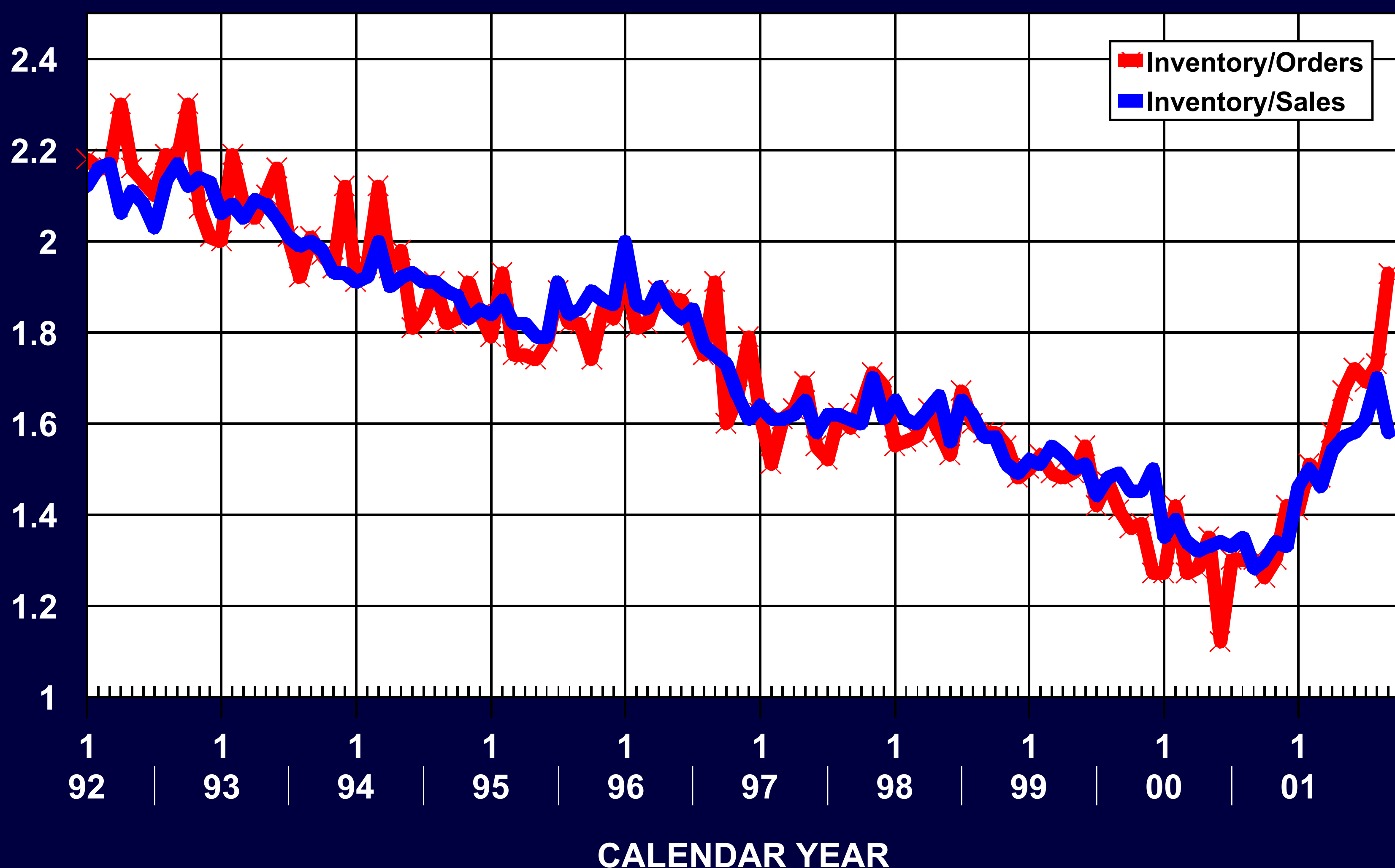


http://www.census.gov/indicator/www/m3/

11/01

US TOTAL ELECTRONIC EQUIPMENT INVENTORIES

Inventory vs. Sales and Orders



http://www.census.gov/indicator/www/m3/

11/01

Consumer Electronics

130 million Personal Computers
40 million Video Games

Communications Equipment

Top Eight Worldwide Telecommunications Equipment Manufacturers ($B)

	2000 Revenue	1999 Revenue	Constant $ Growth (%)	Local Currency Growth (%)
Nortel	29.8	21.0	41.6	41.6
Ericsson	27.7	24.0	15.4	28.1
Nokia	27.2	20.1	35.4	57.0
Lucent*	25.8	33.8	-23.5	-23.5
Cisco	23.9	15.0	59.3	59.3
Siemens**	22.8	20.0	14.5	32.5
Motorola	22.8	19.7	15.3	15.3
Alcatel***	21.6	17.1	26.6	46.8
Top 8 Total	201.6	170.7	18.1	-

* Lucent 2000 figures exclude Avaya; combined figure would be $33.2 billion

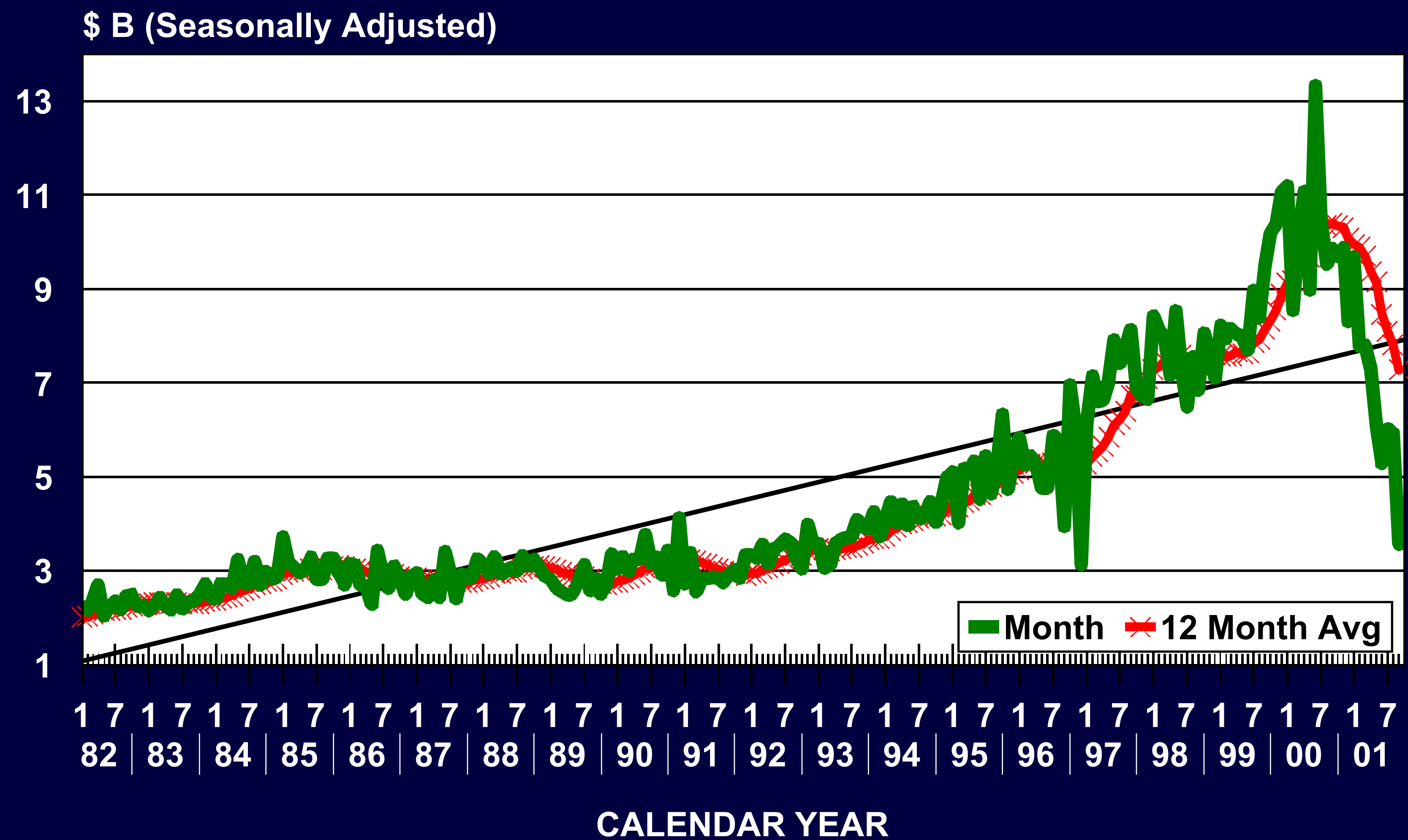
** Siemens 1999 figure re-estimated because of exchange rate updates

*** Alcatel 1999 figure re-established to exclude components business

Dataquest 4/2001

COMMUNICATIONS EQUIPMENT

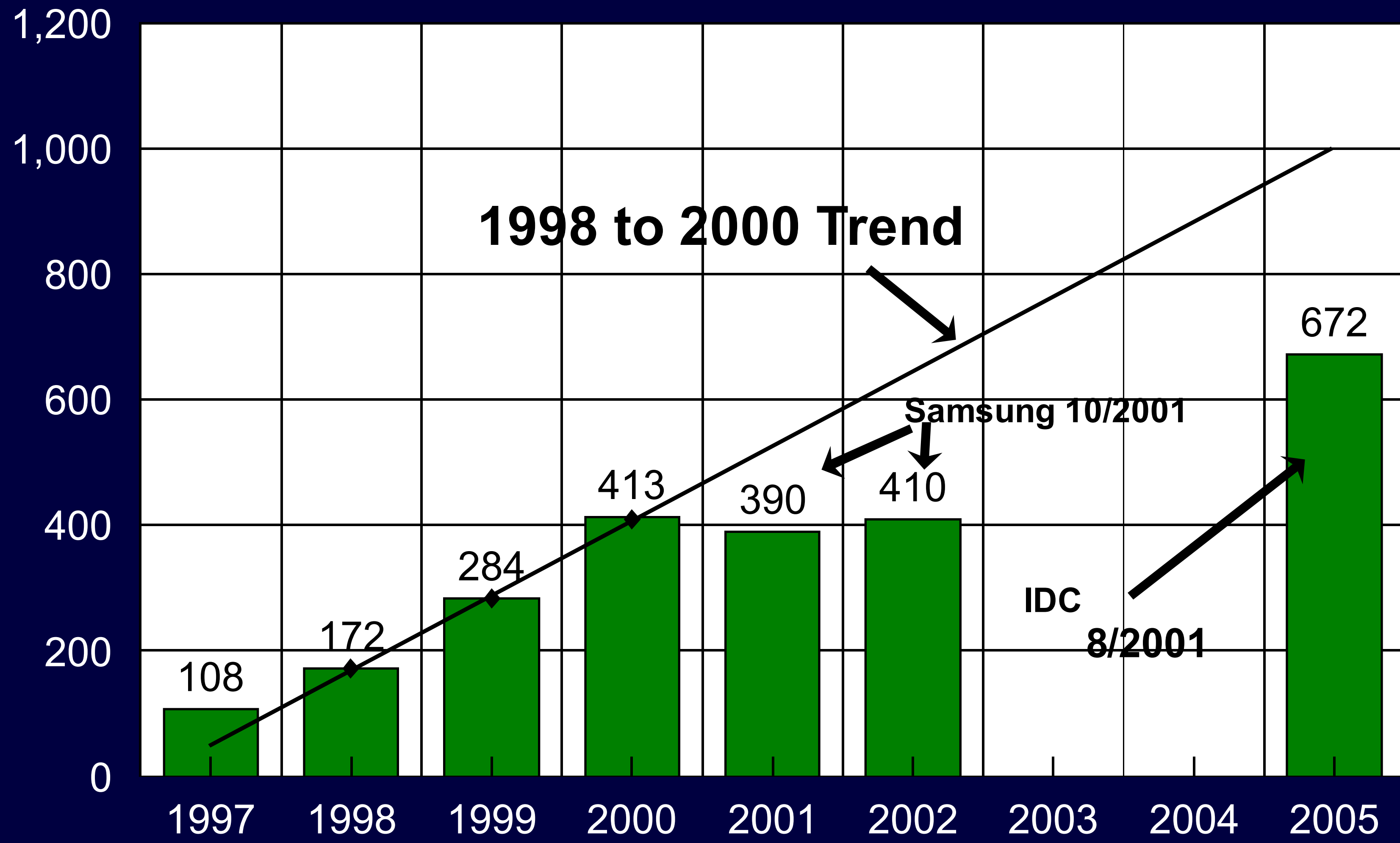
BOOKINGS



http://www.census.gov/indicator/www/m3/
11/2001

WORLD CELLULAR PHONE GROWTH

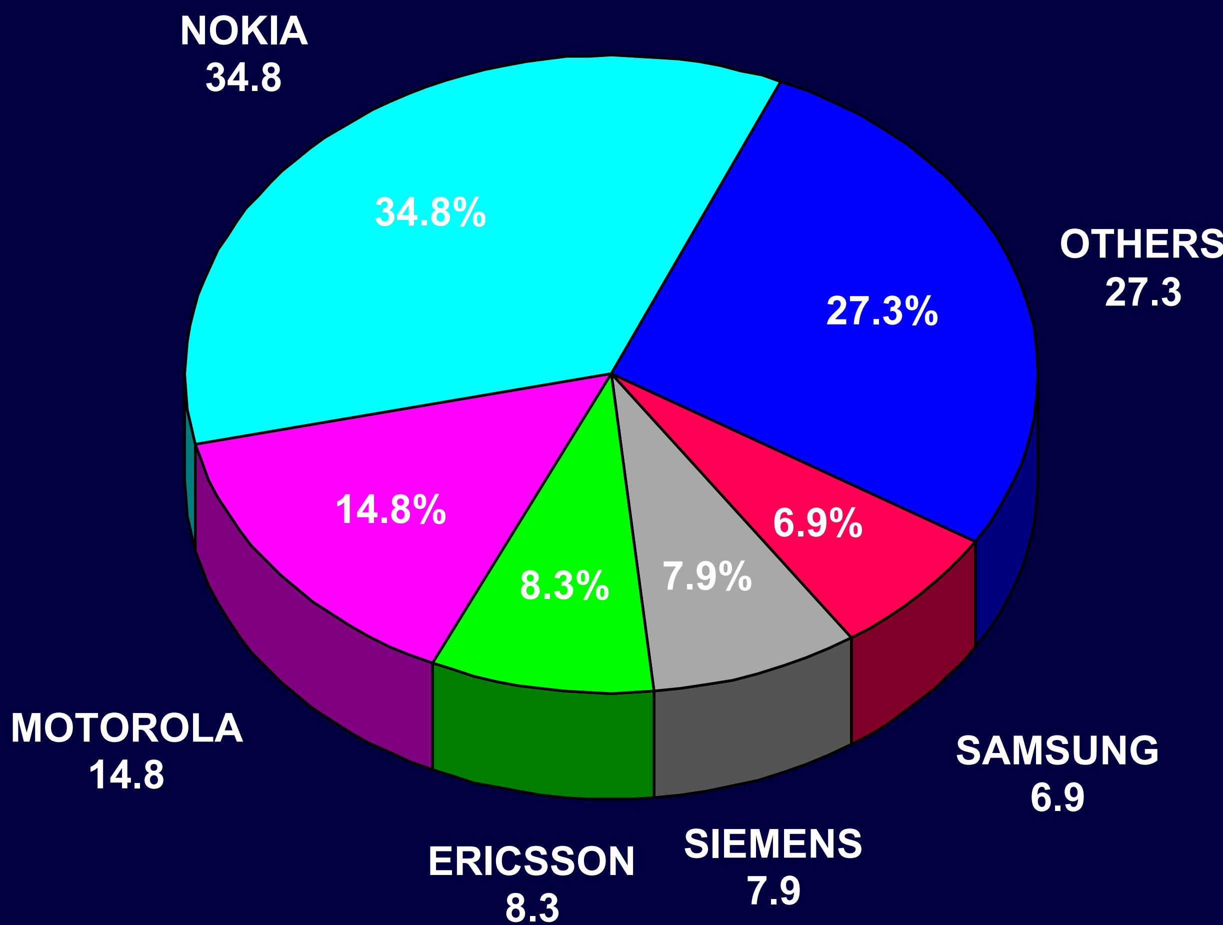
TOTAL SALES - ANALOG & DIGITAL



IDC 8/2001

WORLD CELLULAR PHONE SALES

2Q 2001

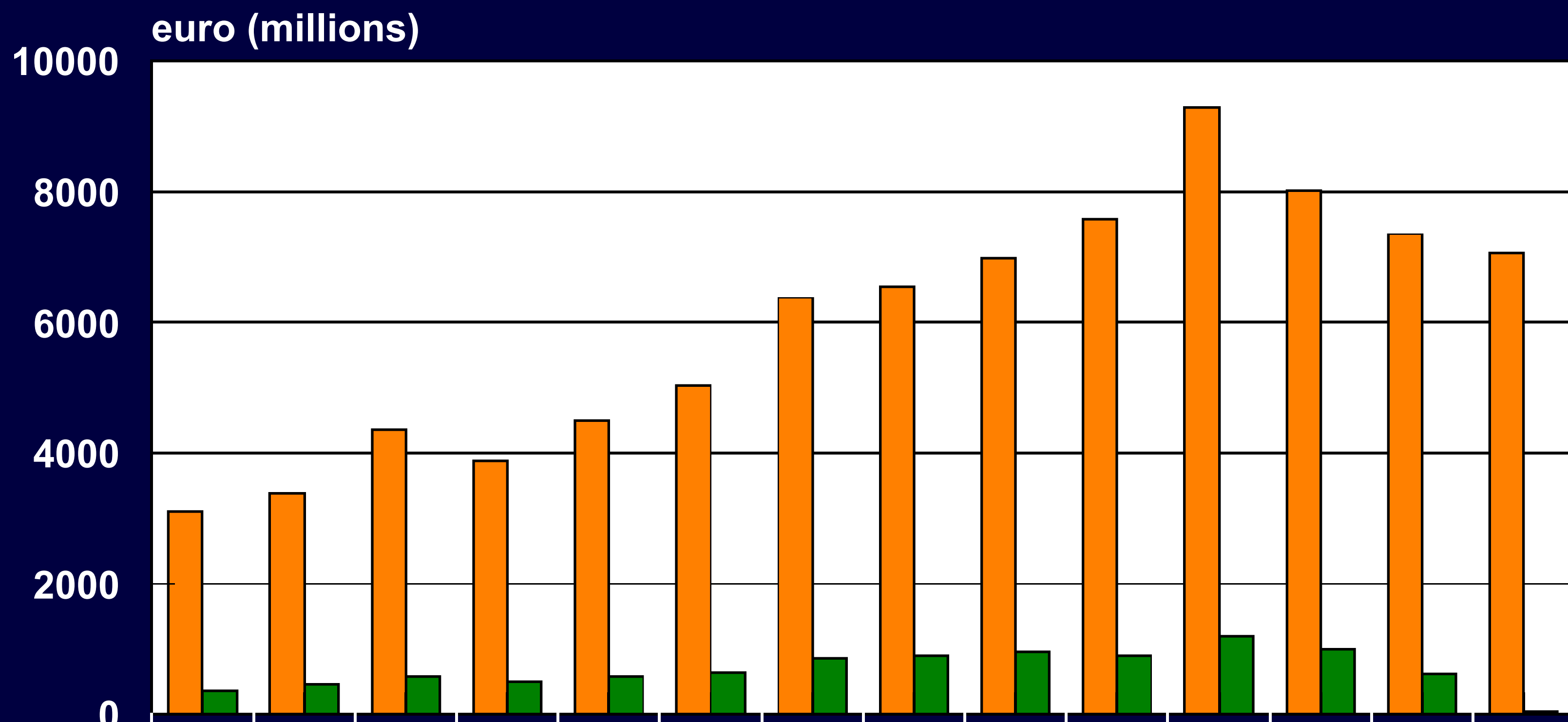


Dataquest 8/2001

TOTAL: 89.8 MILLION UNITS

Nokia

Revenue & Net Income



	6 (98)	9 (98)	12 (98)	1 (99)	2 (99)	3 (99)	4 (99)	1 (00)	2 (00)	3 (00)	4 (00)	1 (01)	2 (01)	3 (01)
Revenue	3098	3375	4352	3870	4493	5037	6372	6537	6980	7575	9284	8007	7346	7050
Income	365	464	585	505	581	638	853	891	951	892	1204	996	622	46

