

TAIWAN + CHINA

SEMICONDUCTOR OUTLOOK **2007**

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Changing Memory Industry Dynamics

*Dr. Brian Shieh, President
Powerchip Semiconductor Corp.
February 7th, 2007
US-Taiwan Business Council
Santa Clara, California*



Outline of Talk

- 1. Introduction of Powerchip**
- 2. DRAM Industry Over 15 Years**
- 3. Future Prospect of Memory Industry**
- 4. Taiwan as a Manufacturing Base**



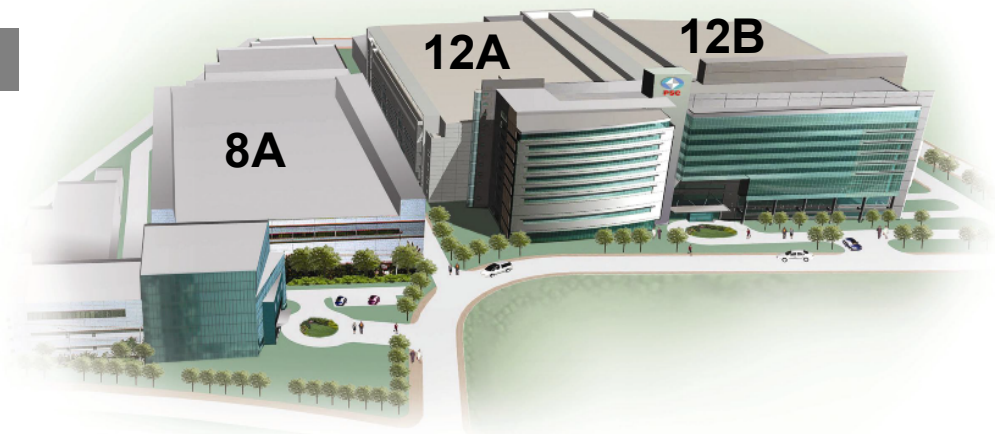
Company Profile

- **Founded in December 1994, Taiwan**
- **DRAM Technology Transfer from Mitsubishi in 1995**
- **From Elpida since 2003**
- **One 8-inch Fab, Three 12-inch Fabs in Operation Currently**
- **Paid-in Capital : US\$ 2.1 B**
- **Number of Employees : 6000人**
- **Revenues :**
 - NT\$23B/USD\$700M(2003), NT\$57B/USD\$1.7B(2004)**
 - NT\$51B/USD\$1.6B(2005), NT\$92B/USD\$2.8B(2006)**



