Is China Too Late To The Semiconductor Race?

China's Gl

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Before the The U.S.- China Economic and Security Review Commission on

" China's High –Technology Development"

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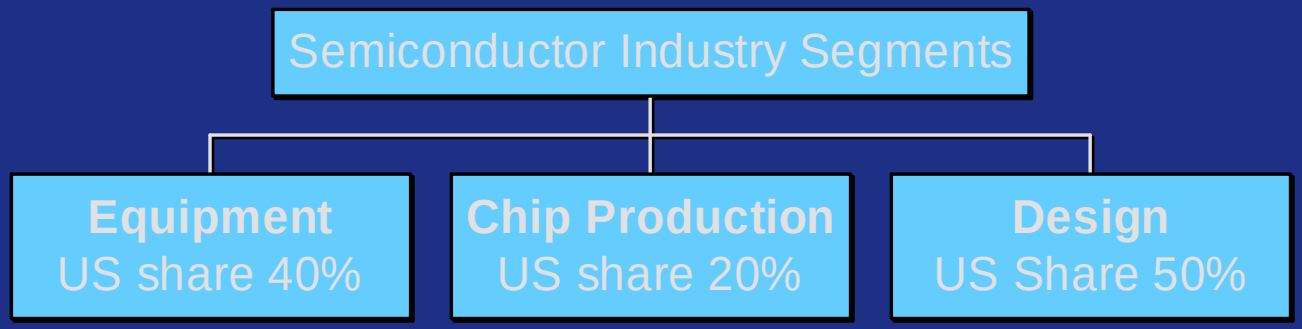
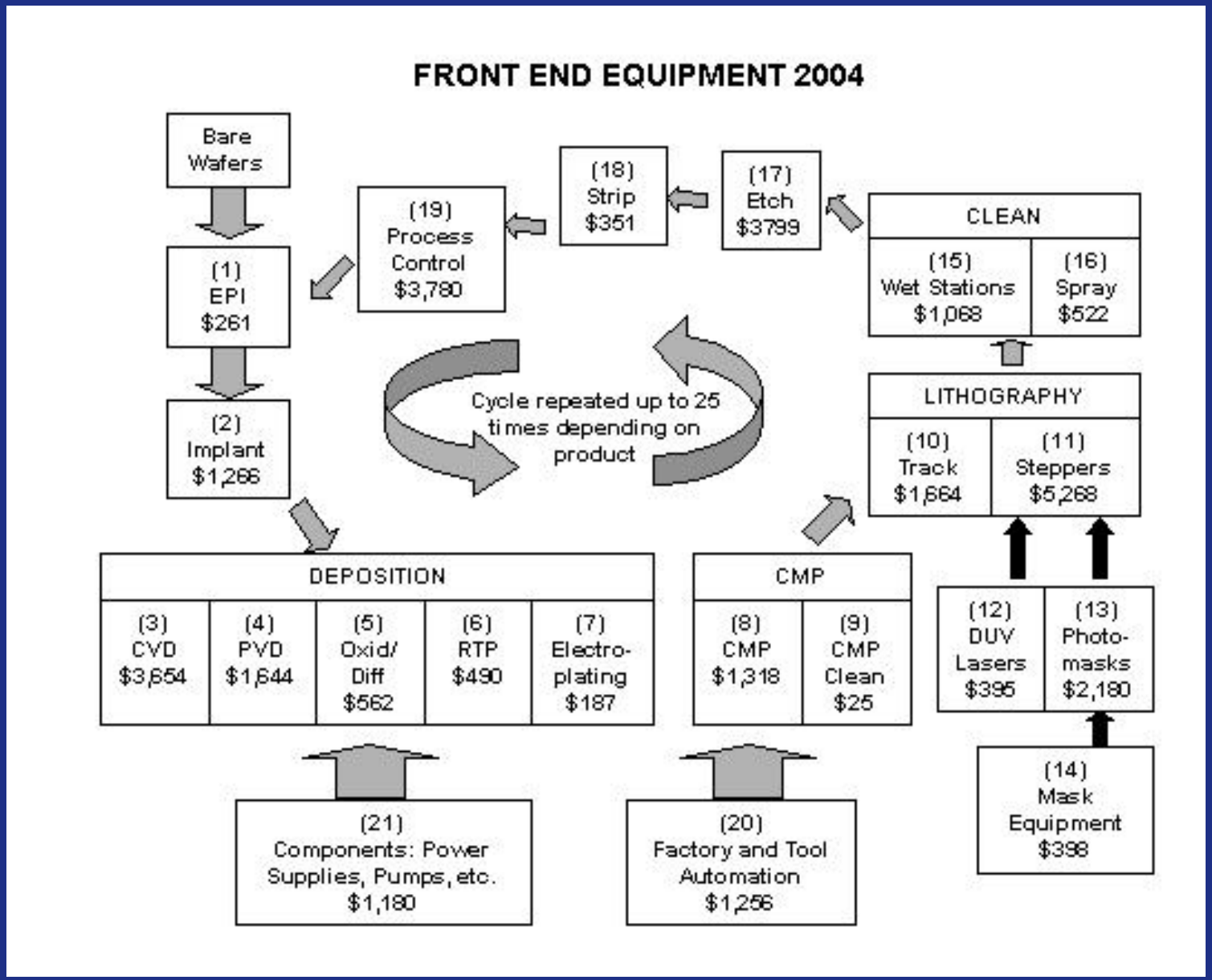
Harder to break-in