Includes 714 m euro Loan Loss provision

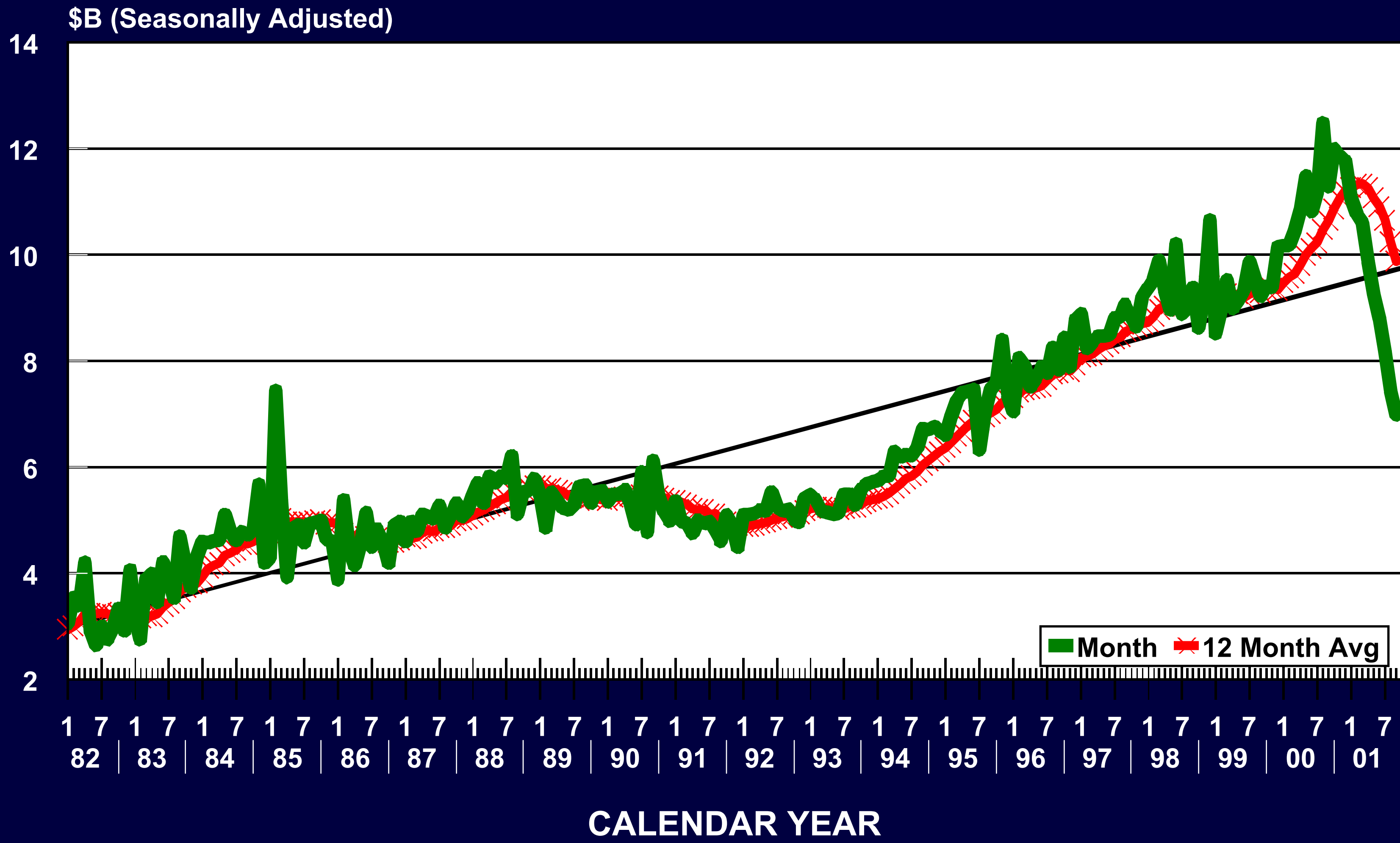
CY

FY=CY

Computer & Office Equipment

COMPUTERS & RELATED PRODUCTS

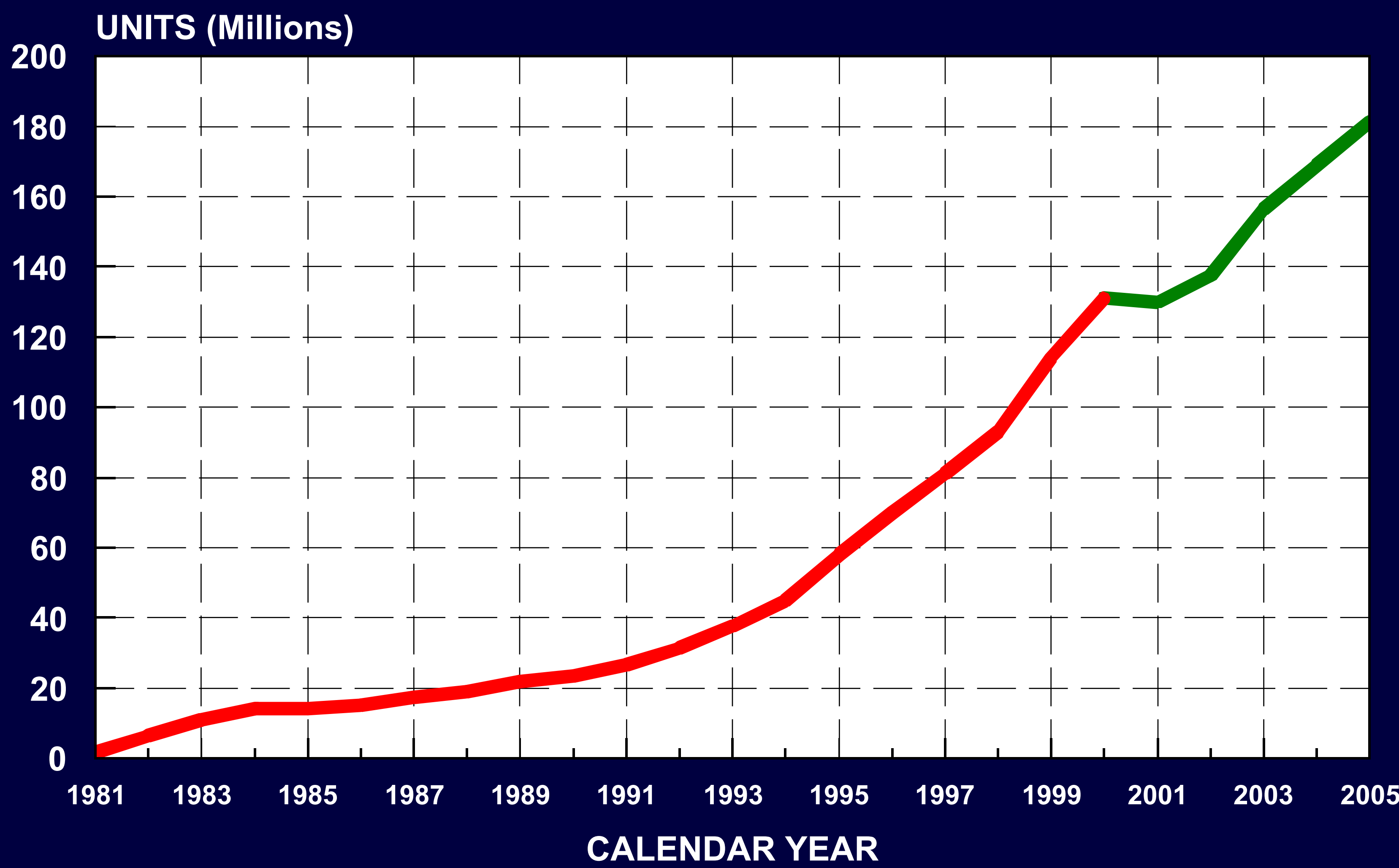
BOOKINGS



http://www.census.gov/indicator/www/m3/
11/2001

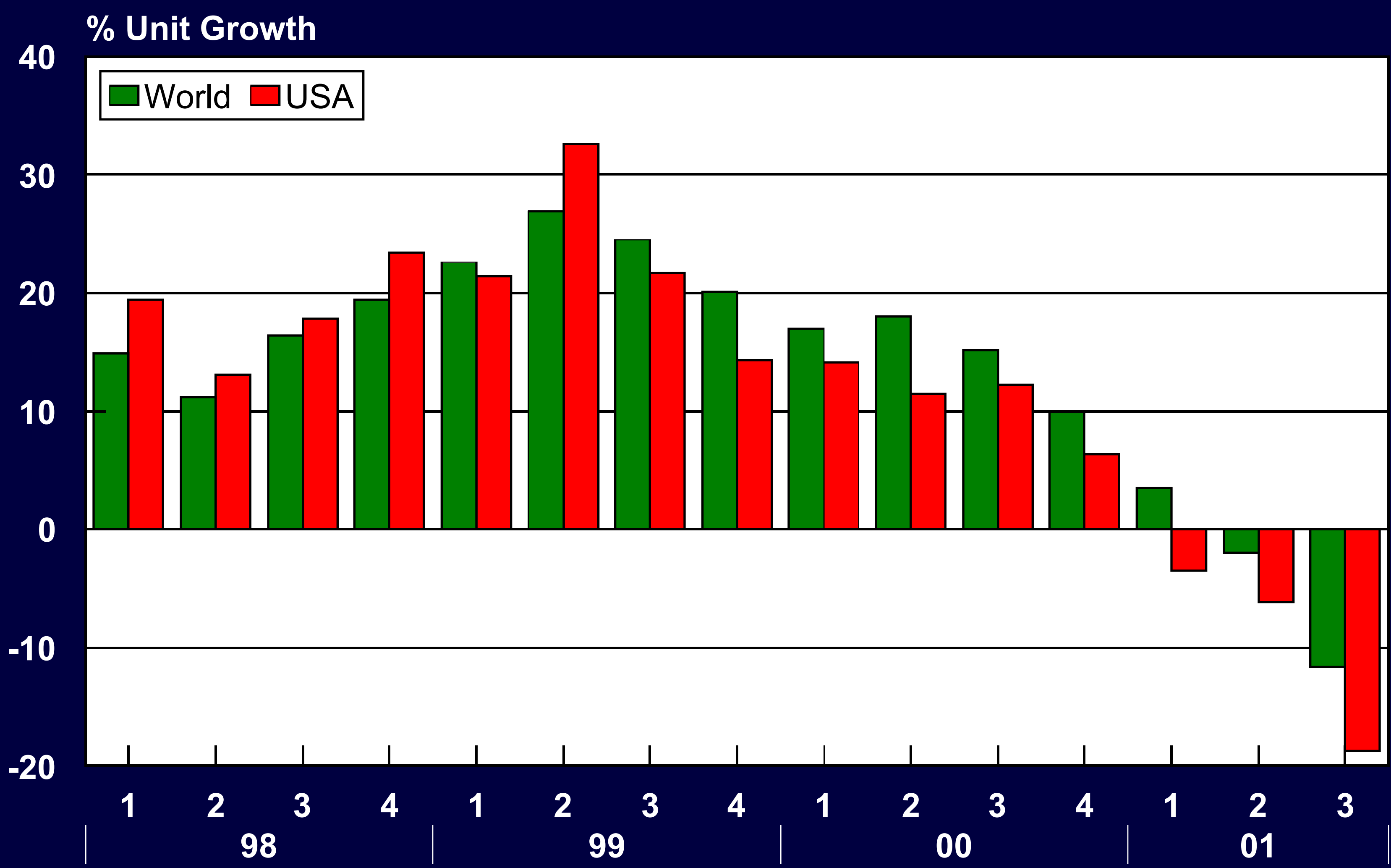
PERSONAL COMPUTER GROWTH

GLOBAL SALES



USA: Gartner Dataquest - historical data 8/2001, Custer forecast 9/2001
Desktops, Notebooks, Ultraportables - does not include Servers

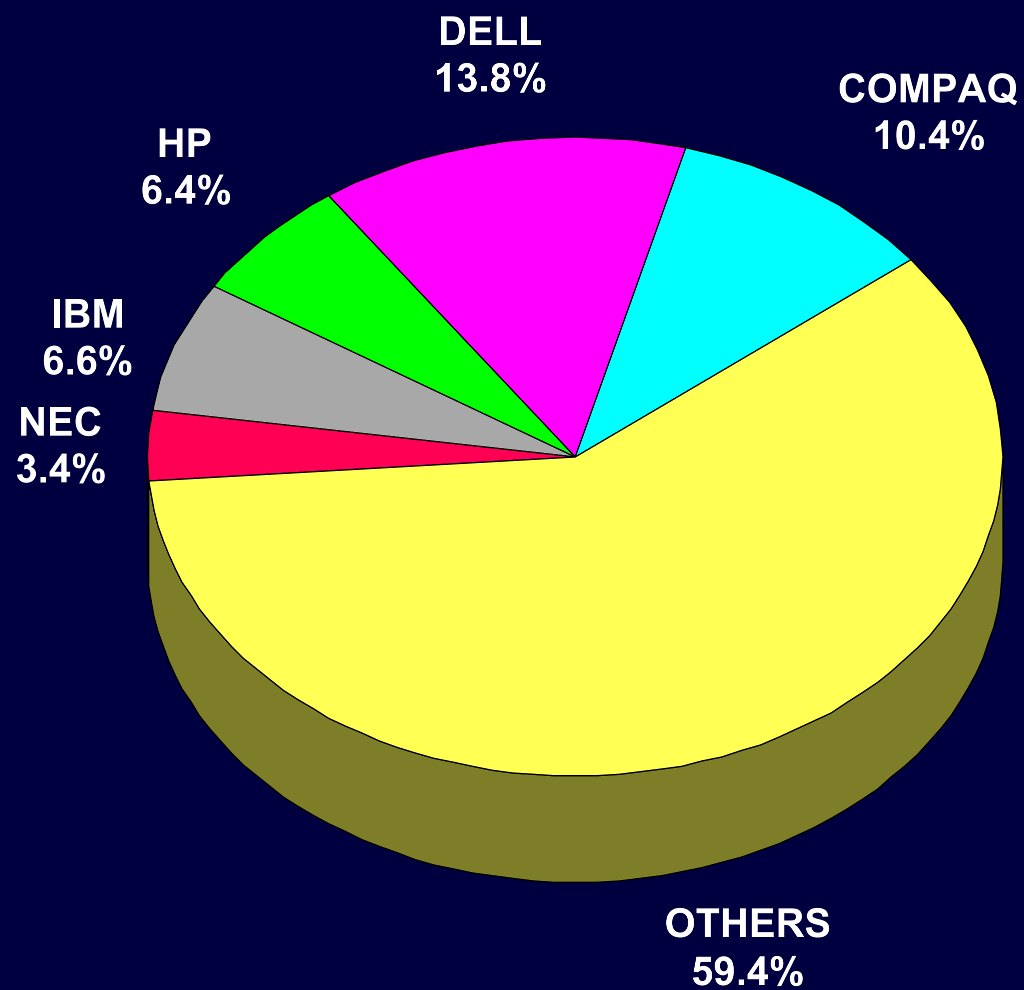
Personal Computer Market Growth
World & USA



DataQuest 10/2001

WORLD PERSONAL COMPUTER MARKET

3Q 2001

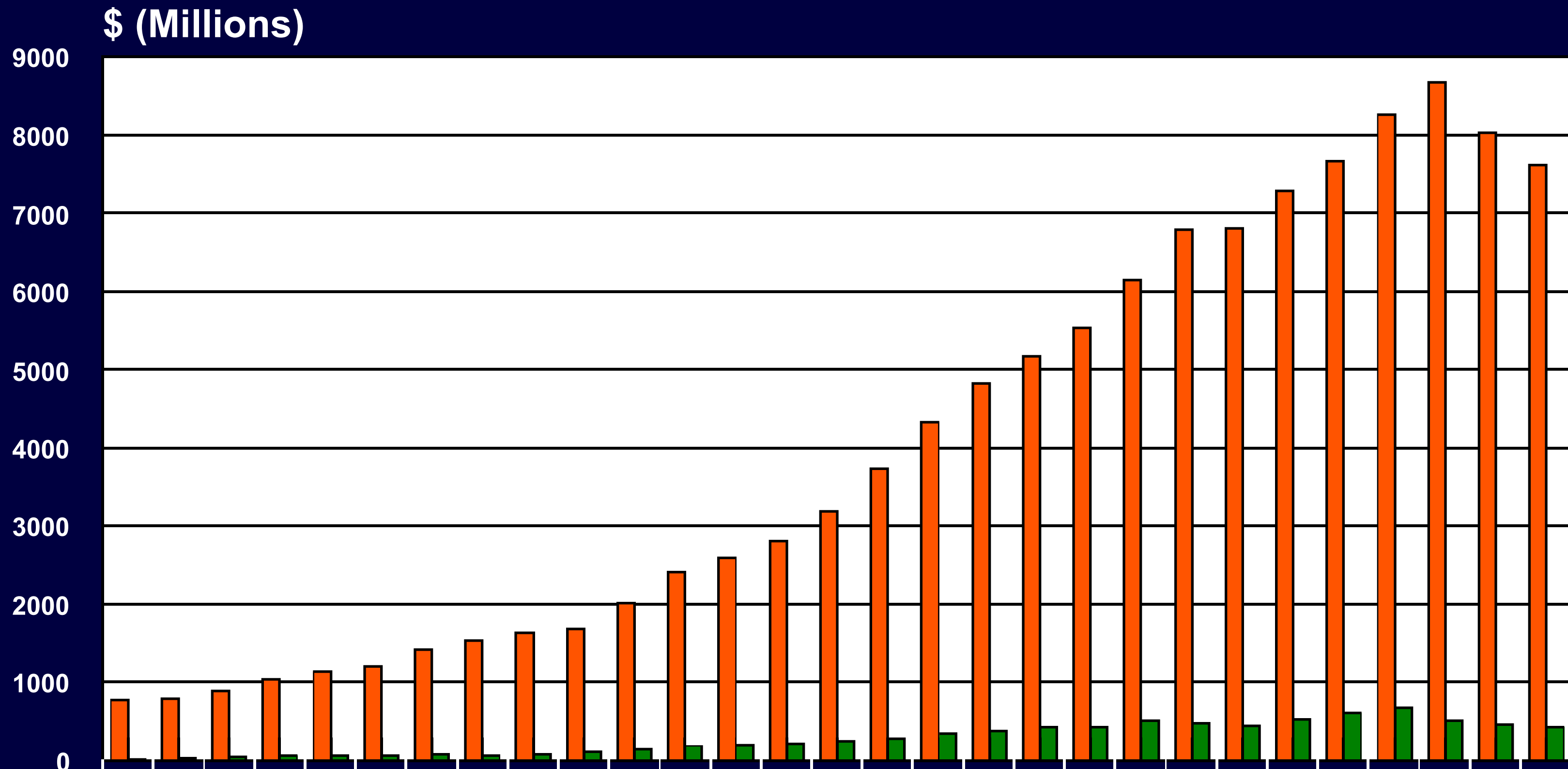


DATAQUEST 10/2001
Preliminary, Servers not included

TOTAL: 30.6 M UNITS

DELL COMPUTER

Revenue & Net Income



	2	3	4	1	2	3	4	1	2	3	4
		94			95				96		
SALES	767	792	885	1033	1136	1206	1416	1539	1638	1690	2019
PROFITS	19	29	41	58	62	65	75	70	82	112	149