8-inch Fab

	Initial Production	Current Capacity
Fab 8A	1996	35K



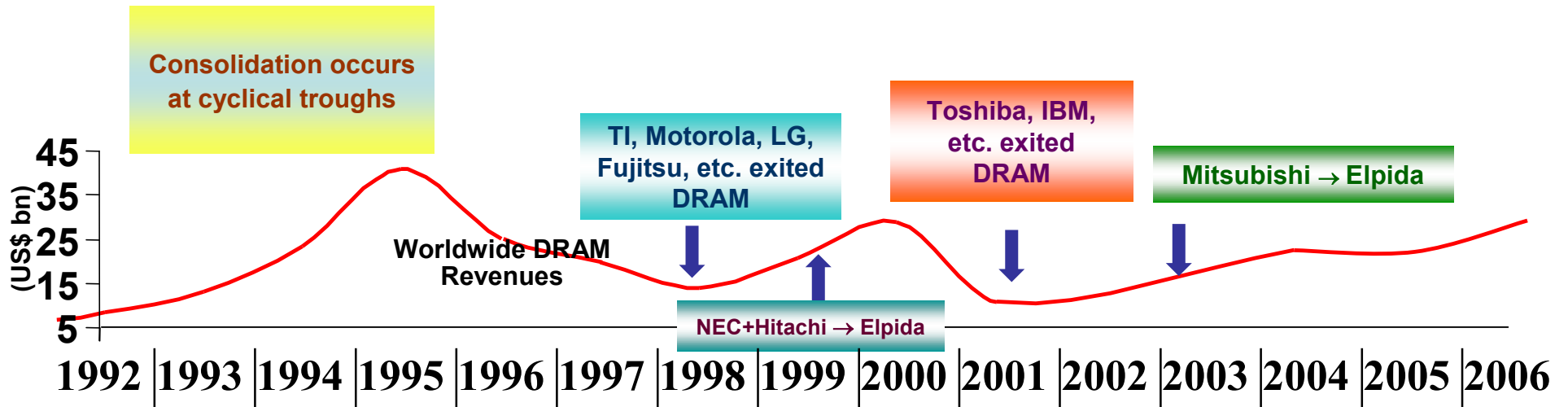
12-inch Fab

	2006 End Capacity	2007 End Capacity
Fab12A+B	85K	90K
Fab 12M	15K	40K
Fab12C+D (Rexchip)	Under Construction	30K (Phase 1)





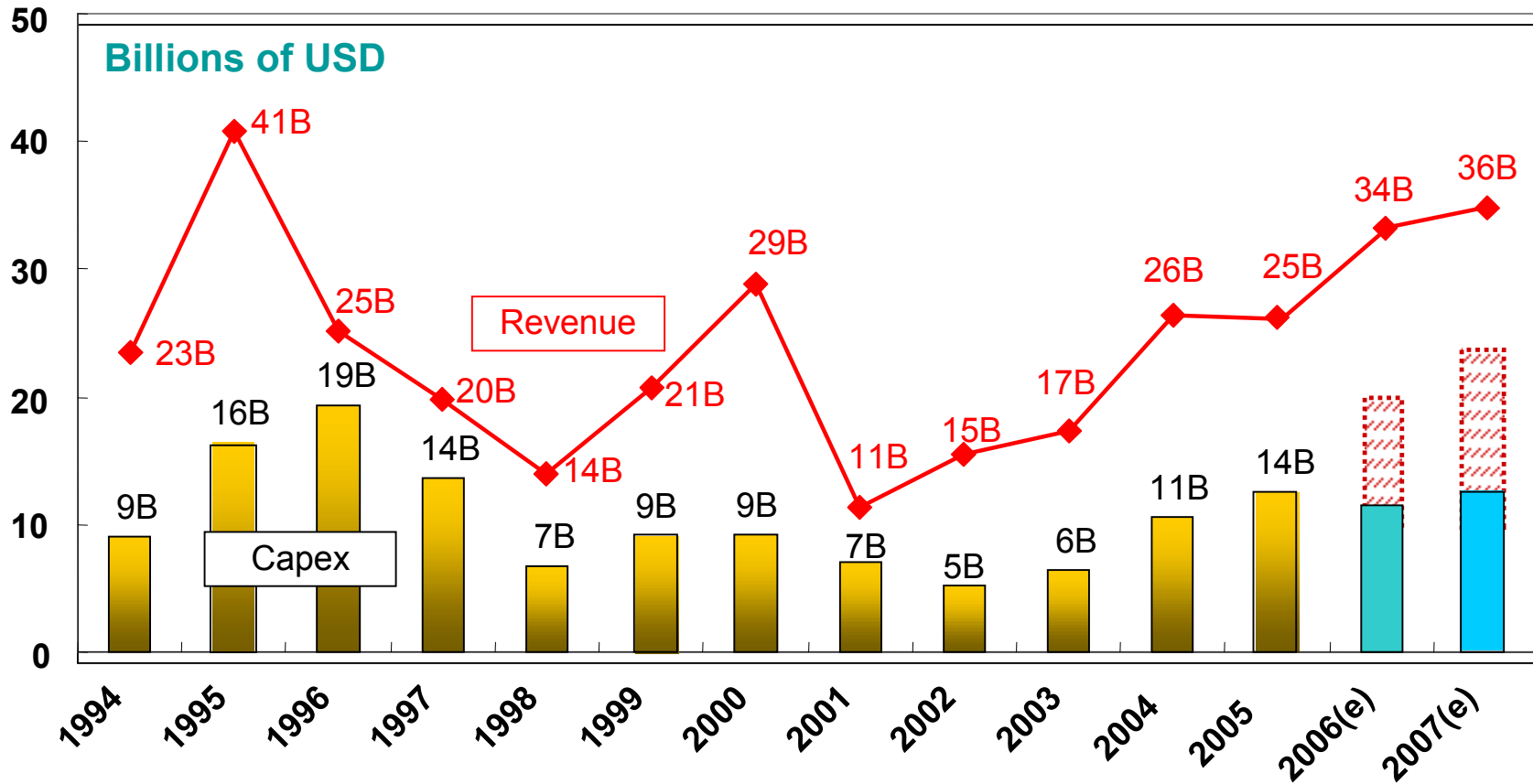
Business Environment



PSC Milestones	Fab 8A Operation	Fab 8A Full Capacity	Foundry Service	Fab 12A Operation	Fab 12B Operation	Fab 12M Operation
Major Manufacturer	Micron IBM Texas Instrument Motorola Samsung Hyundai LG Fujitsu Siemens/Infineon NEC Hitachi Mitsubishi Toshiba OKI TI-ACER Vanguard Winbond	Micron IBM Samsung Hyundai Siemens/Infineon NEC Hitachi Mitsubishi Toshiba Powerchip Promos Nanya Winbond Vanguard	Samsung Micron Hynix Infineon Elpida Powerchip Mitsubishi Promos Nanya Winbond	Samsung Hynix/Promos Elpida/Powerchip SMIC Qimonda/Nanya Inotera/Winbond	Samsung Hynix/Promos Elpida/Powerchip SMIC Qimonda/Nanya Inotera/Winbond	Micron