US share in different parts of the Semicondcutor Industry



How semiconductor chips are made



US companies dominate equipments

1 EPI	$261
Applied Materials	53%
LPE	3%
ASM International	39%
Others	4%

2 Implant	$1,266
Axcelis	38%
Varian	31%
Applied Materials	18%
Others	13%

3 CVD	$3,654
Applied Materials	48%
Novellus	22%
Tokyo Electron	18%
Others	13%

4 PVD	$1,644
Applied Materials	78%
Ulvac	4%
Novellus	6%
Others	11%

5 Oxidation/Diffusion	$562
Tokyo Electron	48%
Kokusai	33%
ASM International	12%
Others	7%

6 RTP	$490
Applied Materials	78%
Mattson Technology	17%
Axcelis	1%

7 ECP	$187
Novellus	80%
Applied Materials	8%
Semitool	9%

8 CMP	$1,318
Applied Materials	75%
Ebarra	21%
Novellus	2%
Others	3%

9 CMP Clean (Standalone)	$25
Dainippon Screen	100%
Lam Research	0%
Others	0%

10 Track	$1,664
Tokyo Electron	83%
Dainippon Screen	15%
FSI	1%
Others	1%

11 Steppers	$5,268
Nikon	27%
Canon	22%
ASM Lithography	51%
Others	0%

12 DUV Lasers	$395
Cymer	85%
Lambdaphysik	5%
Gigaphoton	8%

13 Photomasks	$2,180
DuPont Photomasks	16%
Photronics	21%
Dainippon Printing	22%
Others	41%

14 Mask Writing Equipment	$398
Toshiba	38%
Applied Materials	7%
Hitachi	15%
Others	40%

15 Wet Stations	$1,068
Dainippon Screen	46%
Tokyo Electron	17%
S.E.S Co	17%
Others	21%

16 Spray	$522
FSI International	9%
Semitool	12%
SEZ	45%
Others	35%

17 Etch	$3,799
Lam Research	30%
Tokyo Electron	29%
Applied Materials	27%
Others	14%

18 Strip	$351
Novellus	24%
Mattson Technology	34%
Axcelis	13%
Others	29%

19 Process Control	$3,780
KLA Tencor	42%
Applied Materials	12%
Hitachi	16%
Others	31%

20 Factory Automation	$1,256
Brooks Automation	16%
Asyst Technologies	20%
Others	64%

21 Components	$1,180
Advanced Energy	21%
MKS Instruments	15%
Others	64%

22 Test	$4,790
Advantest	41%
Agilent	12%
Teradyne	20%
LTX	4%

23 Ass/Packaging	$4,569
ASM International	9%
Tokyo Seimetsu	11%
KNS	6%
Tokyo Electron	7%

Front End Equipment Market Share Leaders (2004)

Banc of America Securities

Asia dominates in chip mfg.

TOP 25 SEMICONDUCTOR CAP-EX SPENDERS ($M)						
	2005	2004	2003	2002	2001	2000
Samsung	5,810	5,310	3,308	1,825	2,880	4,130
Intel	5,600	3,843	3,700	4,700	7,300	6,700
UMC	600	2,560	600	1,400	1,800	2,800
TSMC	1,700	2,400	1,250	1,580	2,200	4,500
STMicroelectronics	1,300	2,000	1,221	996	1,700	3,300
SMIC	1,000	1,950	492	897	0	0
Sony	1,400	1,774	1,370	760	1,439	2,316
AMD	1,100	1,500	586	705	703	805
NEC	1,000	1,438	826	494	929	1,820
Micron	1,433	1,433	1,048	781	1,253	1,300
Hynix	2,030	1,740	744	435	480	1,600
Toshiba	1,400	1,920	1,036	504	650	1,382
Texas Instruments	1,100	1,300	800	802	1,790	2,800
Renesas	900	1,286	782	685	0	0
Matsushita	1,100	1,238	614	512	744	1,148
Nanya Tech	1,000	1,140	600	300	300	780
Infineon	1,050	1,050	1,025	654	1,687	2,181
Winbond	600	120	131	104	175	453
Grace Semiconductor	800	800	500	600	100	0
Chartered	700	700	221	420	550	911
IBM	600	600	800	1,000	2,100	1,900
PowerChip	600	870	300	268	163	313
Anam	550	550	200	200	280	370
Elpida	1,000	495	389	317	0	0
Mosel	450	450	250	400	200	400
TOTAL	**34,823**	**38,467**	**22,793**	**21,339**	**29,423**	**41,909**
Yr-Yr Change	-9%	69%	7%	-27%	-30%	

