Deutsche Bank
Markets Research

Industry
Asian Tech Strategy

Date
23 October 2014

Asia
Taiwan
Technology

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F.I.T.T. for investors

From mobility to connectivity

Three positive investment themes

We expect the Internet of Things (IoT), the uptake of wearable devices, and IoT-driven demand for servers to all benefit the Asian technology supply chain in 2015-20. In this report we focus on devices which have yet to become connected and will be new growth drivers in 2015-20. We expect the upstream semiconductor sector to see incremental sales contribution from IoT and wearable ICs in 2015-20. We anticipate server demand to benefit the downstream hardware sector more than the upstream semiconductor sector. Among these companies, we have Buy ratings on TSMC, Samsung, Hynix, Largan, Catcher, Delta, Hon Hai, and Lenovo due to attractive risk/reward.

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Internet of Things – the connectivity theme

After the mobility theme drove the proliferation of smartphones and tablet PCs since 2005, we expect the connectivity theme to trigger IoT demand in 2015-20. We expect 1) low-power application processors and microcontrollers with connectivity and embedded memory, and 2) MEMS (micro-electro-mechanical systems) sensors to be the major growth drivers for the upstream semiconductor sector. The key IoT applications for the downstream hardware sector include smart cities, home automation, eHealth, retail, smart cars, logistics, industrial control, smart metering, and smart agriculture and farming. In our view, IoT will provide benefits such as life quality improvement, productivity improvement, energy saving, and security enhancement.

Wearable devices to be key products in an IoT world

Wearable devices can be connected to mobile devices and belong to the concept of IoT. Major applications for wearable devices will be entertainment, healthcare monitoring, mobile communication (connection with mobile devices), and mobile payment, in our view. We expect wearable device units to grow at a 25% CAGR in 2015-20.

IoT infrastructure should drive continuous server demand growth

We believe IoT infrastructure will be based on the current cloud architecture. Once IoT connects more objects, machines, and networks for global cloud-based services, data will be routed through servers for applications and data analysis. The uptake of IoT should therefore result in growing demand for data analysis and storage in servers and continue to drive demand for servers in 2014-18 with 4.3% unit CAGR.

Summary of key beneficiaries

- IoT (excluding wearable devices and servers): TSMC, UMC, Realtek, Largan, SEMCO, LG Innotek and Hon Hai
- Wearable devices: TSMC, UMC, ASE, Kinsus, Hynix, Largan, AAC, Catcher, SEMCO, Hon Hai, and Quanta
- Servers: Samsung, Hynix, Delta, Hon Hai, Lenovo, and Quanta

Valuation and risks

We use P/B or P/E multiples to derive our target prices. Sector risks are related to trends in demand, currency, ASP, and capex. *(See pages 49–52 for details.)*

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Investment thesis

Outlook – Three themes for long-term growth drivers

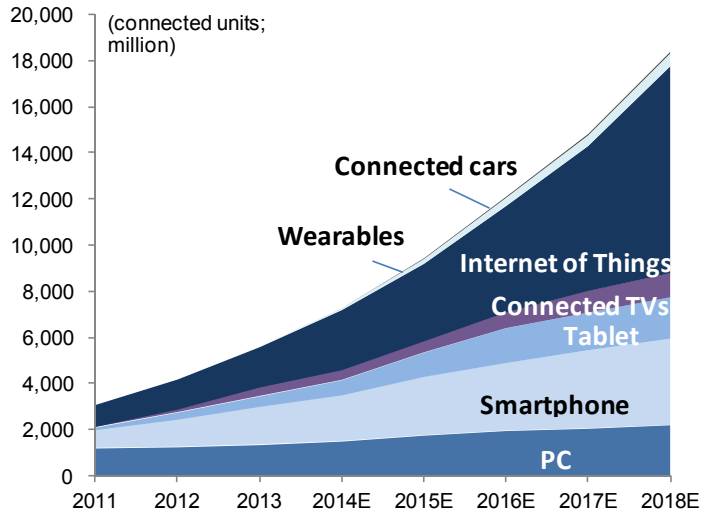
This report builds on the themes outlined in the DB FITT report – *The Internet of Things - Not quite the Jetsons yet, but places to look*; published on 6 May 2014 by our US analyst, Brian Modoff. We examine the subject from the perspective of Asian companies and provide an analysis of implications for IoT, wearable devices, servers, and beneficiaries in upstream subsectors (foundry/OSAT/substrate/fabless/memory) and downstream subsectors (component/EMS/ODM/OEM).