Worldwide DRAM Revenue & CAPEX

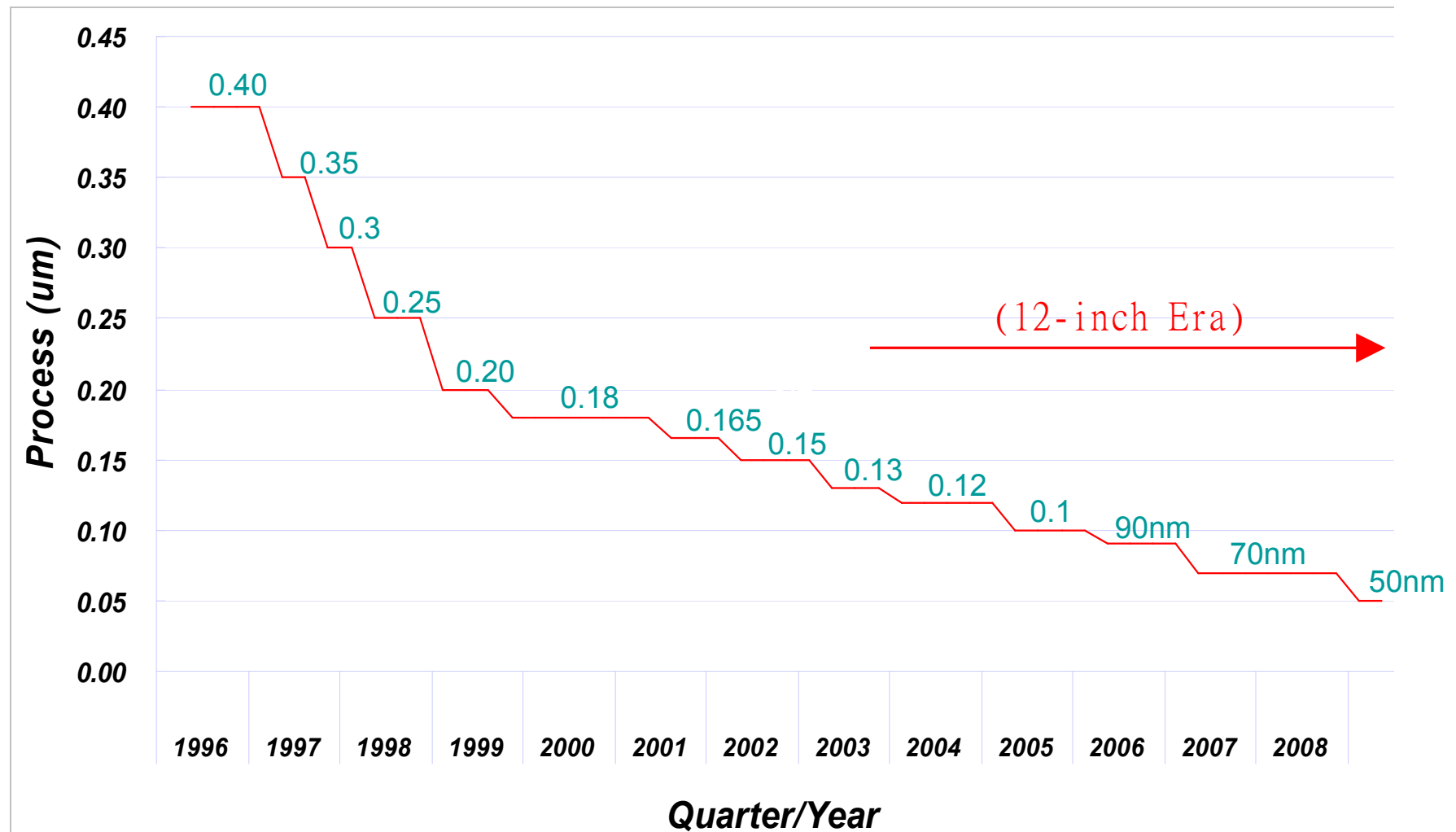


20 DRAM Makers	→	8 DRAM Makers
CAPEX ~60% Revenue	→	CAPEX ~45% Revenue
Annual Bit Growth ~80%	→	Annual Bit Growth ~45%

Source: iSuppli, (December / 2006)