	1	2	3	4	1	2	3	4	1	2	3	4
		97				98				99		
SALES	2412	2588	2814	3188	3737	4331	4818	5173	5537	6142	6784	6801
PROFITS	188	198	214	248	285	346	384	425	434	507	483	436

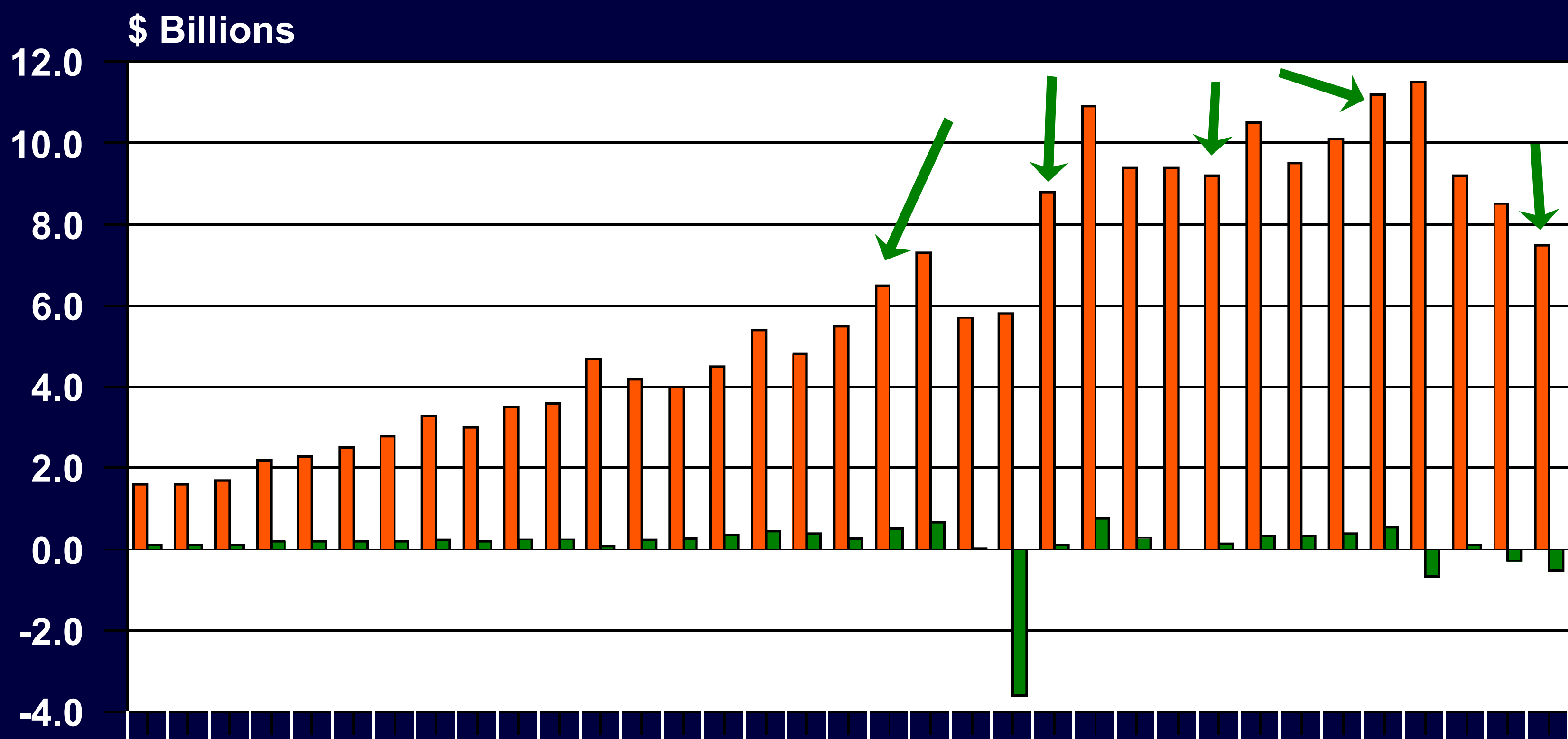
	1	2	3	4	1	2
		00			01	
SALES	7280	7670	8264	8674	8028	7610
PROFITS	525	603	674	508	462	433

CY

FY ends October

Compaq Computer

Revenue & Net Income



	93 Q1	93 Q2	93 Q3	93 Q4	94 Q1	94 Q2	94 Q3	94 Q4	95 Q1	95 Q2	95 Q3	95 Q4	96 Q1	96 Q2	96 Q3	96 Q4	97 Q1	97 Q2
Revenue	1.6	1.6	1.7	2.2	2.3	2.5	2.8	3.3	3.0	3.5	3.6	4.7	4.2	4.0	4.5	5.4	4.8	5.5
Income	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.1	0.2	0.3	0.4	0.5	0.4	0.3

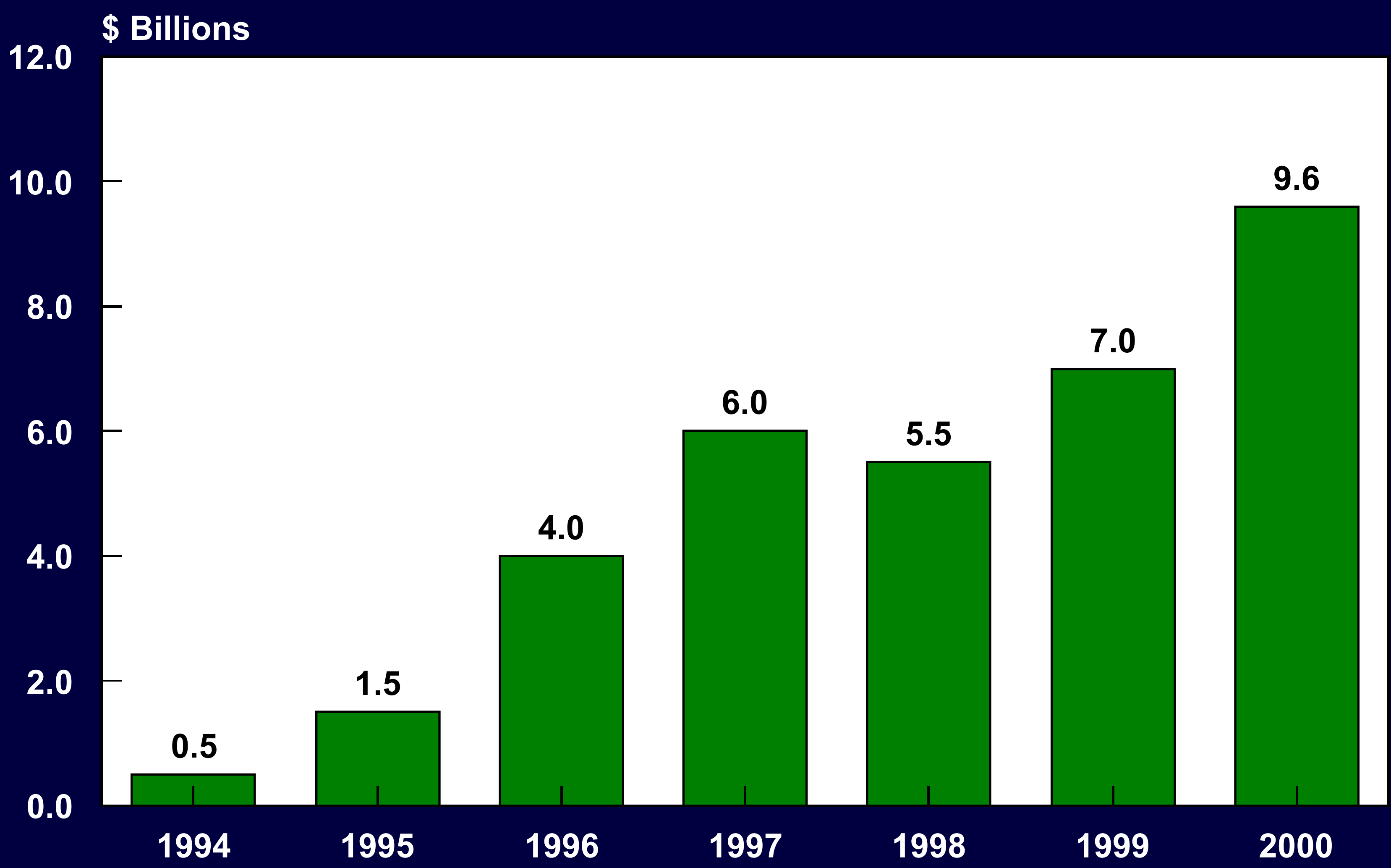
	97 Q3	97 Q4	98 Q1	98 Q2	98 Q3	98 Q4	99 Q1	99 Q2	99 Q3	99 Q4	00 Q1	00 Q2	00 Q3	00 Q4	01 Q1	01 Q2	01 Q3
Revenue	6.5	7.3	5.7	5.8	8.8	10.9	9.4	9.4	9.2	10.5	9.5	10.1	11.2	11.5	9.2	8.5	7.5
Income	0.5	0.7	0.0	-3.6	0.1	0.8	0.3	0.0	0.1	0.3	0.3	0.4	0.6	-0.7	0.1	-0.3	-0.5

CY

FY=CY

CPQ

Compaq - Products Procured in Taiwan



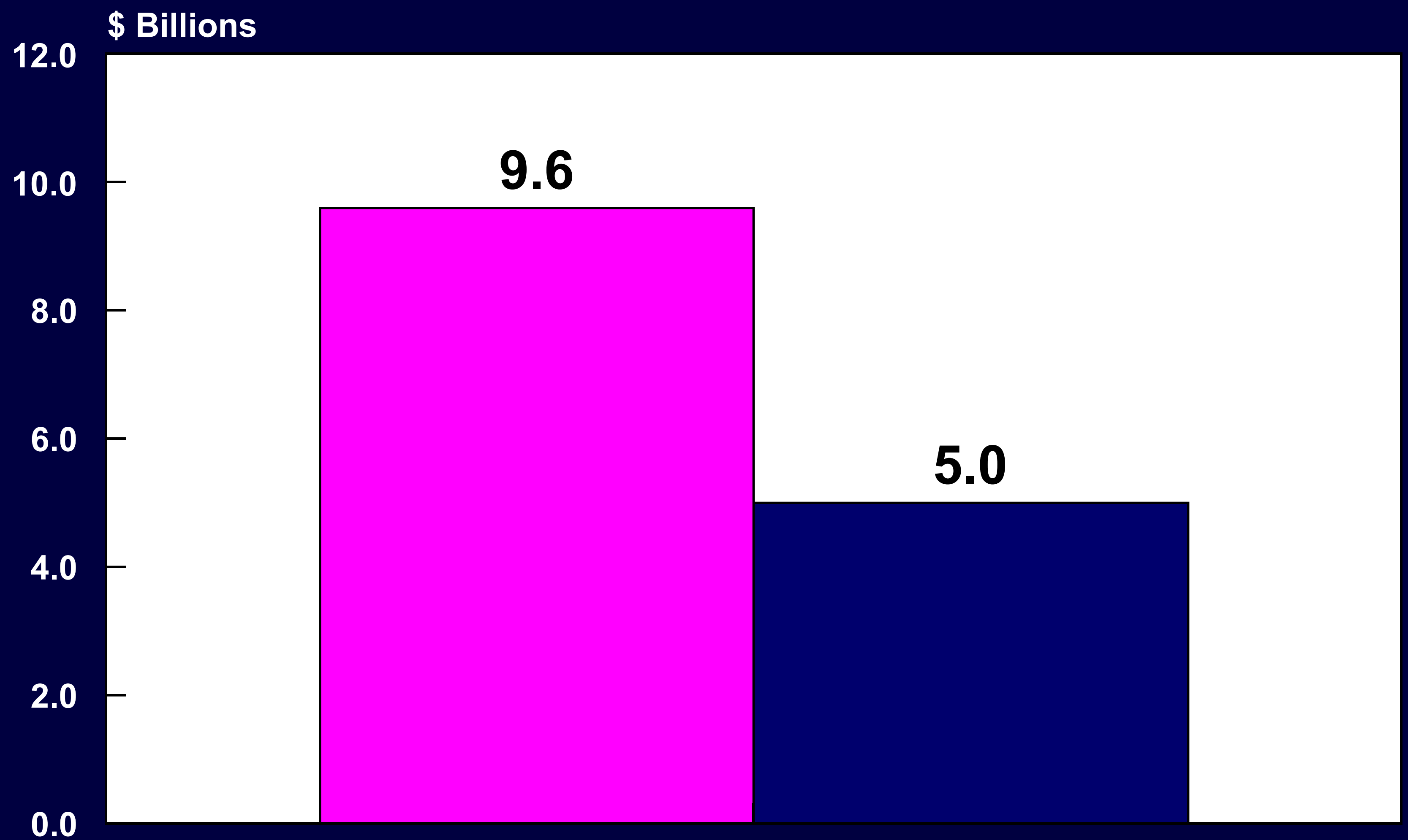
Electronic Buyers News 3/99, Compaq 8/01

How HP & Compaq Compare

	Annual Sales $B	Net Inc $B	Employees thousand
Hewlett-Packard	47	1.4	89
Compaq	40	-.3	65
HP/Compaq Combined	87	1.1	145
IBM	90	8.4	325
Dell	33	1.5	35
Sun Microsystems	18	1.0	43

9/2001

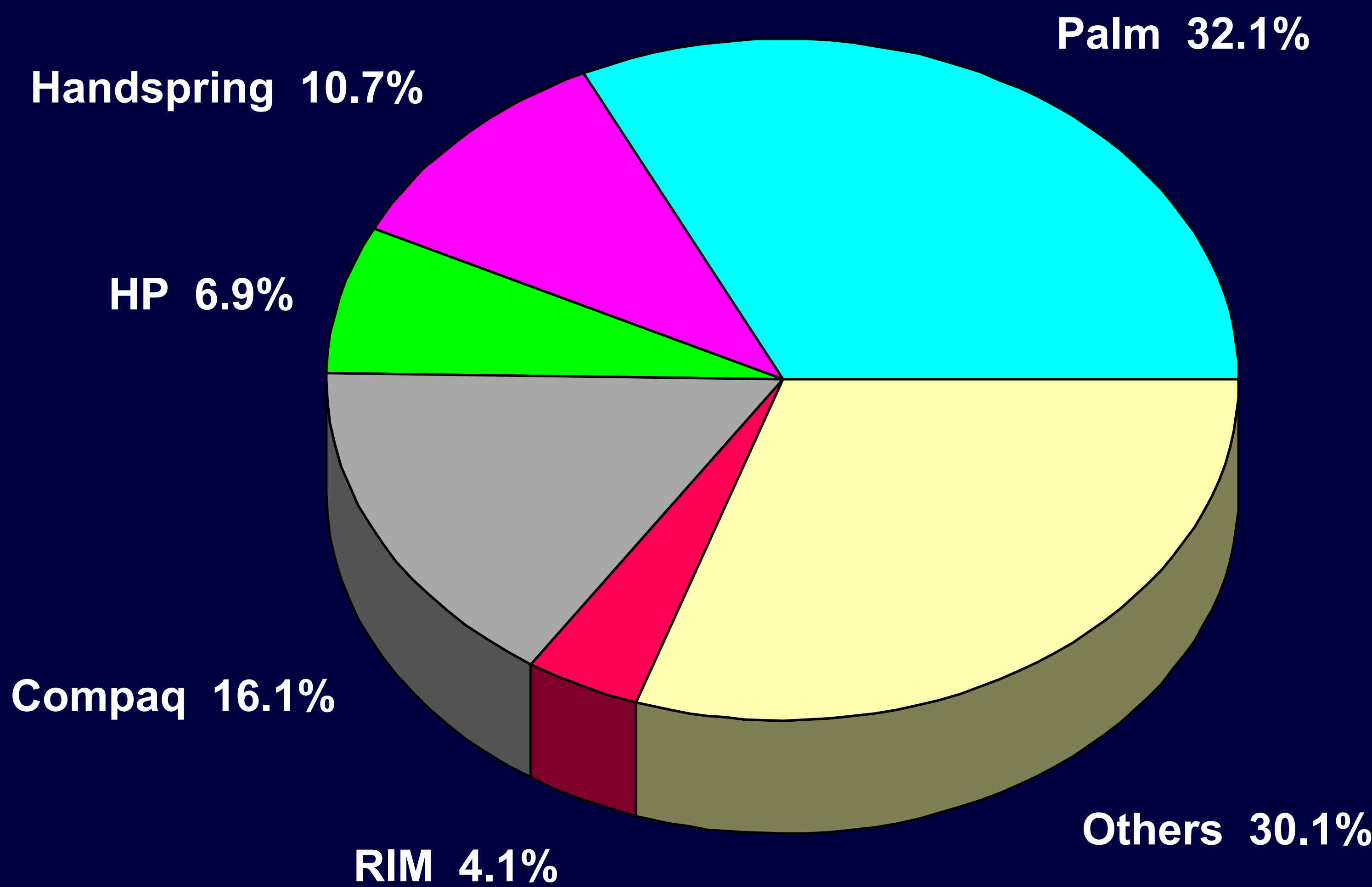
Compaq & Hewlett-Packard Purchases from Taiwan - 2000