Theme #1 – IoT a new structural growth opportunity in 2015-20

Smartphones, tablet PCs and smart TVs have long been connected to Internet. However, the connection between these and other devices are not well built up. In an IoT world, smartphones, tablet PCs and smart TVs can be connected to more devices such as wearable devices, smart cars, digital home devices, eHealth machines, public transportation information reminders, industrial control machines, etc. IoT can provide 1) life quality and security improvement, 2) energy saving, and 3) productivity enhancement through better connectivity of devices around the human life and data analysis.

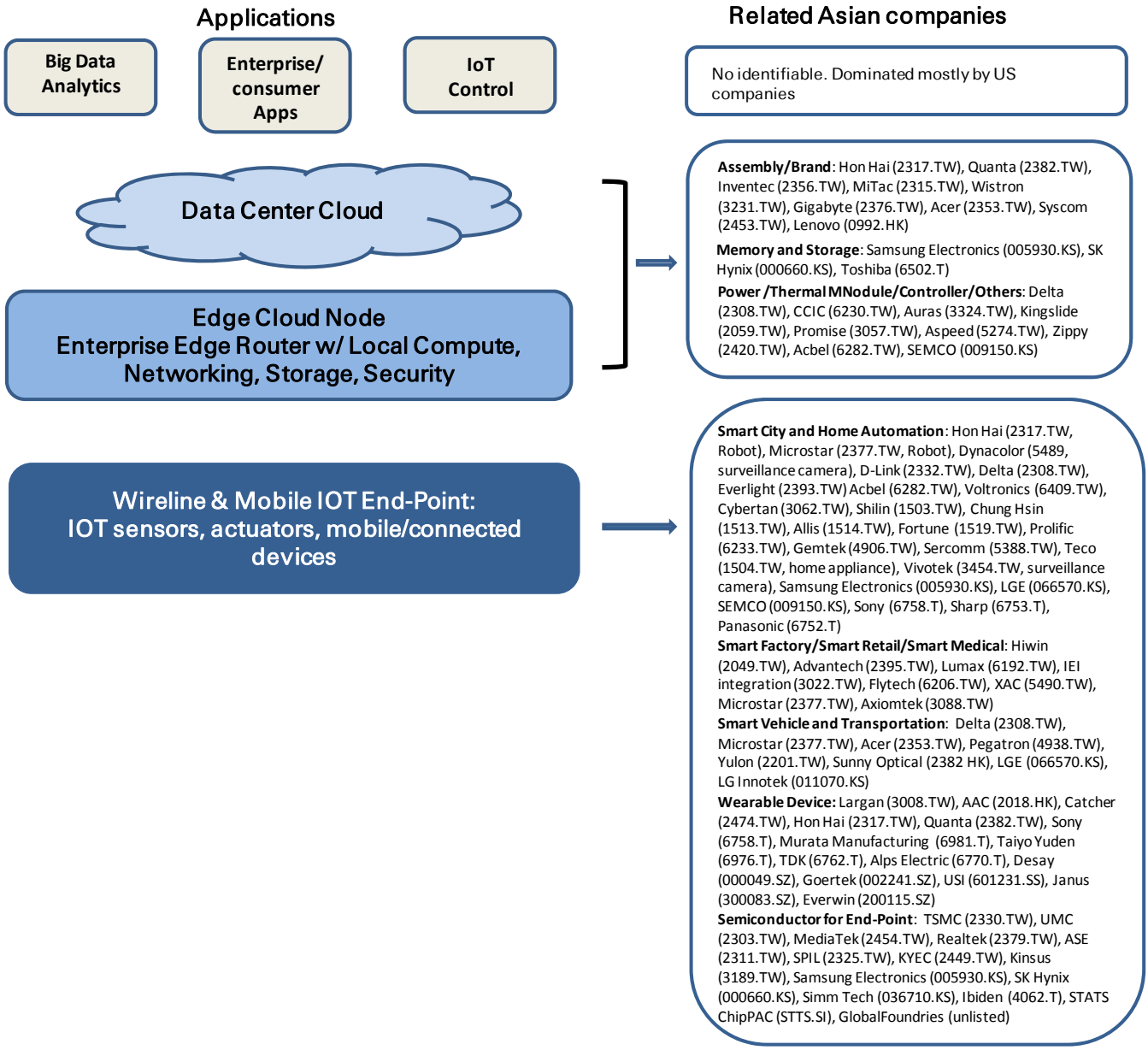
Industry players' forecasts of IoT units for 2020 vary widely from 25bn to 200bn. Intel, for example, expects 26 devices to be connected to each human being in 2020. Based on IDC forecast, the installed IoT units could grow to 8.9bn by 2018 from 2.6bn in 2014. We expect TSMC, UMC, Realtek, Largan, SEMCO, LG Innotek and Hon Hai to be the major beneficiaries of IoT proliferation in the Asian tech space in 2015-20. Based on our US analyst Brian Modoff's IoT architecture, Figure 2 lists the companies which are related to IoT in the Asian technology supply chain. Figures 3-8 provide our IoT sales estimates for the upstream/downstream companies under our coverage in 2013-16.