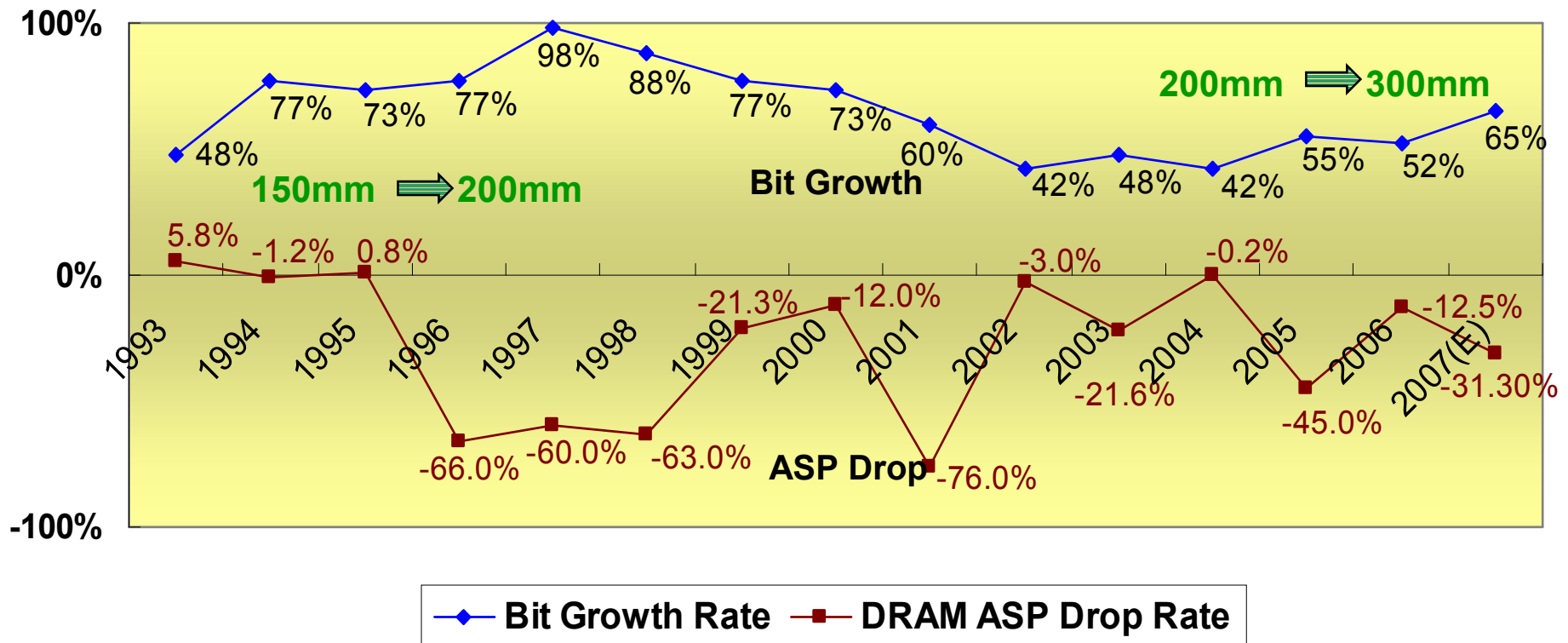
Process Technology Migration





DRAM ASP Drop and Bit Growth Rates

0.4um ⇒ 0.25um ⇒ 0.18um ⇒ 0.14um ⇒ 0.11um ⇒ 90/70nm





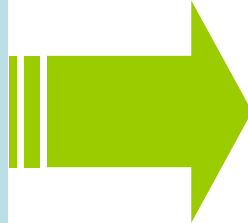
PSC

Consolidated Industry / Diversified Product Line



1990-2001

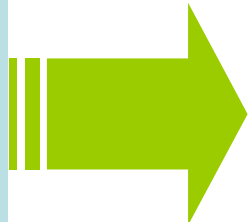
Micron	Siemens/Infineon
IBM	NEC
Texas Instruments	Hitachi
Motorola	Mitsubishi
Samsung	Toshiba
Hyundai	OKI
LG	TI-ACER
Fujitsu	Vanguard
NEC	Winbond



**Companies with
Non-DRAM Business
Options Exited DRAM Race**

2001-2010

Samsung
Hynix/Promos
Infineon/Nanya/Inotera/ Winbond
Elpida/Powerchip
Micron



**DRAM Companies
enter Non-DRAM Business
(Flash, Sensor, LCD Driver,
Foundry)**



DRAM History in Summary In 1990's

1. Quick expansion during 6-inch to 8-inch transition (18 players).
2. Fast technology migration (every 3 quarters).
3. Quick 6-inch Fab exit from DRAM production.
4. DRAM consumption dominated by PC in developed country.
5. Tough competition among DRAM makers and hard surviving.



DRAM History in Summary In 2000's

1. Slower transition from 8-inch to 12-inch (5 major players + 3 minor players).
2. Technology migration slows down significantly.
3. Longer ramp down of 8-inch DRAM Fabs.
4. DRAM application extends to digital consumer, mobile communications.
5. Growing Flash market shares memory manufacturing capacity.
6. Geographic PC market change leads to DRAM cycle change.



Future Prospect of Memory Industry in DRAM

1. PC sales in developing country continue to grow at strong two-digit annual rates.
2. Vista effect will show strongly after Q2/2007, booting up content per box over 1.2GB.
3. Struggling migration to 70nm, visibility of technology beyond 60nm is low. Further consolidation maybe inevitable.
4. Slower technology shrink requires greater CAPEX to build up capacity.