Reuters 9/2001

World Handheld Market Share

Top PDA Brands by Units Sold - 2Q'01

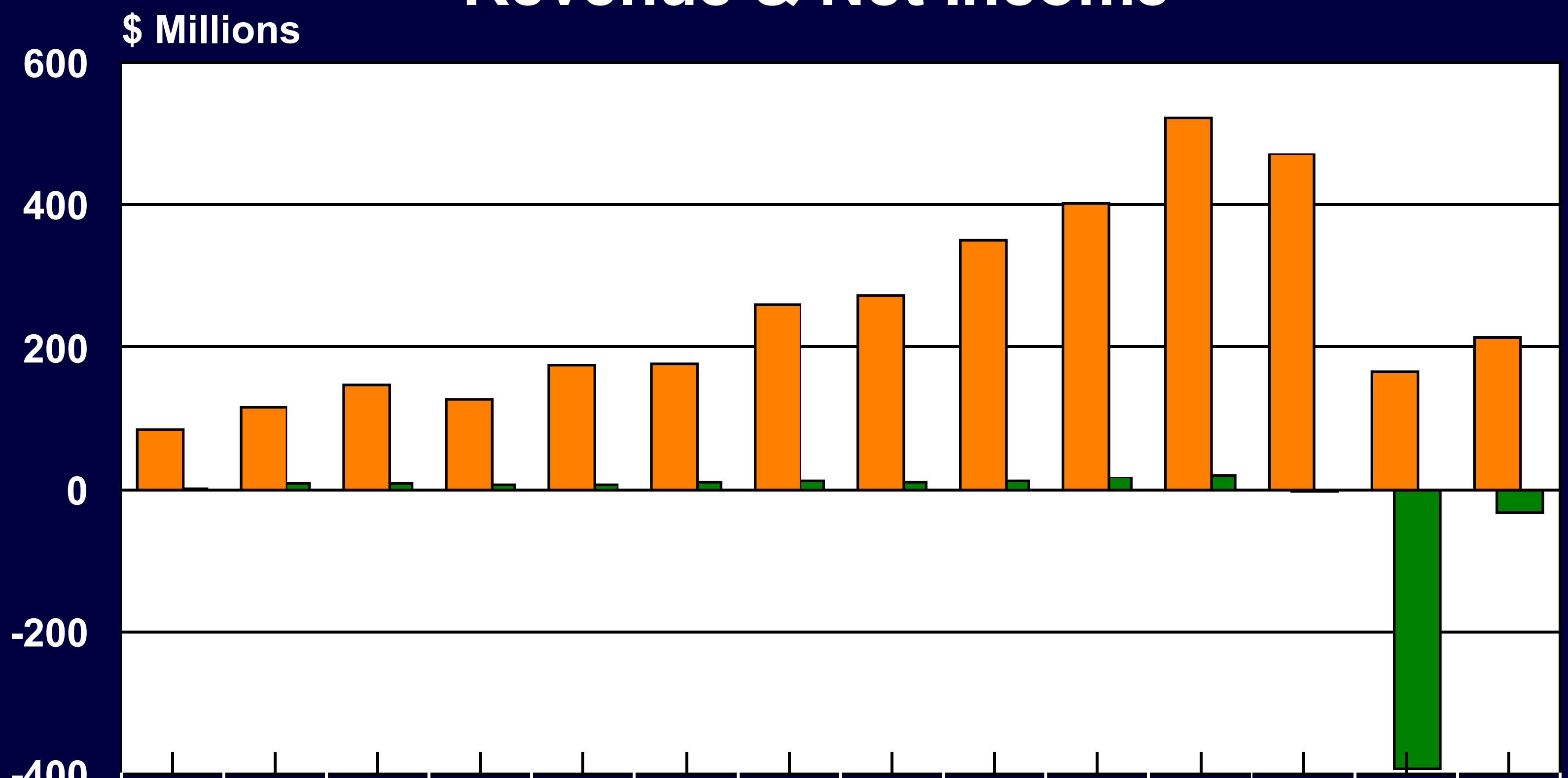


Total 2.8 Million Units

Dataquest 8/2001

Palm Inc

Revenue & Net Income



	2	3	4	1	2	3	4	1	2	3	4	1	2	3
		98			99				00				01	
Revenue	85	116	147	126	174	176	259	272	350	401	522	471	165	214
Income	1	8	8	7	7	10	13	11	12	17	20	-2	-392	-32

CY

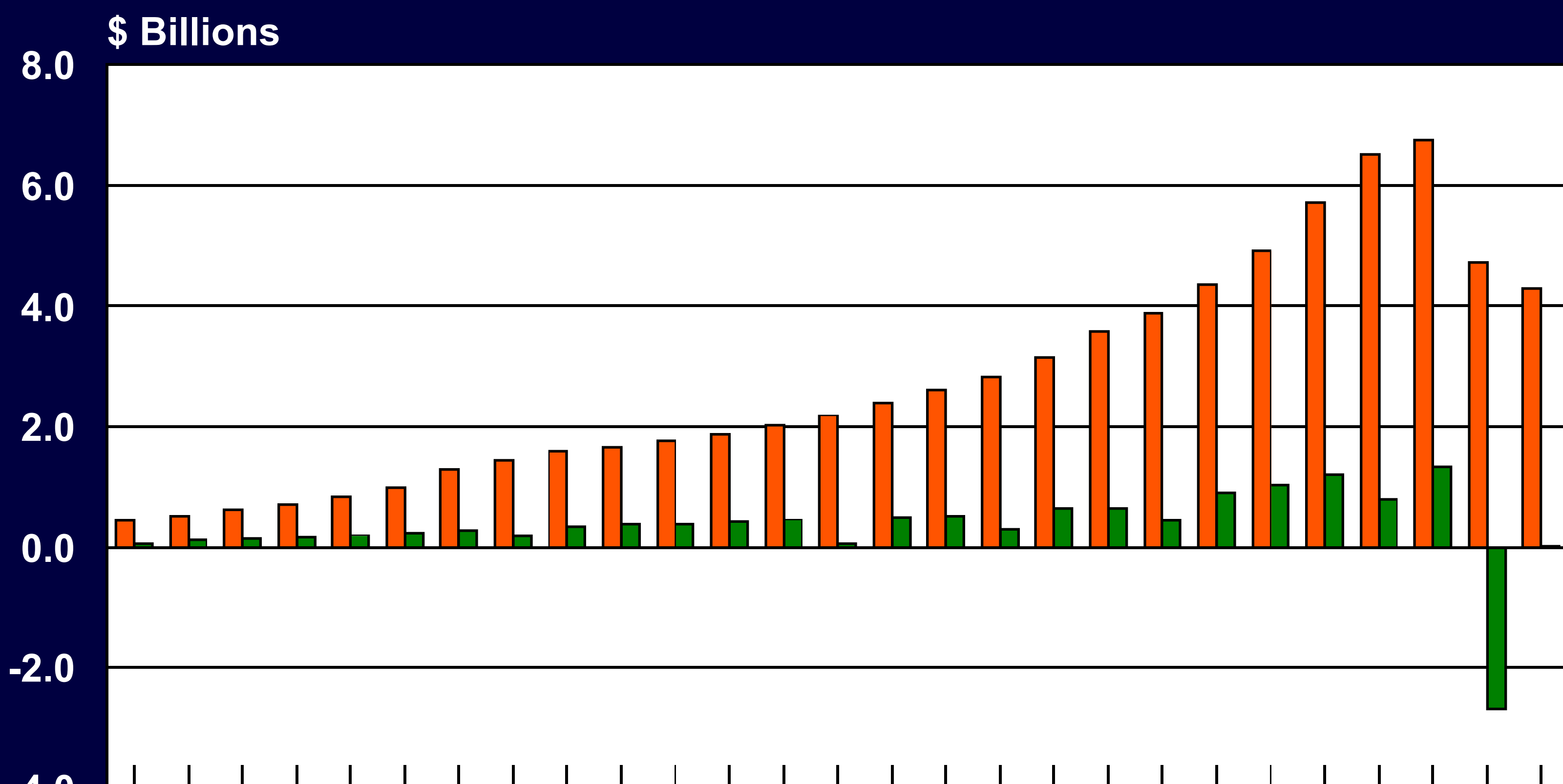
PALM

FY ends May


DANGER:
FALLING
DOT-COMS
COPYRIGHT © 2001 SATIREWIRE
WWW.SATIREWIRE.COM

CISCO SYSTEMS

Revenue & Net Income



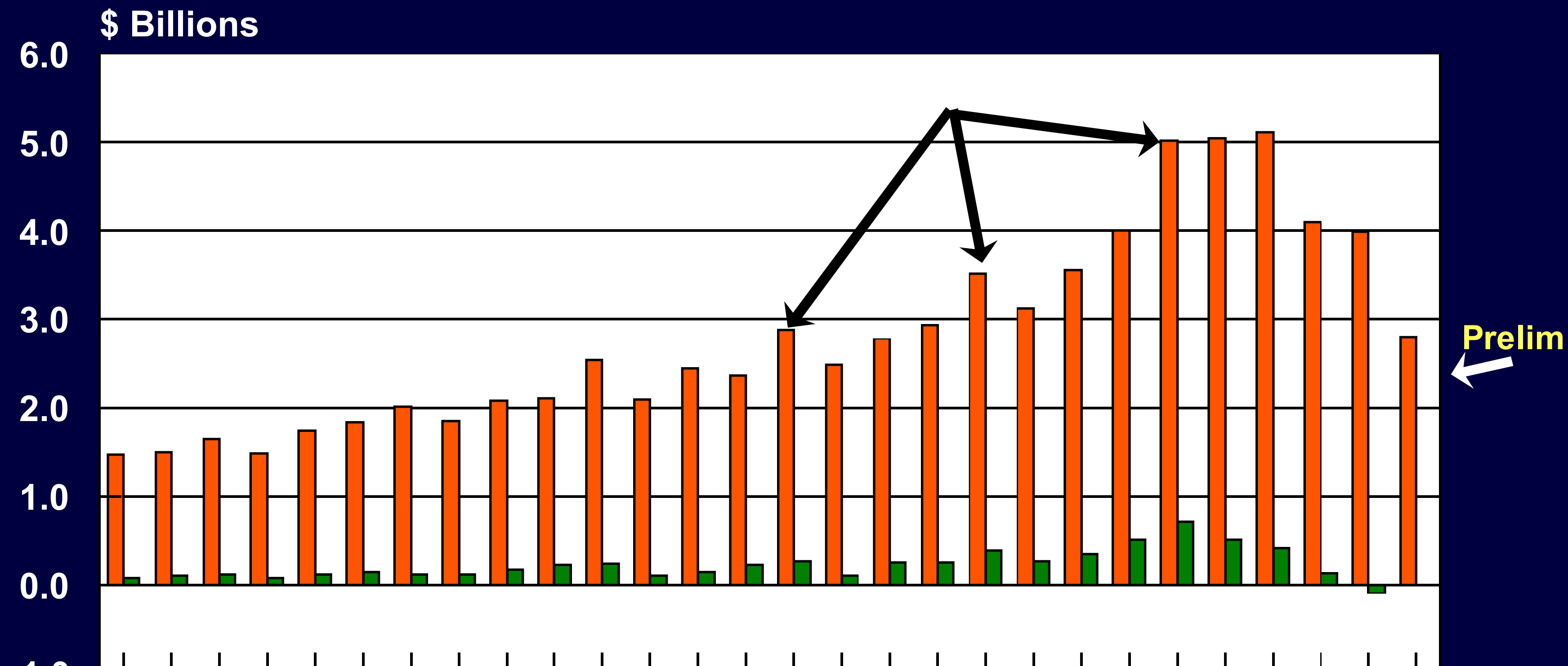
	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
	94	95				96				97				98				99				00				01	
Revenue	0.5	0.5	0.6	0.7	0.8	1.0	1.3	1.4	1.6	1.6	1.8	1.9	2.0	2.2	2.4	2.6	2.8	3.1	3.6	3.9	4.4	4.9	5.7	6.5	6.7	4.7	4.3
Income	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.3	0.4	0.4	0.4	0.5	0.1	0.5	0.5	0.3	0.6	0.7	0.4	0.9	1.0	1.2	0.8	1.3	-2.7	0.0

CY

CSCO

Sun Microsystems

Revenue & Net Income



	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
	94		95				96				97				98				99				00				01	
Revenue	1.5	1.5	1.6	1.5	1.8	1.8	2.0	1.9	2.1	2.1	2.5	2.1	2.5	2.4	2.9	2.5	2.8	2.9	3.5	3.1	3.6	4.0	5.0	5.0	5.1	4.1	4.0	2.8
Income	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.3	0.1	0.3	0.3	0.4	0.3	0.4	0.5	0.7	0.5	0.4	0.1	-0.1	

CY

FY ENDS 6/30

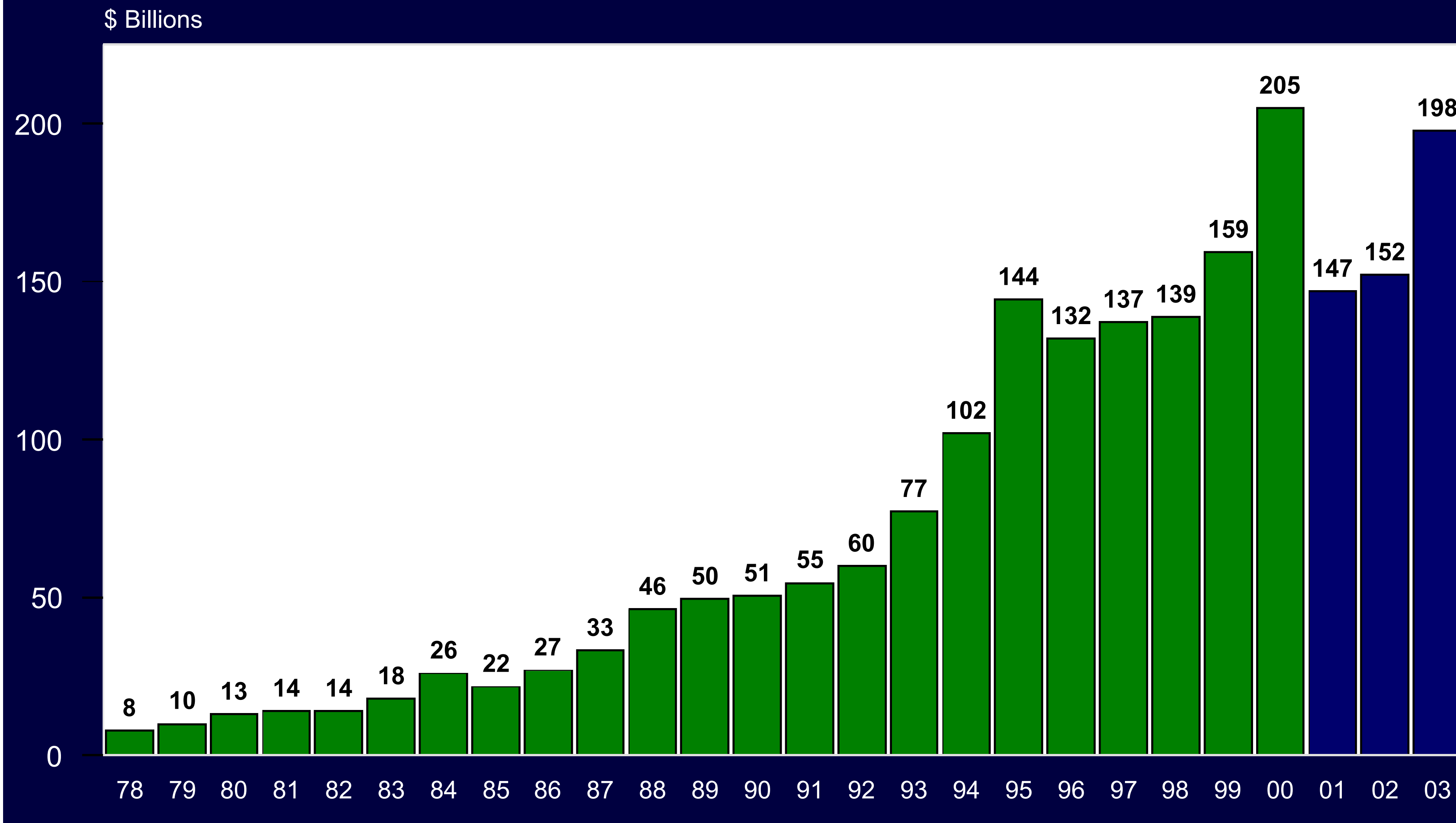
The Internet will be 2000 times larger in five years.

All of the servers in the market today represent less than 4% of the Internet's expected capacity in five years.