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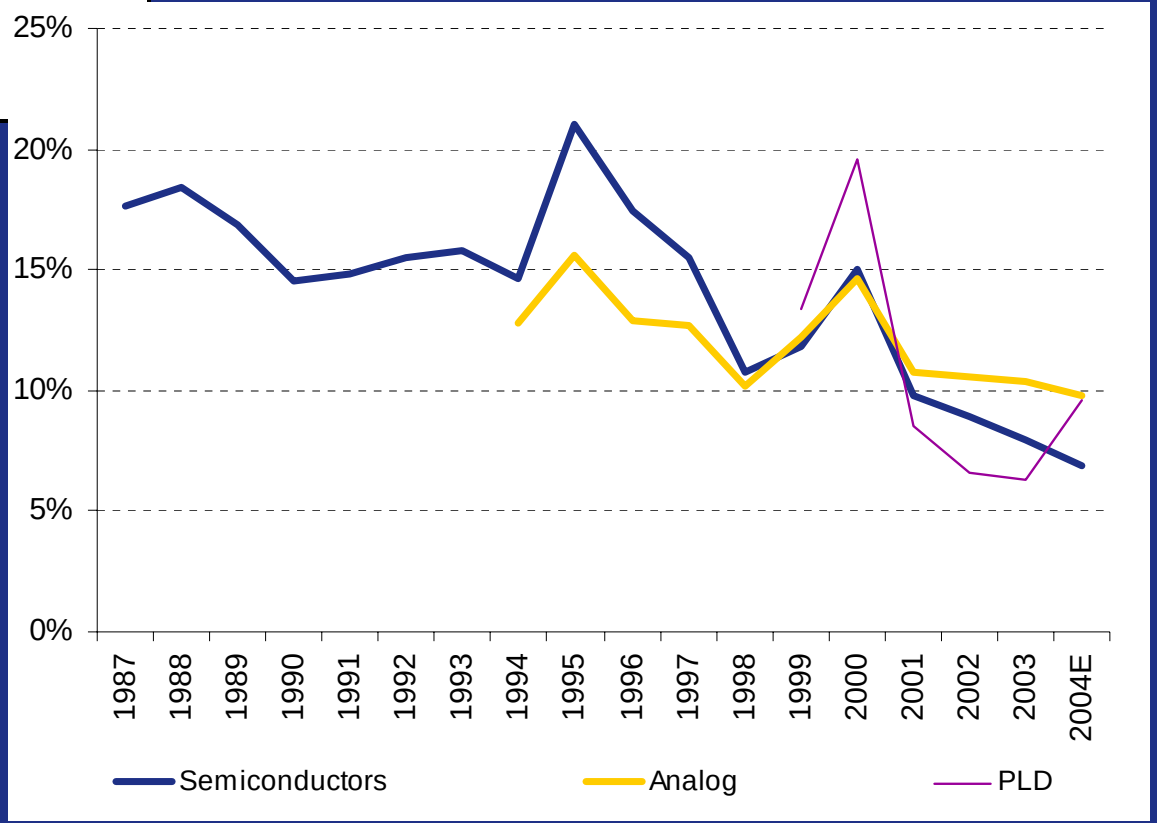
Slowing Industry Growth
Higher Hurdles for new entrants

The Times, They Are A' Changing…"Semi-Growth" is Slowing

Peak - Peak		Semi Revenue CAGR	US GDP CAGR
1959 - 2000	(41 Yrs.)	17%	3%
1974 - 2000	(26 Yrs.)	15%	3%
1984 - 2000	(16 Yrs.)	14%	3%
1995 - 2000	(5 Yrs.)	7%	4%
2000 - 2005E	*(5 Yrs.)*	*4%**	2%