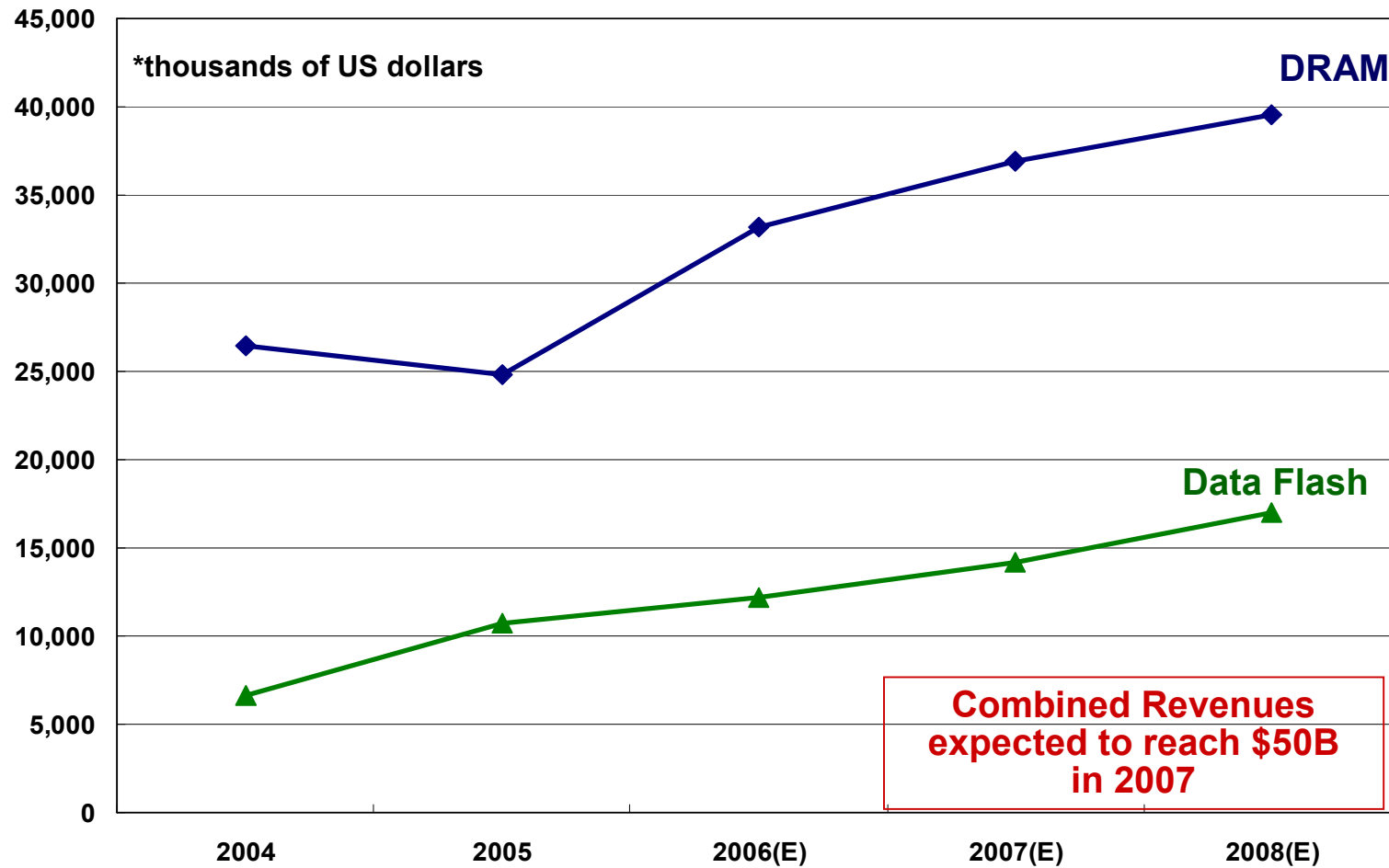


Future Prospect of Memory Industry in Data Flash

1. Applications in cards, MP3 players, USB drives, handsets.
2. Great potential to become a standard component in PC before 2010 (HDD, NAND cache).
3. Fast technology migration and cost down aggressively till 45nm/32nm. Flash has become important technology driver.
4. Will go through a high annual bit growth (100~200%) low revenue growth (15~20%) period.