John Shoemaker, Exec VP, Sun Microsystems 11/2000

Semiconductors

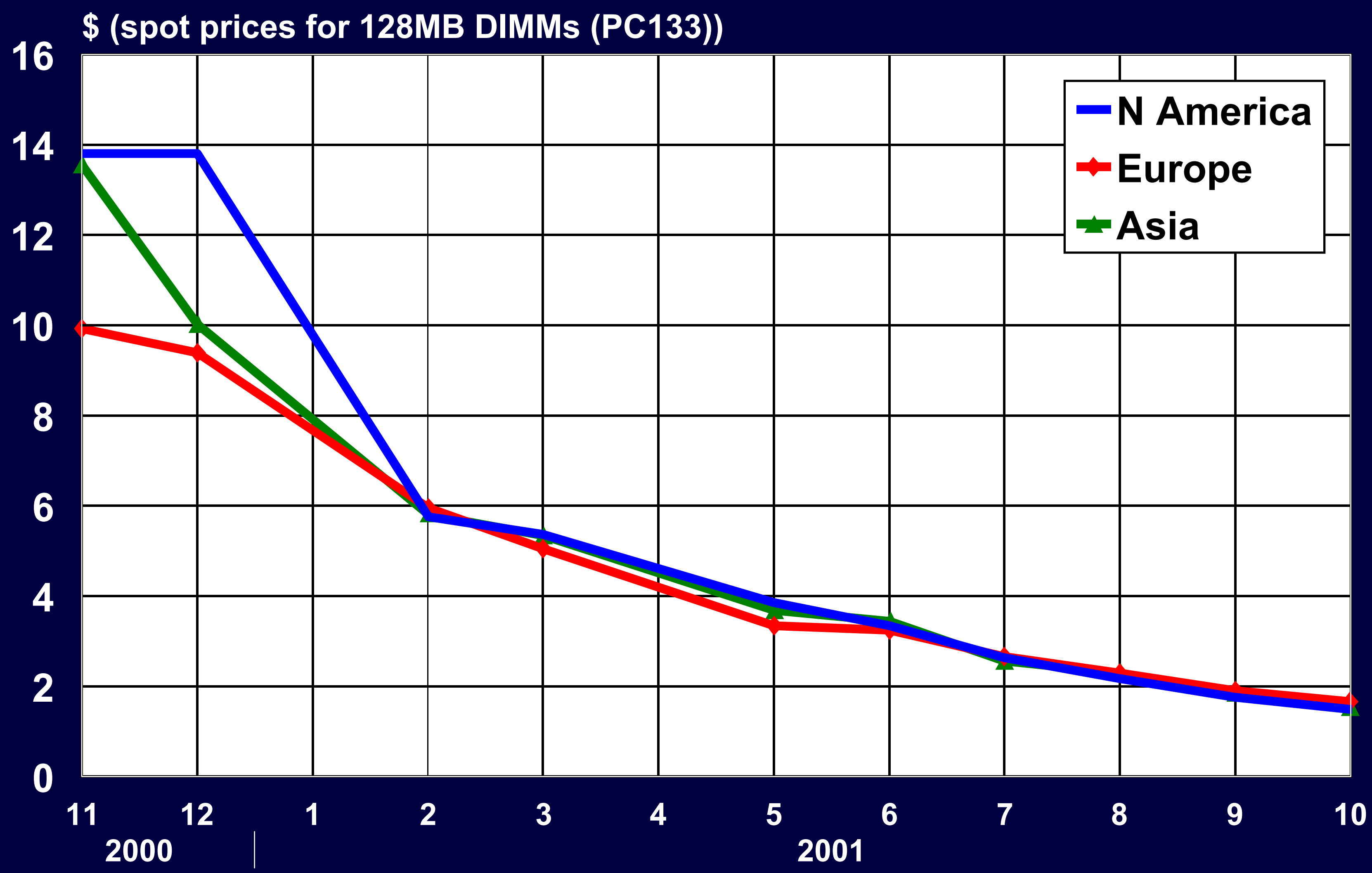
World Semiconductor Sales
Actual & Forecast



Dataquest 10/01

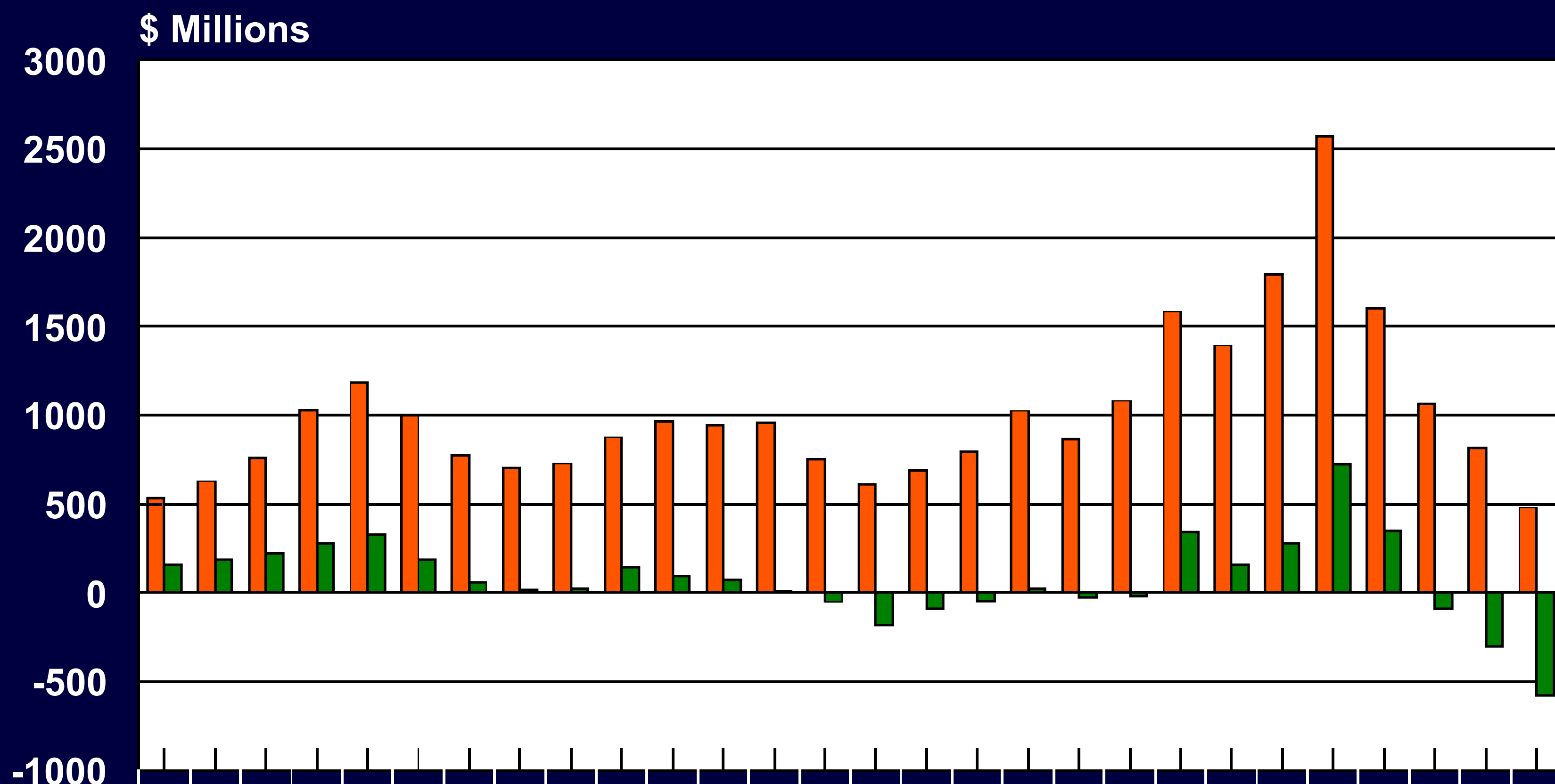
DRAM Prices

30-Day Rolling Averages of 128Mb DRAMs (PC133, 16M x 8)



MICRON TECHNOLOGY

Revenue & Net Income



	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
	94		95				96				97				98				99		98		00				01	
Revenue	535	629	761	1028	1186	997	771	701	728	876	965	946	955	755	613	692	794	1025	864	1081	1584	1393	1789	2570	1600	1066	818	480
Income	159	184	220	281	329	188	58	19	21	143	97	72	10	-51	-179	-89	-46	22	-28	-17	341	161	275	727	352	-88	-304	-576

CY

MU

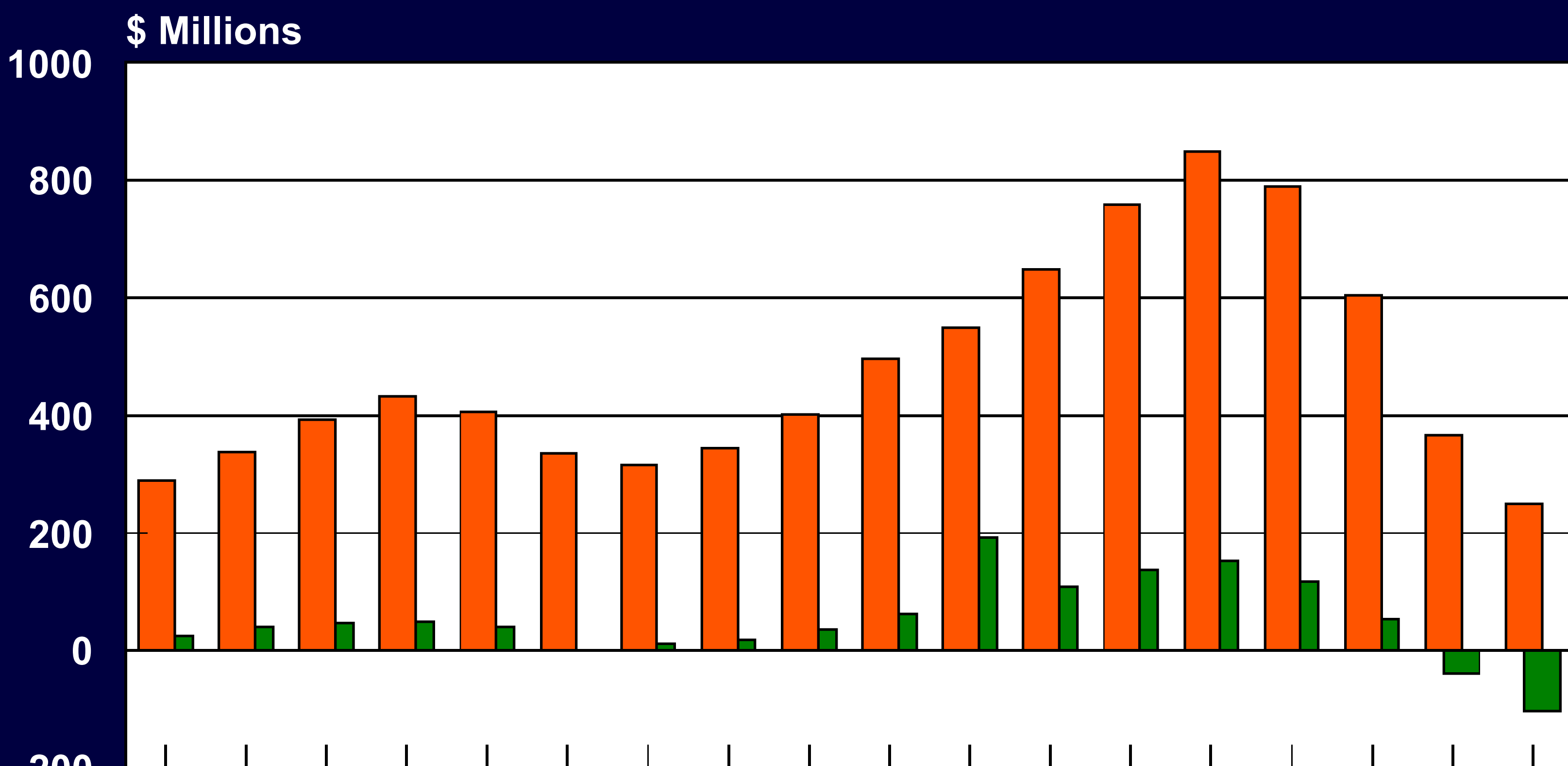
Top 10 Semiconductor Equipment Suppliers
2000 Sales in $Billion

		2000/1999 % Growth
Applied Materials	10.460	89%
Tokyo Electron Ltd.	5.142	89%
Nikon	2.432	70%
Teradyne	2.044	69%
ASM Lithography	2.016	58%
KLA-Tencor	2.003	91%
Advantest	1.865	95%
Lam Research	1.627	82%
Canon	1.418	90%
Dainippon Screen	1.390	115%

Source: VLSI Research Inc. 2/2001

Teradyne

Revenue & Net Income



	97			98				99				00				01		
	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Revenue	290	337	392	432	406	335	316	344	401	497	549	648	759	848	789	605	366	249
Income	25	39.2	46.2	49.6	39.4	1.3	11.8	18	35.8	62.7	191.6	109	138	153	118	54	-40	-103

CY

TER

PCB ASSEMBLY

Top World Contract Electronic Manufacturers

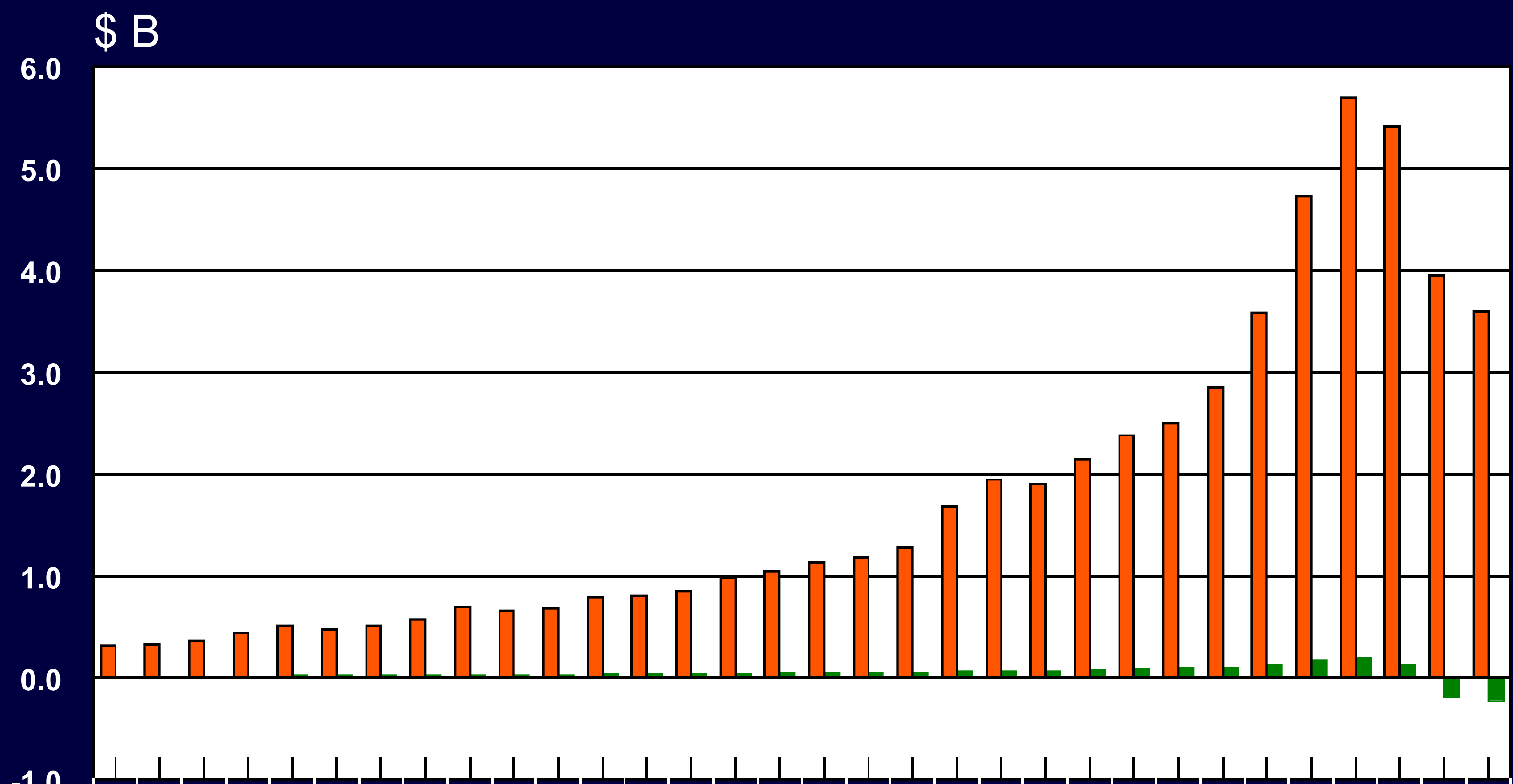
1999 vs 2000

			1999	2000	Grow %
Solectron	SLR	USA	8,948	16,884	89
Flextronics	FLEX	Singapore	3,089	10,369	236
Celestica	CLS	Canada	5,298	9,752	84
SCI Systems	SCI	USA	7,175	9,146	28
Sanmina	SANM	USA	1,400	4,218	201
Jabil Circuit	JBL	USA	2,242	3,998	78
Elcoteq Network	Y.ELC	Finland	803	2,050	155
Manufacturers' Services Ltd	MSV	USA	921	1,757	91
C-MAC Industries	T:CMS	Canada	791	1,715	117
Benchmark Electronics	BHE	USA	879	1,706	94
Total Top 10			31,546	61,595	95%

Sources: Company Data
$US Millions converted at fluctuating exchange

SOLECTRON

Revenue & Net Income



	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
	93		94				95				96				97	
Revenue	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8	0.8	0.9	1.0	1.0
Income					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

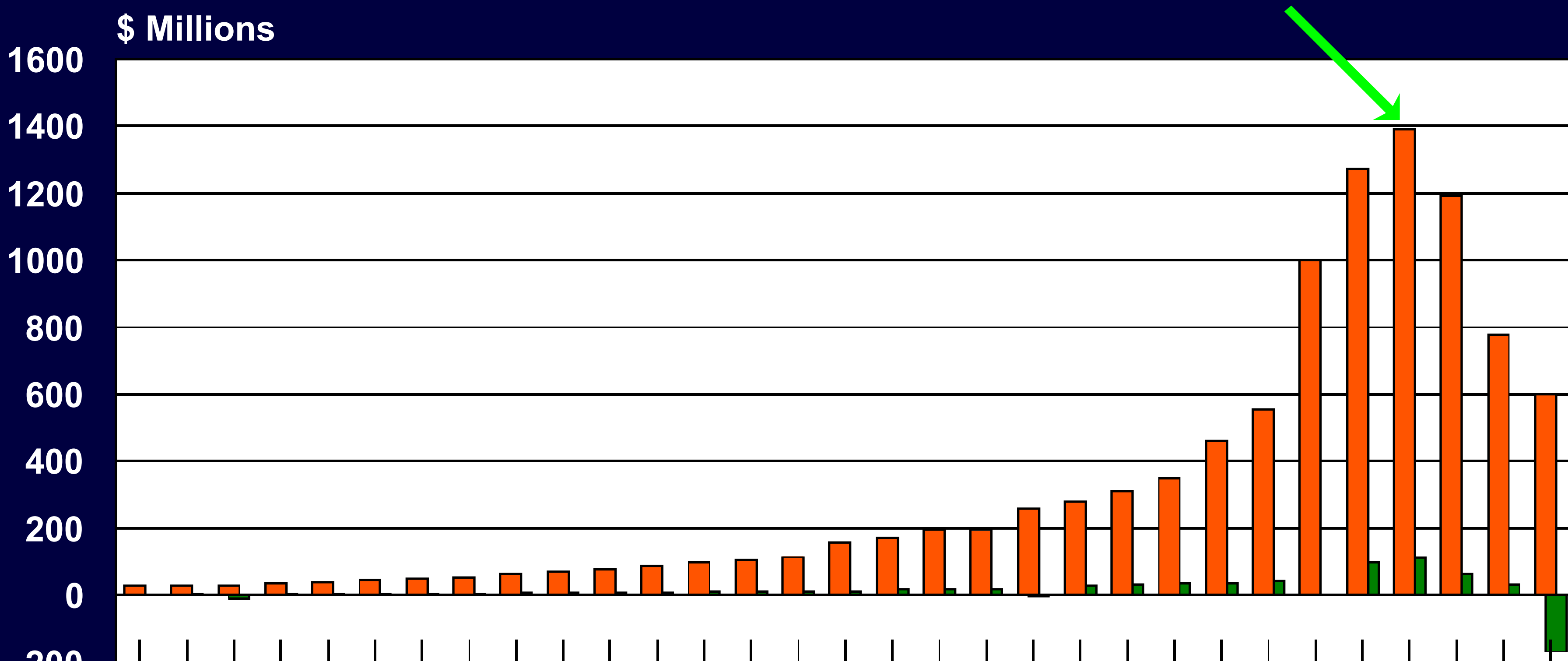
	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
			98				99				00				01	
Revenue	1.1	1.2	1.3	1.7	1.9	1.9	2.2	2.4	2.5	2.9	3.6	4.7	5.7	5.4	4.0	3.6
Income	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	-0.2	-0.2