* Estimates are based upon 25% growth expectations



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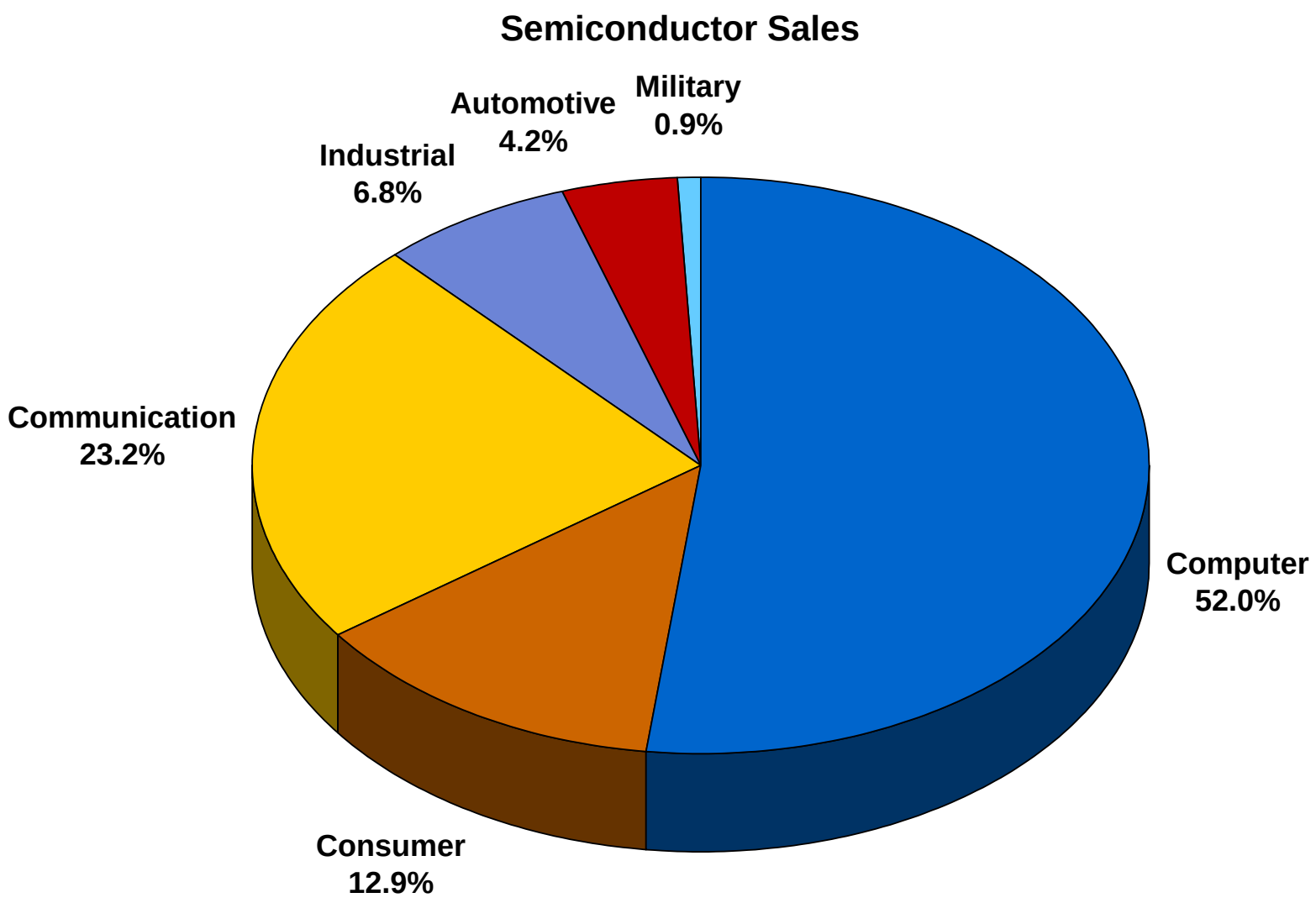
Semiconductor design follows applications



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Volatility		Ratings		
		Buy	**Neutral**	**Sell**
Low	0-30%	10%+	9%-(6)%	(7)% or worse
Medium	31-40%	15%+	14%-(10)%	(11)% or worse
High	41-70%	25%+	24%-(15)%	(16)% or worse
Extreme	71%+	50%+	49%-(25)%	(26)% or worse

Source on volatility: Bloomberg.

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Coverage Universe	Companies	Percent	Investment Banking Clients	Companies	Percent*
Buy	258	41	Buy	124	48
Hold	325	52	Hold	139	43
Sell	39	6	Sell	13	33

Technology Sector

Coverage Universe	Companies	Percent	Investment Banking Clients	Companies	Percent*
Buy	24	27	Buy	4	17
Hold	56	63	Hold	8	14
Sell	9	10	Sell	1	11

* Percentage of companies in each rating group that are investment banking clients.
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