WW DRAM / Flash Revenues

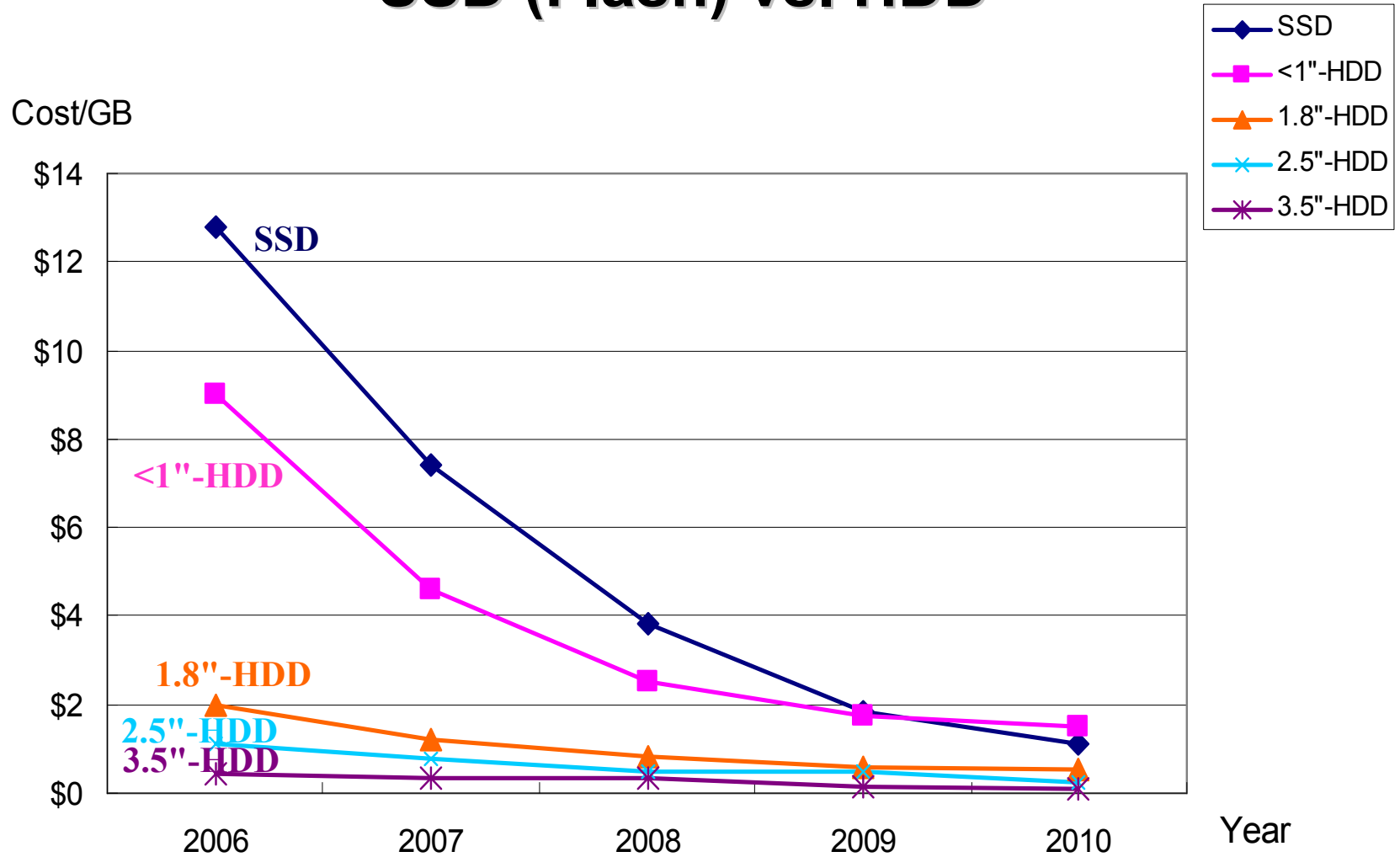


*iSuppli/PSC Company Estimates

◆ DRAM ▲ Data Flash



SSD (Flash) vs. HDD



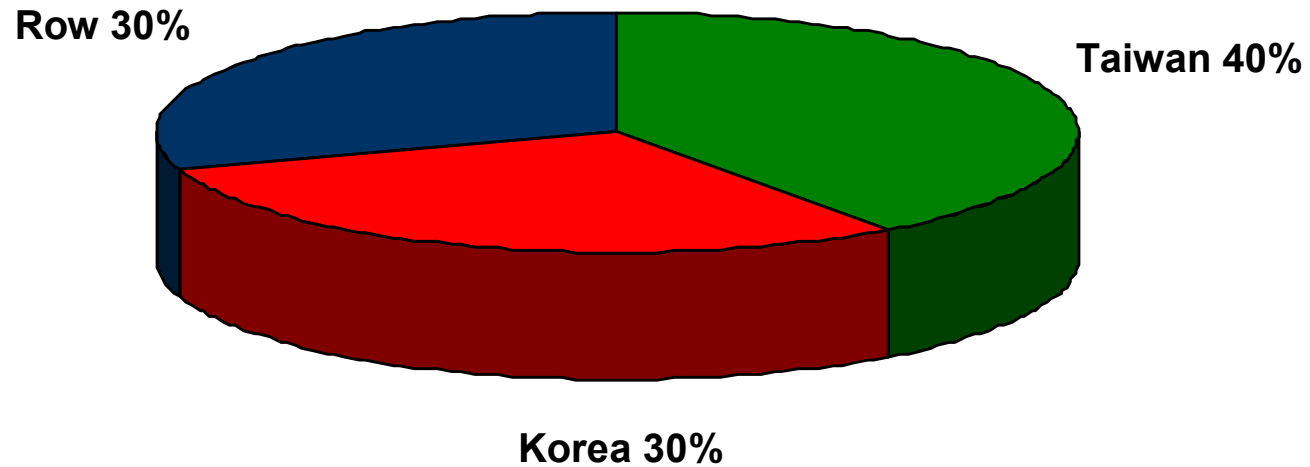


Taiwan as a Manufacturing Base

1. Highly-educated work force.
2. Excellent infrastructure of support (equipment and backend vendor service, downstream modules customer) within one hour drive.
3. Entrepreneurship maximizes productivity.
4. Behind in 8-inch, but will dominate 12-inch memory production.