SLR

FY ends in August

SANMINA
Revenue & Net Income

PCBs: $1.5 billion out of $ 5.6 billion annualized sales



	94				95				96				97				98			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Revenue	28	29	30	35	39	45	49	52	63	71	79	89	97	105	114	159	172	197	194	260
Income	3	3	-11	3	4	5	5	6	7	8	8	9	10	11	11	13	17	19	19	-1

	99				00				01		
	1	2	3	4	1	2	3	4	1	2	3
Revenue	281	310	349	460	555	1001	1272	1390	1191	777	601
Income	29	31	34	36	44	2	97	111	62	31	-168

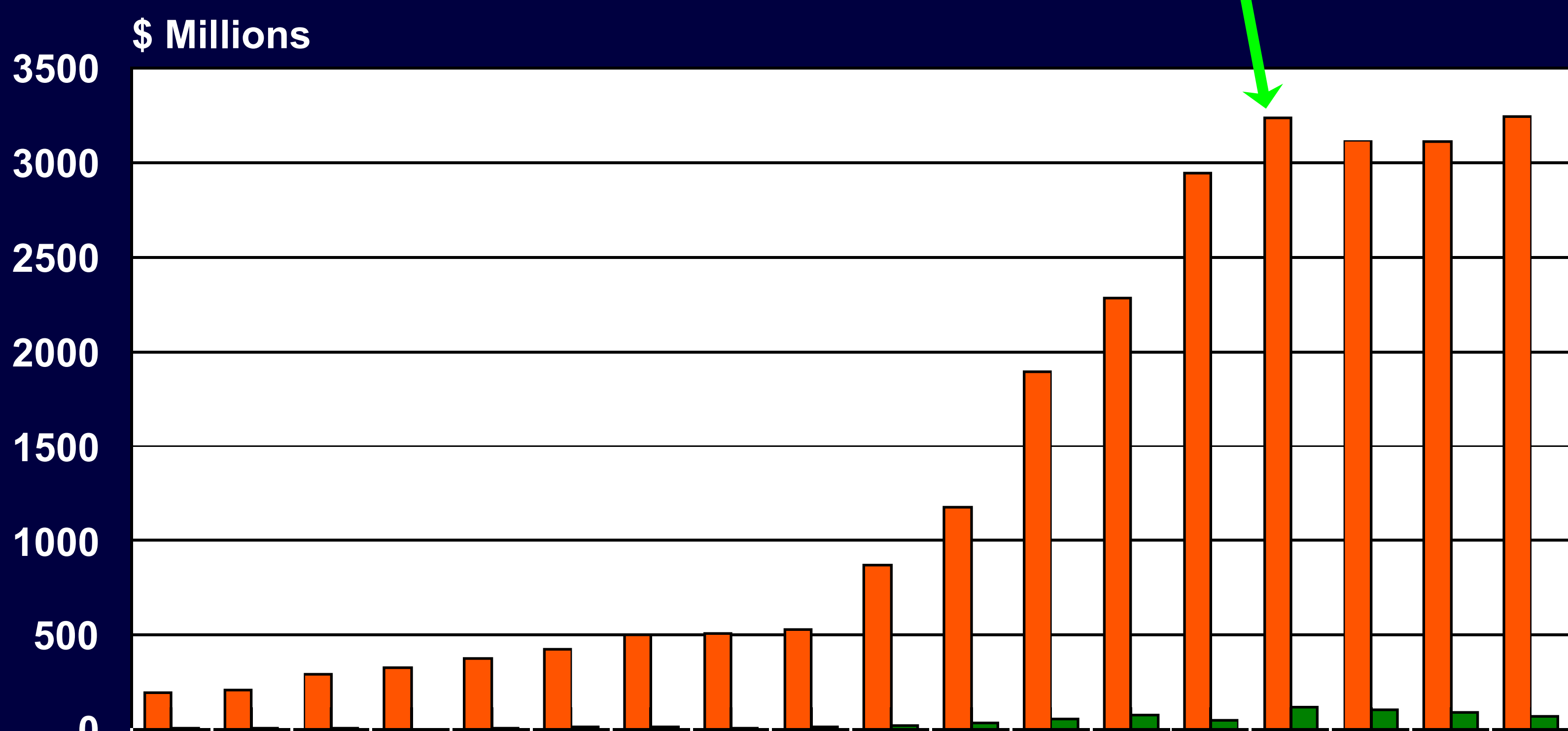
CY

FY ends September 30

Flextronics

Revenue & Net Income

PCBs: $750 million out of $12 billion annualized sales



	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
		97			98				99				00				01	
Revenue	197	210	295	331	376	423	500	509	530	871	1179	1897	2286	2947	3239	3114	3111	3245
Income	5.3	6.5	5.9	0.8	11.7	12.9	15.5	11.5	17.6	23	34.3	57.3	76.5	51	123	109	91	73

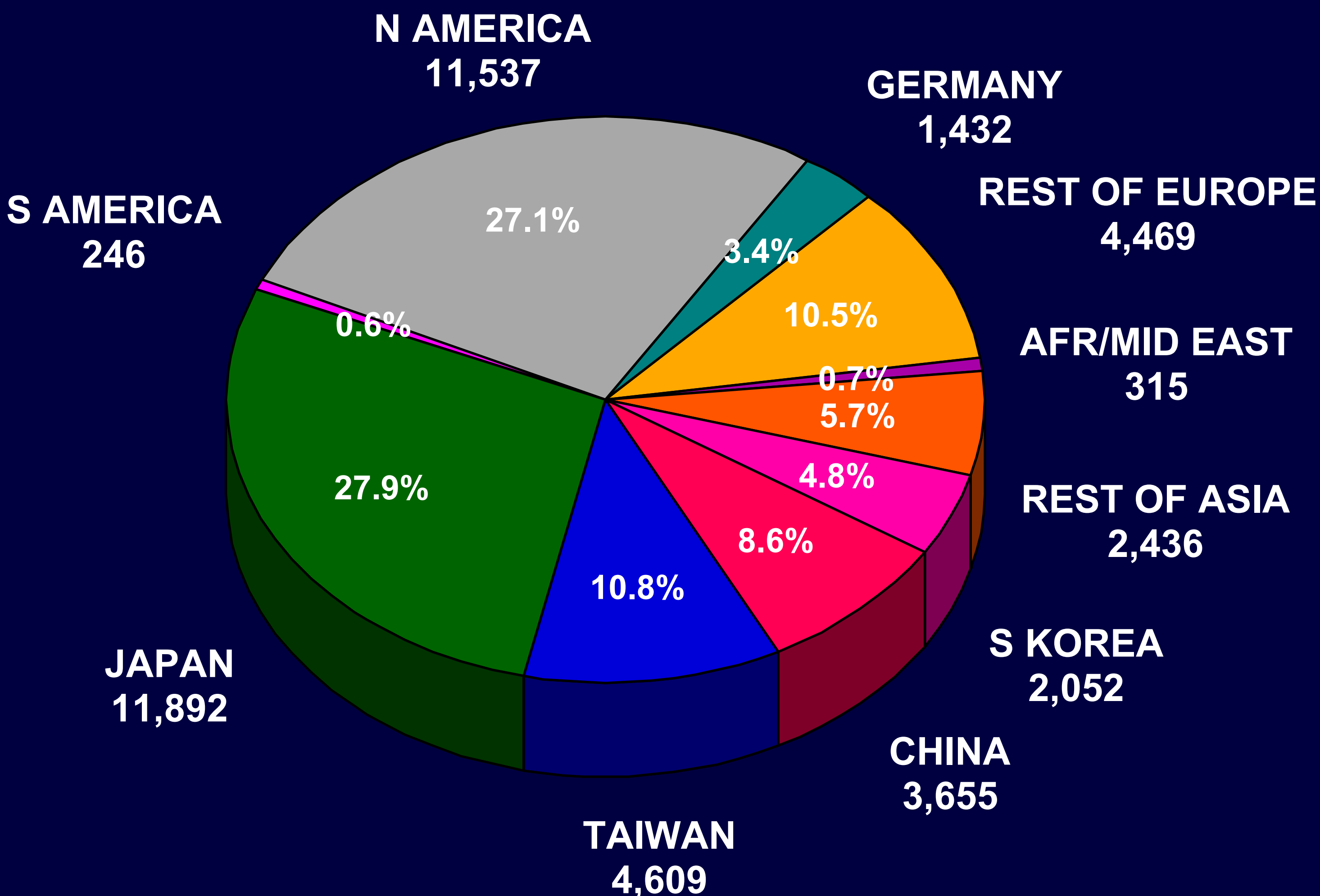
FY ends 3/31

CY

PCB Fabrication

2000 WORLD RIGID & FLEX PCB PRODUCTION

BY GEOGRAPHICAL AREA ($M)

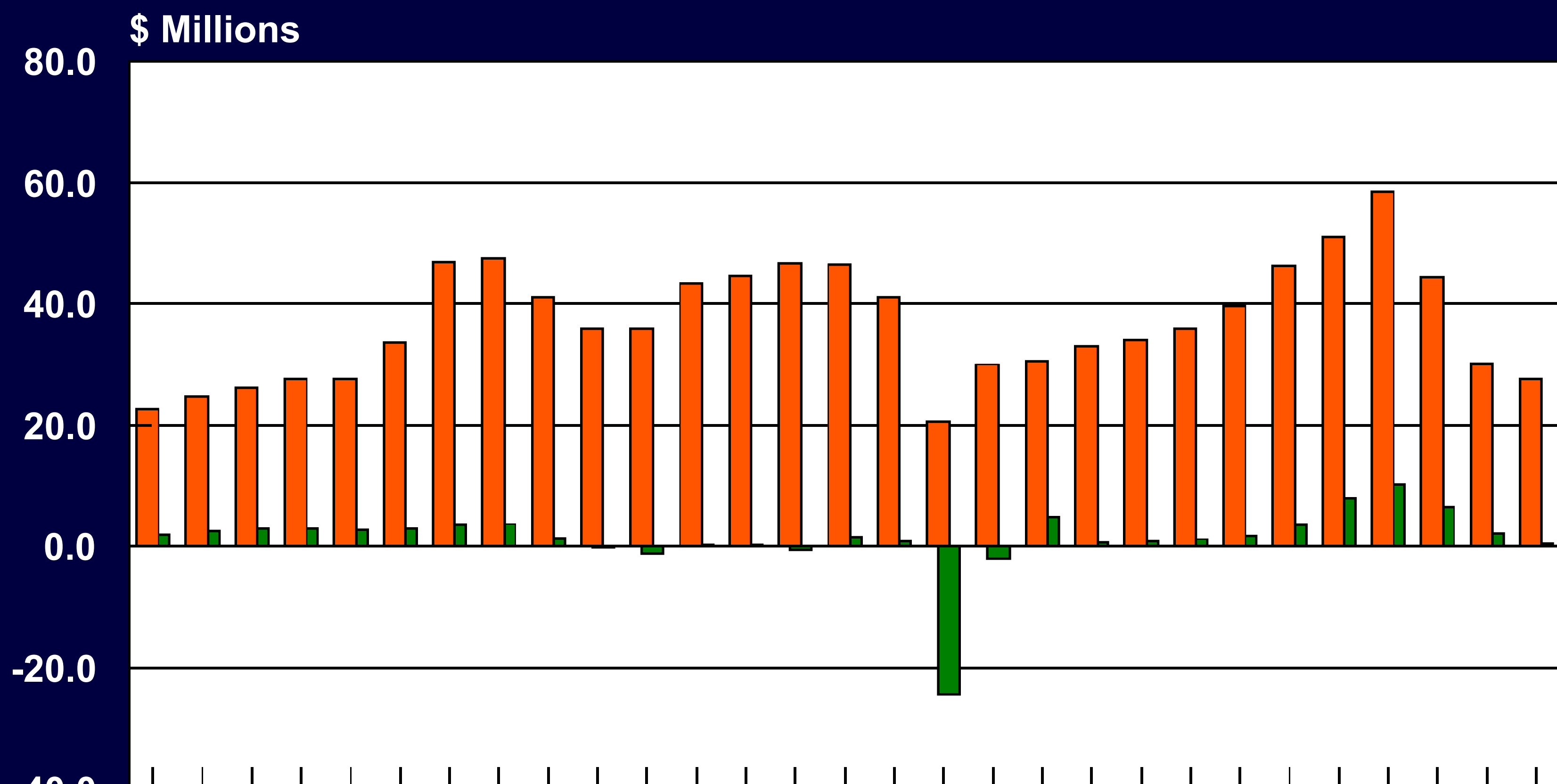


Total: $42.6 Billion

IPC T/MRC 5/2001 (includes Buildup PCBs)

MERIX

Revenue & Net Income

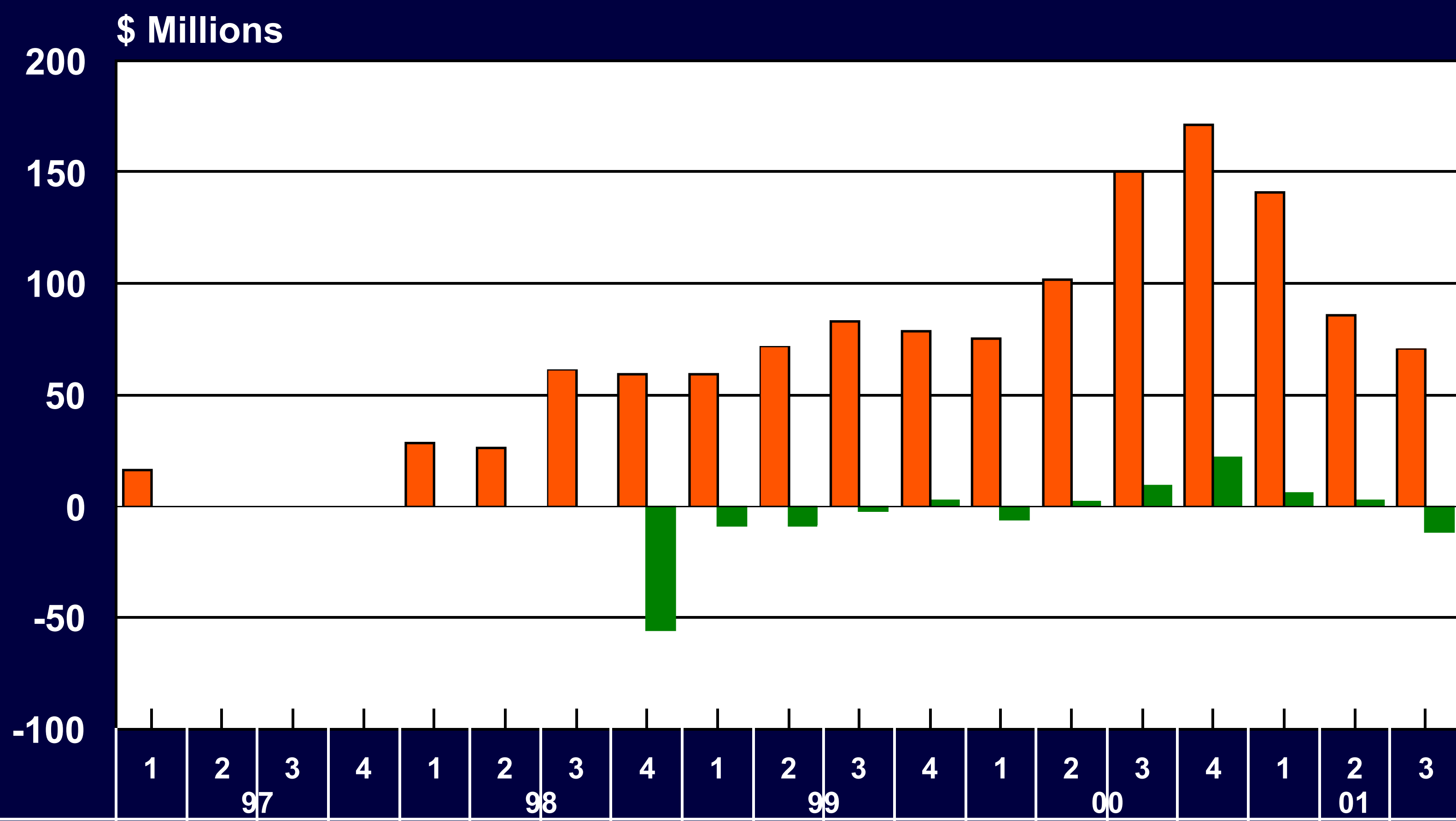


	b	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
		94		95				96				97				98				99				00				01	
Revenue	22.7	24.8	26.2	27.7	27.7	33.6	46.9	47.5	41.1	35.8	35.9	43.3	44.6	46.6	46.4	41.1	20.5	30.0	30.5	32.9	34.1	35.9	39.7	46.2	51.0	58.4	44.4	30.1	27.7
Income	2.0	2.7	3.0	3.0	2.7	2.9	3.5	3.7	1.3	-0.1	-1.1	0.3	0.3	-0.6	1.5	1.0	-24.4	-1.9	4.9	0.7	1.0	1.2	1.7	3.6	7.9	10.2	6.4	2.2	0.5

FY ends May

DDi Corp

Revenue & Net Income



	97 Q1	97 Q2	97 Q3	97 Q4	98 Q1	98 Q2	98 Q3	98 Q4	99 Q1	99 Q2	99 Q3	99 Q4	00 Q1	00 Q2	00 Q3	00 Q4	01 Q1	01 Q2	01 Q3
Revenue	16.3				28.2	26.3	61.2	59.1	59.2	71.7	82.9	78.7	75.3	101.5	150	171.3	140.7	85.8	70.6
Income								-55.6	-8.6	-8.4	-1.9	2.5	-5.7	1.8	9	21.8	5.7	2.4	-11.5

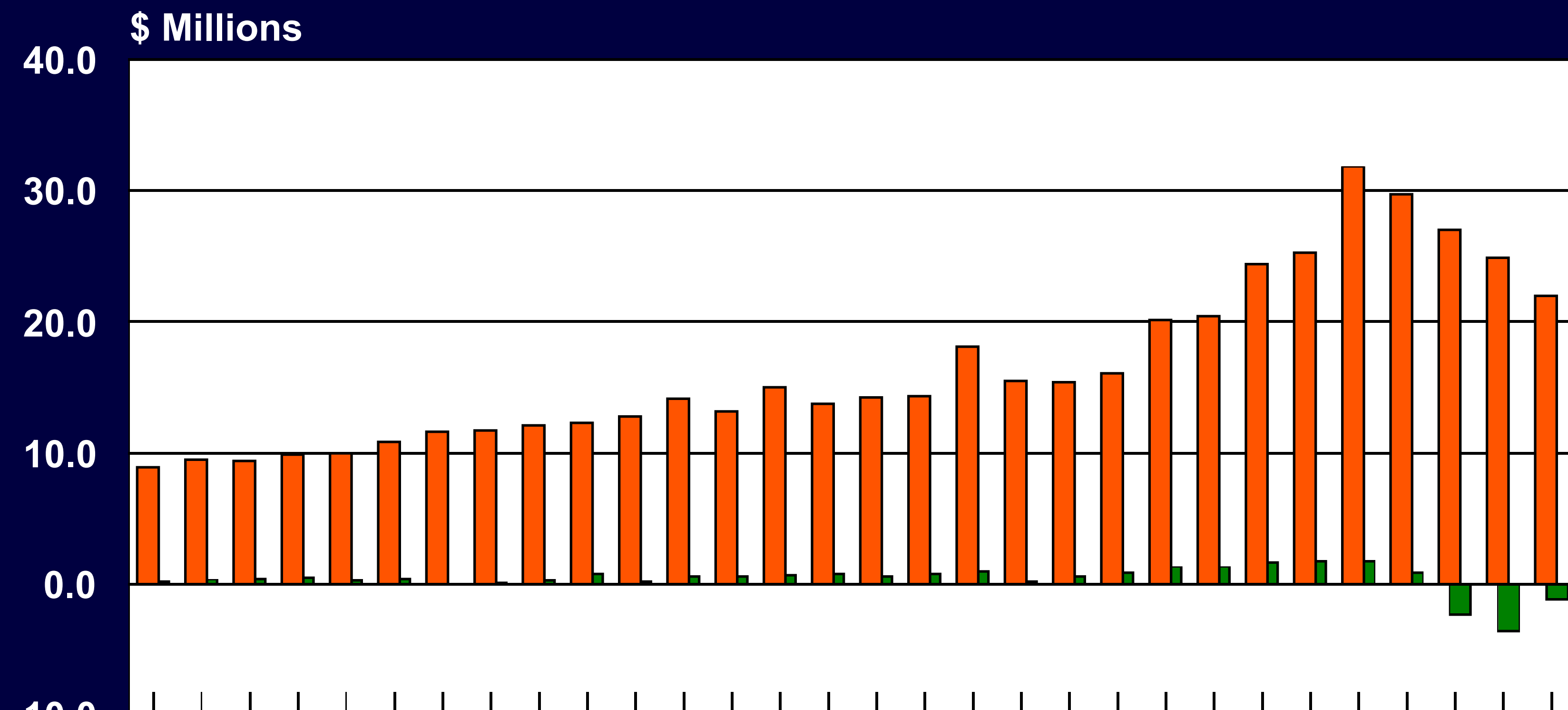
CY

FY=CY

DDIC

PARLEX

Revenue & Net Income



	94				95				96				97				98				99				00				01	
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
Revenue	8.9	9.5	9.4	9.9	9.9	10.8	11.6	11.7	12.1	12.3	12.8	14.1	13.2	15.0	13.7	14.2	14.3	18.1	15.5	15.4	16.1	20.1	20.4	24.4	25.3	31.8	29.7	27.0	24.9	22.0
Income	0.2	0.3	0.4	0.5	0.2	0.4	0.0	0.1	0.3	0.8	0.2	0.6	0.6	0.7	0.7	0.6	0.8	1.0	0.2	0.5	0.9	1.3	1.3	1.6	1.7	1.7	0.9	-2.3	-3.6	-1.2

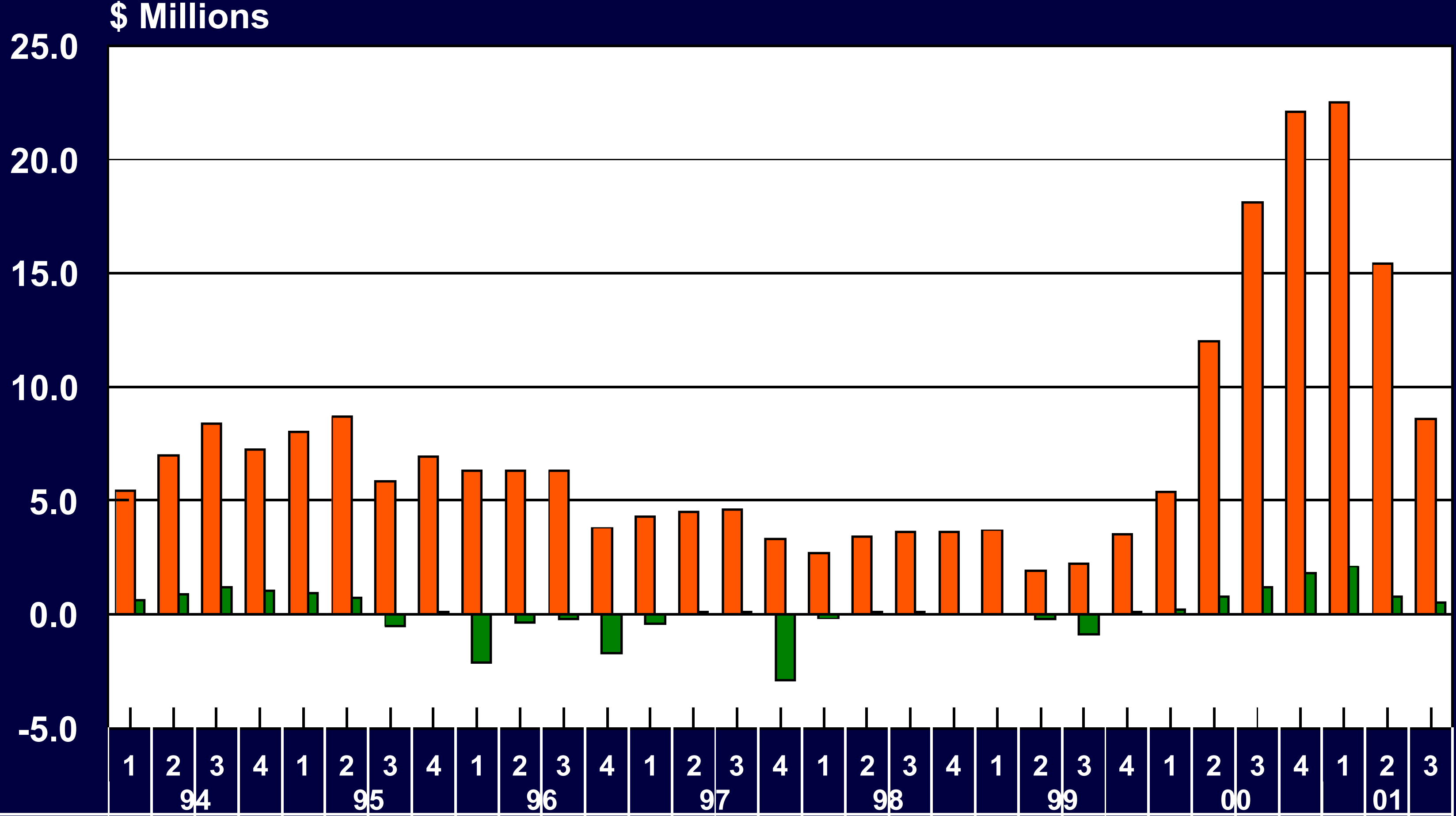
CY

FY ends June 30

PRLX

M-WAV

Revenue & Net Income



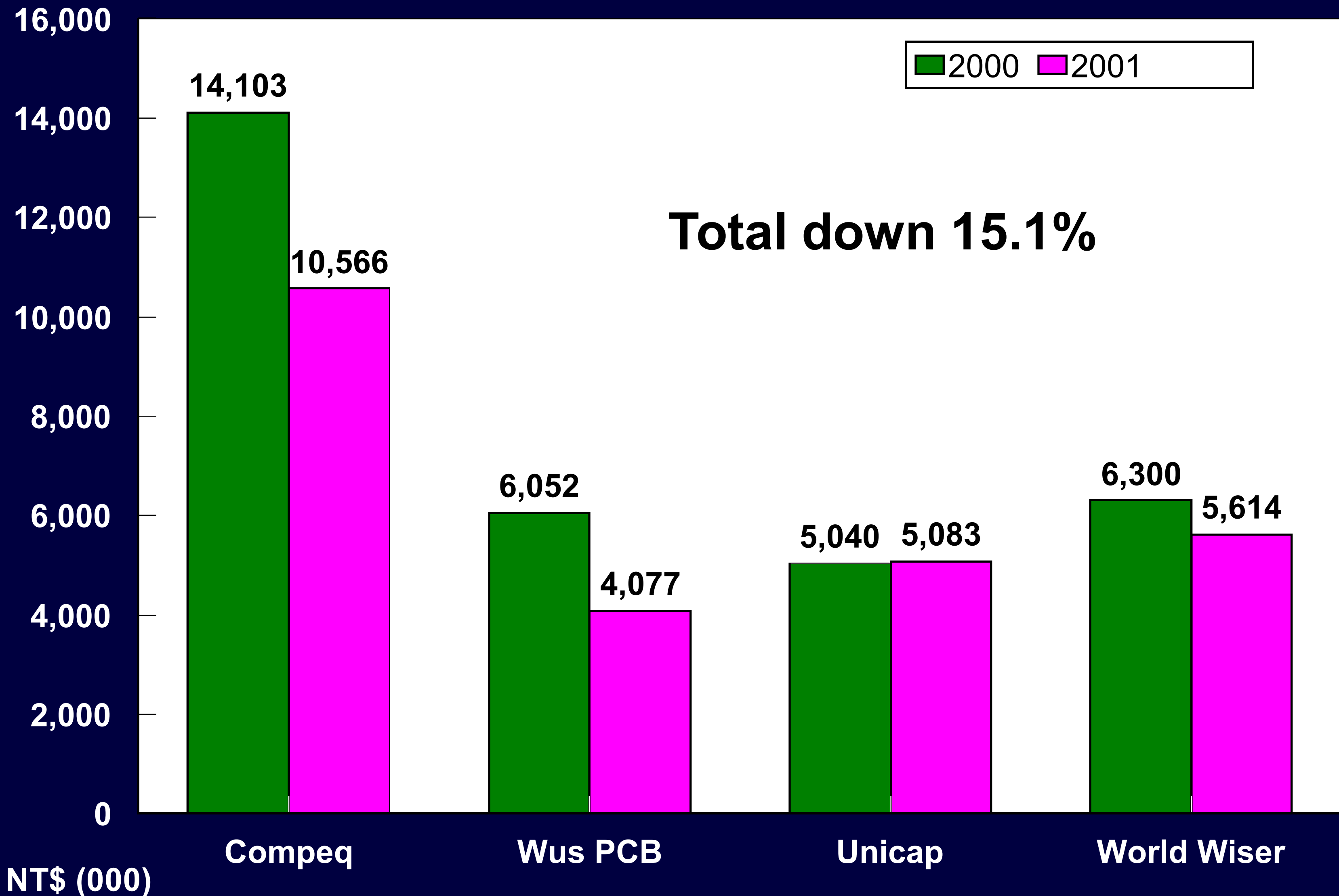
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
	94				95				96				97				98				99				00				01		
Revenue	5.4	7.0	8.4	7.2	8.0	8.7	5.9	6.9	6.3	6.3	6.3	3.8	4.3	4.5	4.6	3.3	2.7	3.4	3.6	3.6	3.7	1.9	2.2	3.5	5.4	12.0	18.1	22.1	22.5	15.4	8.6
Income	0.6	0.9	1.2	1.1	0.9	0.7	-0.5	0.1	-2.1	-0.3	-0.2	-1.7	-0.4	0.1	0.1	-2.9	-0.2	0.1	0.1	0.0	0.0	-0.2	-0.9	0.1	0.2	0.8	1.2	1.8	2.1	0.8	0.5

FY = CY

MWAV

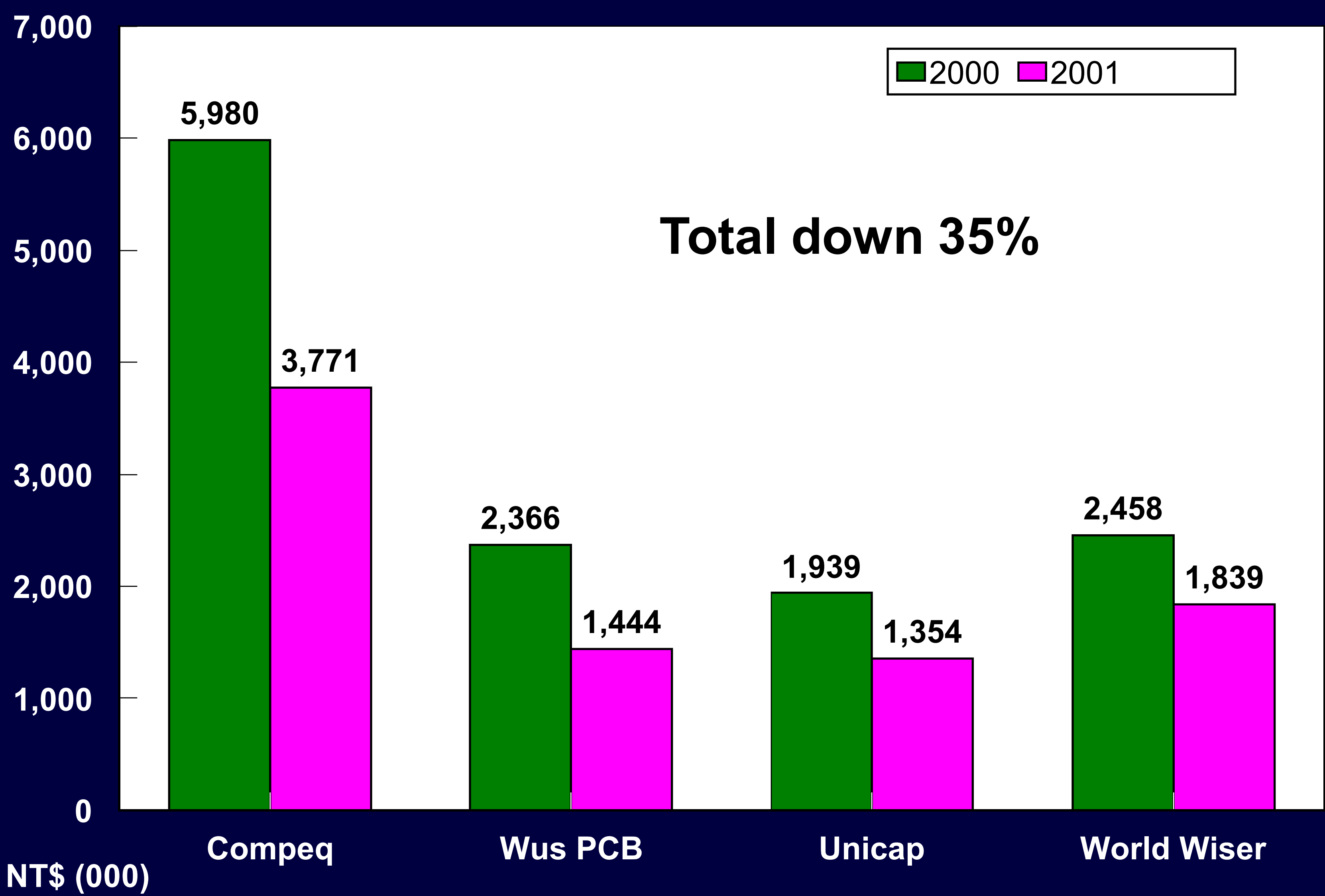
Taiwan PCB Company Sales

January - September 2000 vs 2001



Taiwan PCB Company Sales

July - September 2000 vs 2001



SEPTEMBER N AMERICAN PCB GROWTH INDICATORS

% GROWTH - Sep 2001 vs Sep 2000

RIGID PCB $ SHIPMENTS
- DOWN 45.5%

RIGID PCB $ BOOKINGS
- DOWN 58.8%

RIGID PCB BOOK/BILL RATIO

3-MONTH AVG	0.83
1-MONTH	0.77

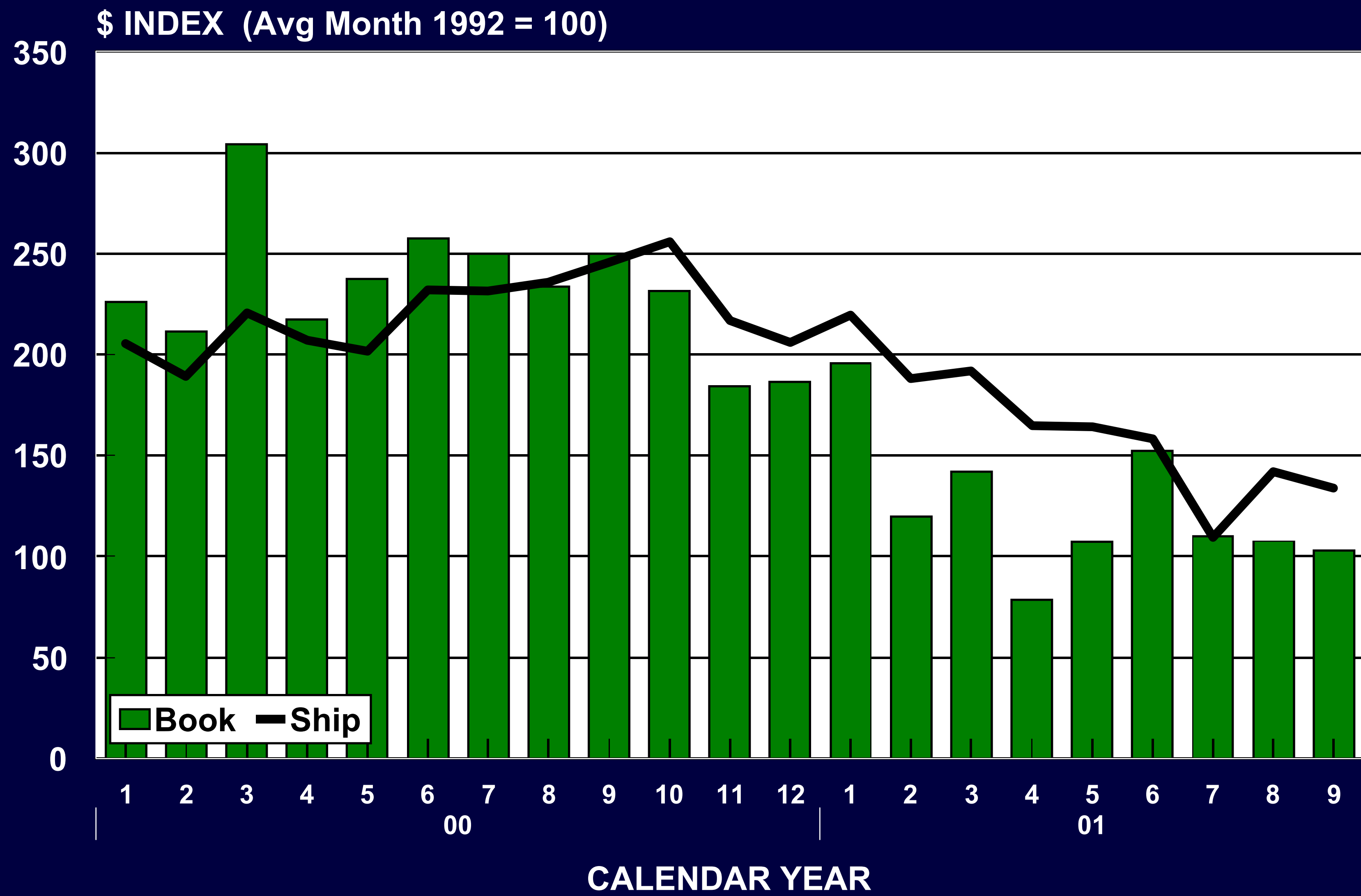
LAMINATE+PREPREG SQ FT SHIPMENTS
- DOWN 66.5%