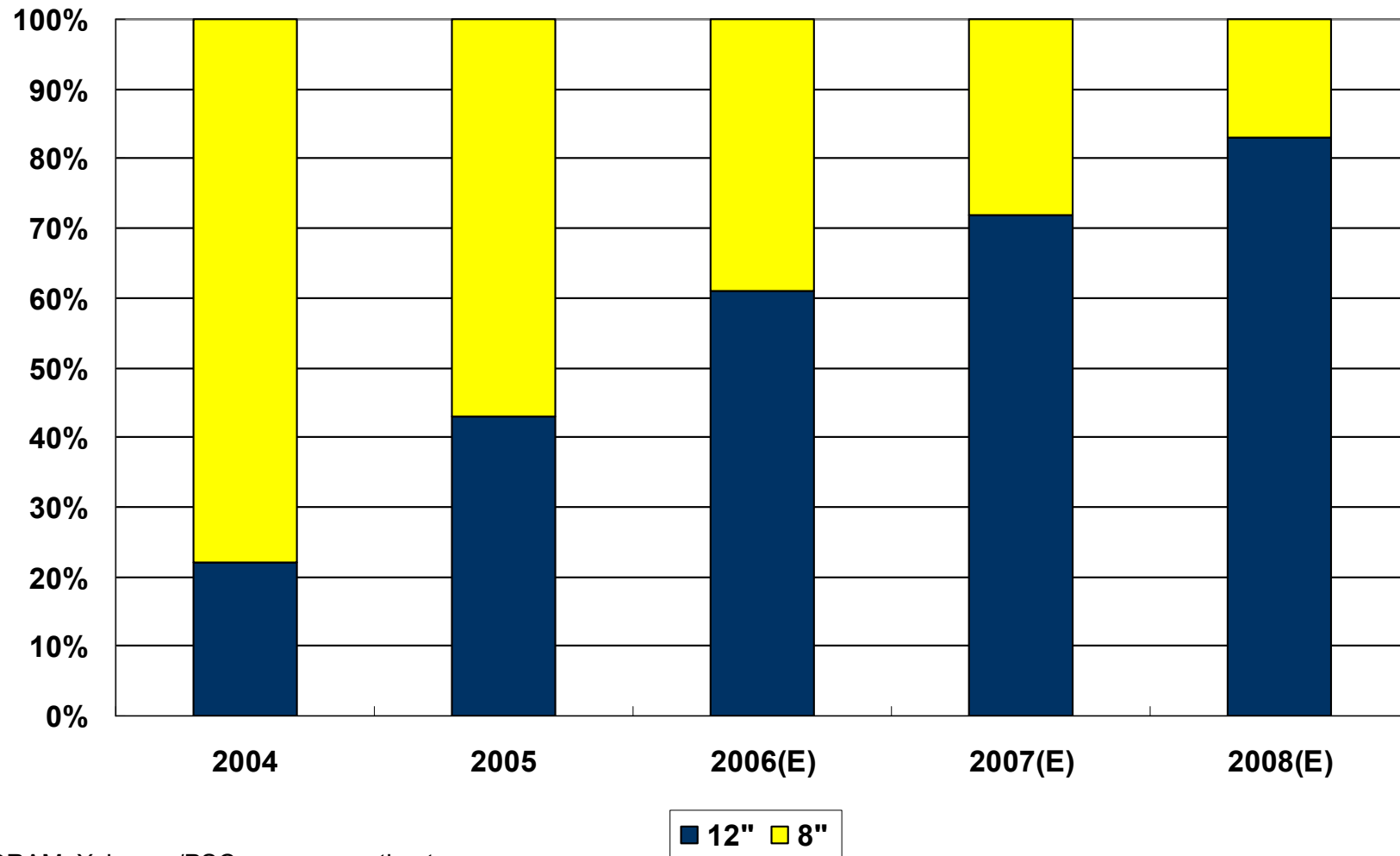
Taiwan Leads in 12-inch DRAM Production



*DRAMeXchange/PSC Company Data



12-inch Fabs to Dominate Memory Production



*DRAMeXchange/PSC company estimates



Business Strategy

**Technology – Market – Channel – Capacity – Cost
(Successful High-Tech Business)**

Technology Leading Countries

US

Japan

Manufacture Bases

Taiwan

China

Powerchip and Elpida announced JV agreement to build 240K/month
12-inch DRAM production capacity in Taiwan within 3~5 years