LAMINATE+PREPREG SQ FT BOOKINGS
- DOWN 66.5%

FLEX CIRCUIT $ SHIPMENTS
- UP 17.4%

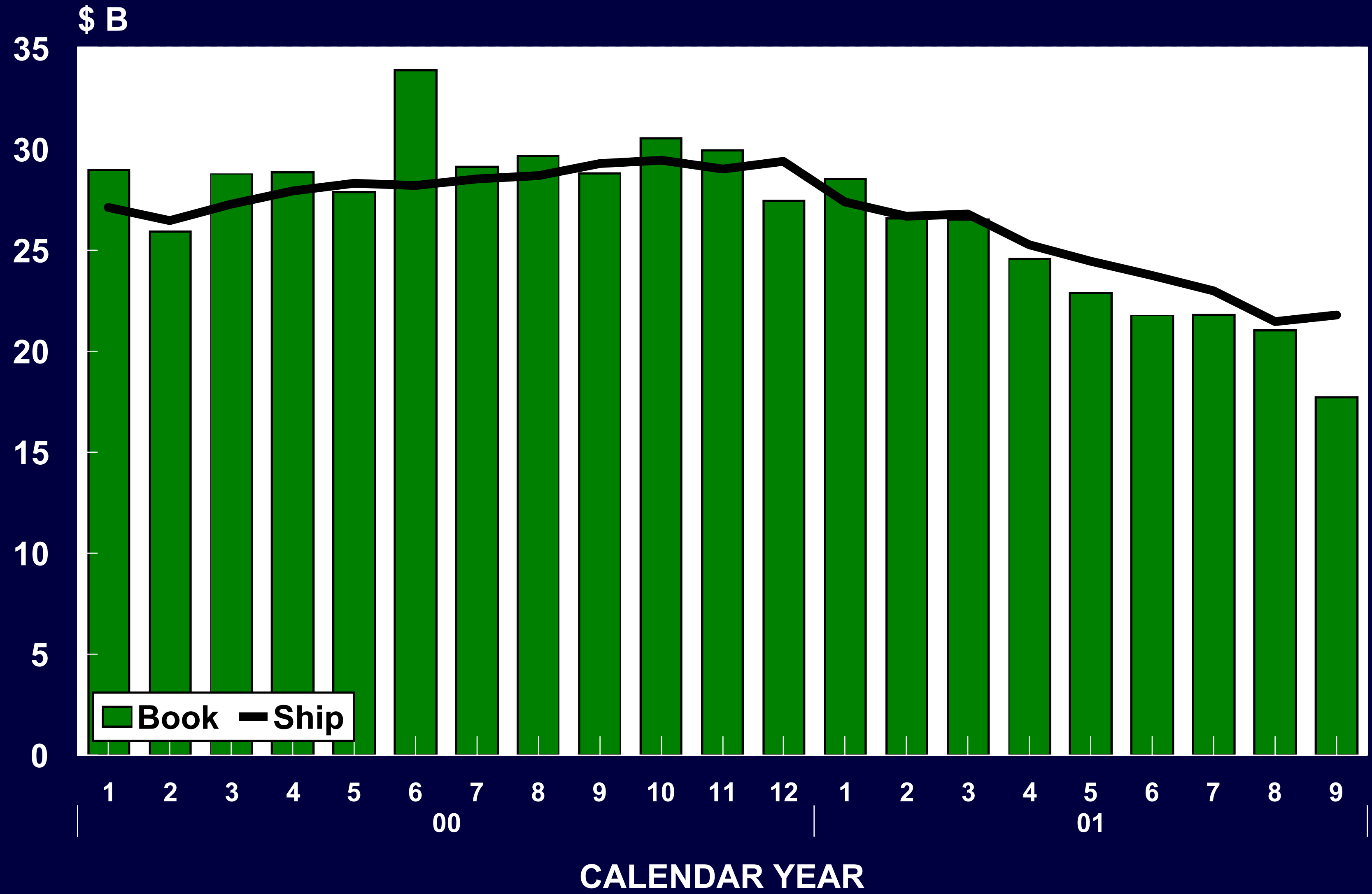
FLEX CIRCUIT $ BOOKINGS
- DOWN 7.4%

U.S. RIGID PCB BOOKINGS & SHIPMENTS



IPC T/MRC 10/2001

U.S. ELECTRONIC EQUIPMENT BOOKINGS & SHIPMENTS



Dept of Commerce

PRESENT GROWTH RATES (%)

U.S. ECONOMY & ELECTRONICS INDUSTRY

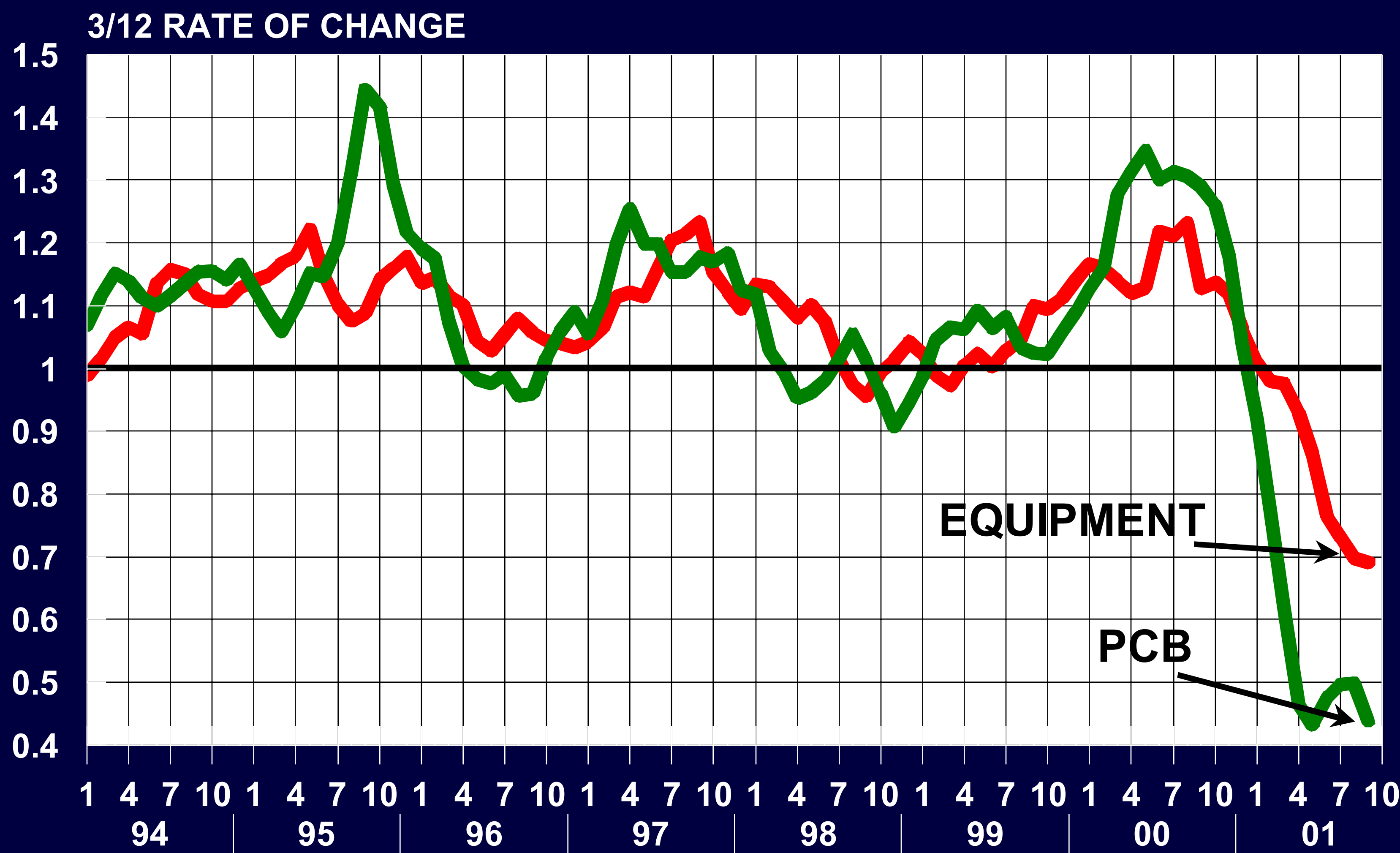
	LATEST MONTH	ANNUAL GROWTH RATE	3-MONTH GROWTH RATE
RIGID PCB ORDERS $	9/01	62.0	43.7
RIGID PCB SHIPMENTS $	9/01	84.9	54.1
LAMINATE+PREPREG ORDERS SF	9/01	66.6	38.0
SEMICONDUCTOR ORDERS $	9/01	78.0	64.4
ELECTRONIC EQUIPMENT ORDER $			
COMPUTER & RELATED	9/01	92.8	64.6
COMMUNICATIONS	9/01	70.0	52.1
MEDICAL, MEASUREMENT & CONTROL	9/01	105.9	96.1
SEARCH & NAVIGATION	9/01	92.5	102.0
TOTAL ELECTRONIC EQUIPMENT	9/01	86.8	69.1
INDUSTRIAL PRODUCTION	9/01	99.5	95.4

NOTE: 3 month growth rates compare most recent 3 months to same 3 months one year earlier

Growth Rates
&
Future Outlook

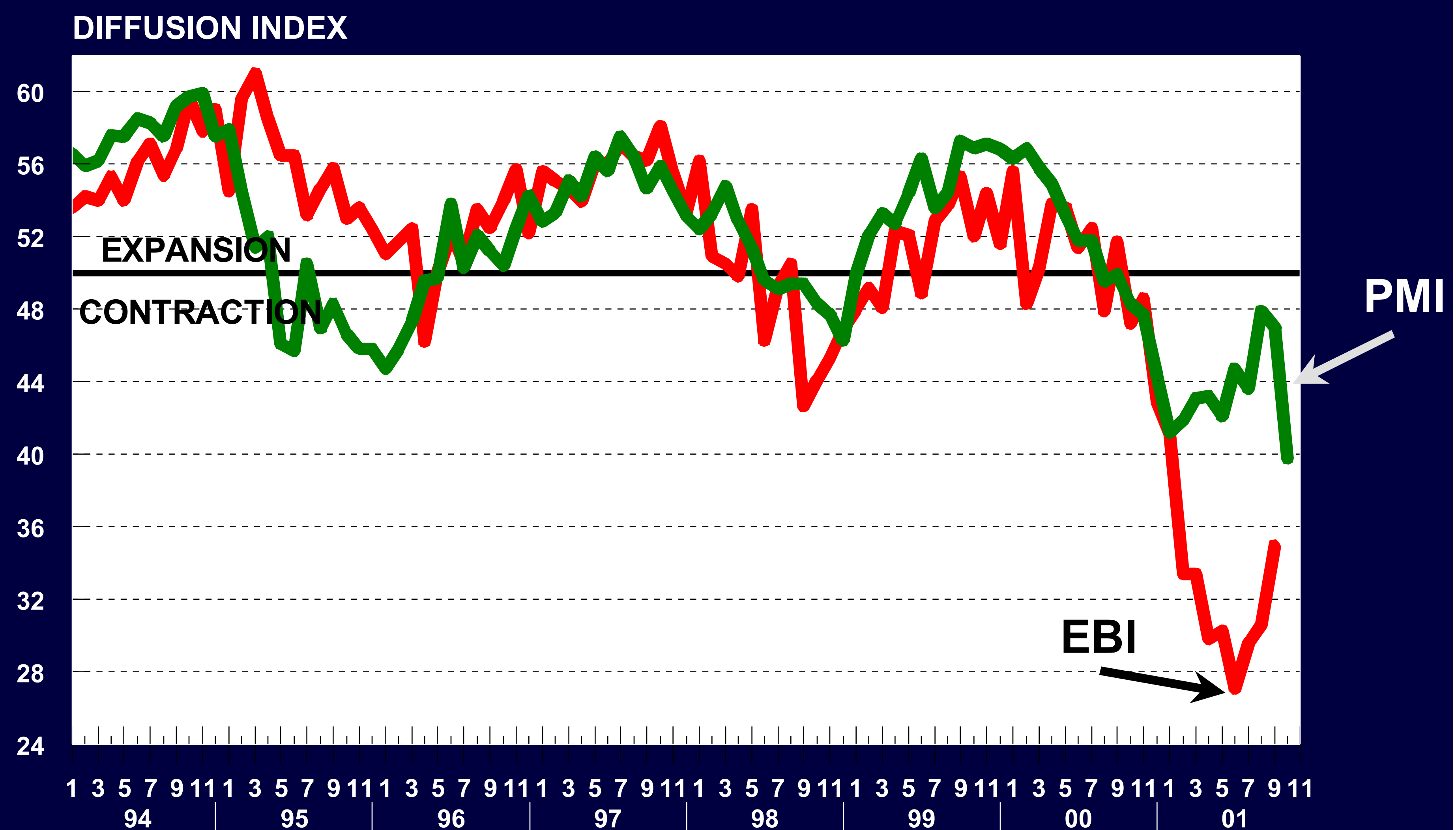
U.S. ELECTRONIC EQUIPMENT vs PCBs

$ BOOKINGS GROWTH



11/2001

PMI vs EBI "QUEST" ELECTRONIC BUYERS' INDEX



NATIONAL ASSOC of PURCHASING MANAGERS
ELECTRONIC BUYERS NEWS www.ebnonline.com

Summary
&
Conclusions

Summary

- The boom of 2000 was driven by very strong communications equipment and Internet infrastructure demand. Double ordering of components and inventory building were common throughout the supply chain.

- 2001 saw a massive slowdown. PCB orders plummeted due to both inventory reduction efforts and a sharp drop in electronic equipment demand.

- Hopes of a modest recovery were dashed by the terrorist attacks of September 11.

- While some endmarkets (military electronics and security devices) will grow, a recession is now likely for the volume electronic equipment markets.

Summary

- 2001 saw about a 15% reduction N American PCB capacity. Major multinationals shifted U.S. capacity to China.

- Following the Sept 11 terrorist activities international trade has become more difficult.

- Assuming a resurgence in military electronics, increased nationalism and concerns with offshore PCB supply, U.S. PCB makers may see opportunities for higher margin PCB sales.

- 2001 has been disastrous and a recession is likely short term. PCB growth opportunities if any will be in new markets - military & security.

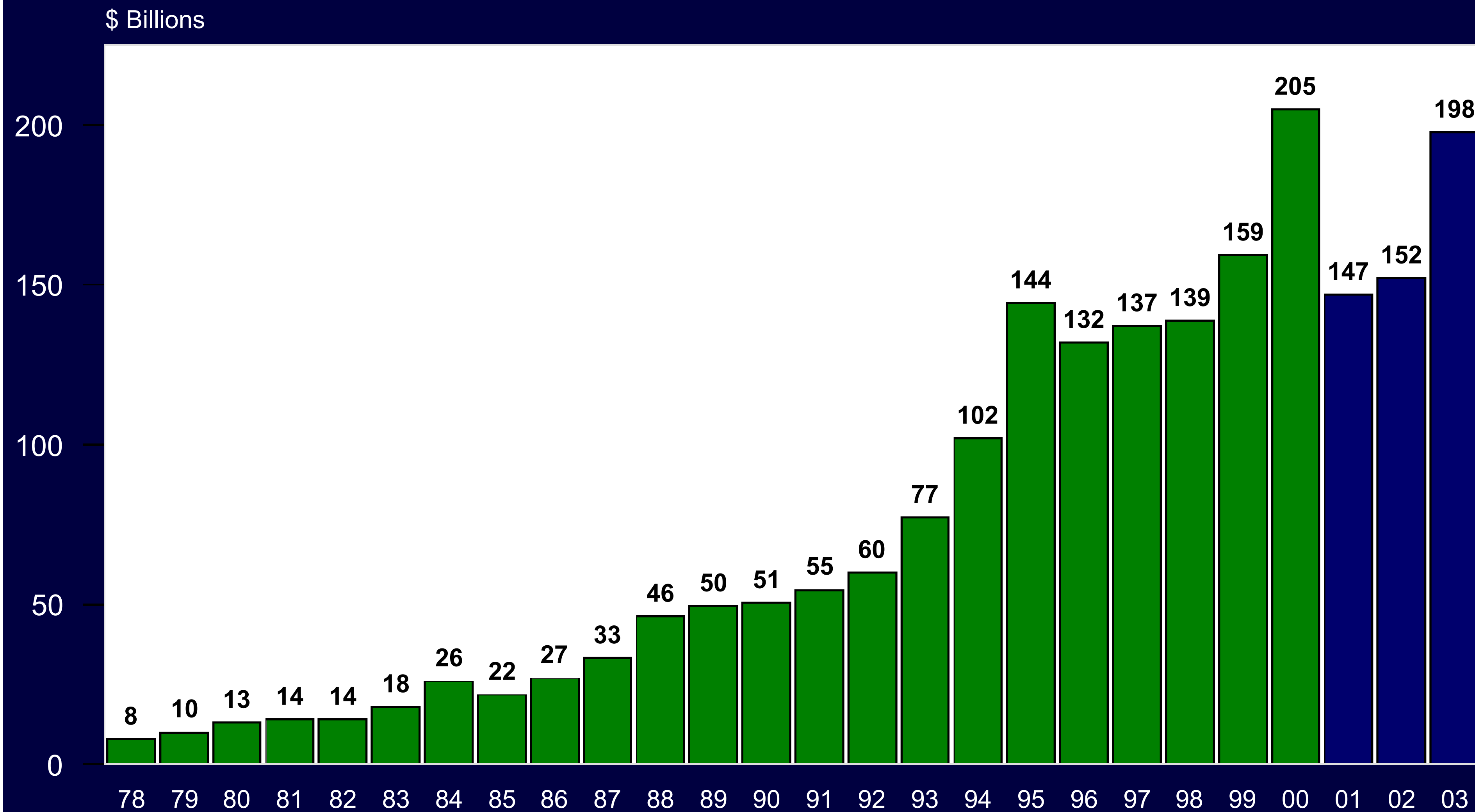
Electronic Equipment Production Growth

Constant $ Growth Rates Converted @ Constant Exchange Rates

	1999	2000	2001	2002	2003
World	7.3	12.0	-7.1	-0.4	9.9
USA	8.5	12.9	-12.5	-0.9	10.1
W Europe	8.5	11.4	-6.7	-1.5	9.6
Japan	-3.0	7.5	-4.4	-3.7	5.5
Four Tigers	6.9	17.8	-3.2	1.9	9.1
Others	17.3	12.0	3.0	5.0	14.5

Henderson Ventures 10/2001
www.hendersonventures.com

World Semiconductor Sales
Actual & Forecast



Dataquest 10/01