Figure 1: Priming future volume growth for IoT



Source: IDC, Deutsche Bank

Figure 2: Key IoT-related companies in the Asian technology supply chain



Source: Company data, Deutsche Bank

Theme #2 – Wearable devices as one of the first waves of the IoT theme

In our view, the uptake of wearable devices will be triggered by the following applications that are part of the IoT theme: 1) healthcare monitoring, such as preliminary health analysis through personal health data collection by wearable devices and the calculation of calorie consumption for exercising; 2) mobile communication and payment through wearable devices. We forecast smartwatches, wearable fitness devices, and smartglasses to be the main wearable devices in 2015-20. We expect wearable device unit to grow at a 25% CAGR in 2015-20 (400m units in 2020). We anticipate the beneficiaries of the wearable uptrend will be TSMC, UMC, ASE, Kinsus, Hynix, Largan, AAC, Catcher, SEMCO, Hon Hai and Quanta in 2015-20.

Theme #3 – Increasing server demand thanks to IoT uptake

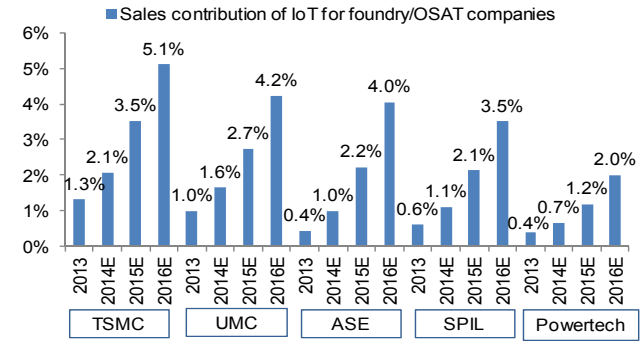
We expect the server unit CAGR to reach 4.3% during 2014-18. We forecast share gains of Delta, Hon Hai, Quanta, and Lenovo in the server market will help these companies monetize the server growth story in 2014-18. Notably, we anticipate 17.1%/17.4% of Hynix's sales to come from the server memory market in 2015-16, the highest among all Asian technology names.

Summary of key beneficiaries of three themes for the companies under our coverage

- Theme #1: IoT (excluding wearable devices and servers) – TSMC, UMC, Realtek, Largan, SEMCO, LG Innotek and Hon Hai
- Theme #2: Wearable devices – TSMC, UMC, ASE, Kinsus, Hynix, Largan, AAC, Catcher, SEMCO, Hon Hai, and Quanta
- Theme #3: Servers – Samsung, Hynix, Delta, Hon Hai, Lenovo, and Quanta

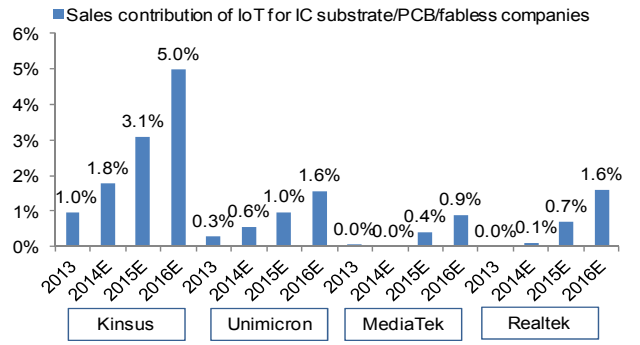
Each downstream company may penetrate specific IoT segments with limited sales portion in 2015-20 given their high sales base from mobile devices. Wearable devices should benefit the component sector the most thanks to component makers' specialty in lens, speakers, and casing. In contrast, servers could benefit downstream sectors more than the upstream sectors due to high ASPs of end devices. The servers should account for relatively high sales portion for the downstream companies in 2015-20.

Figure 3: Sales contribution of IoT for foundry/OSAT companies



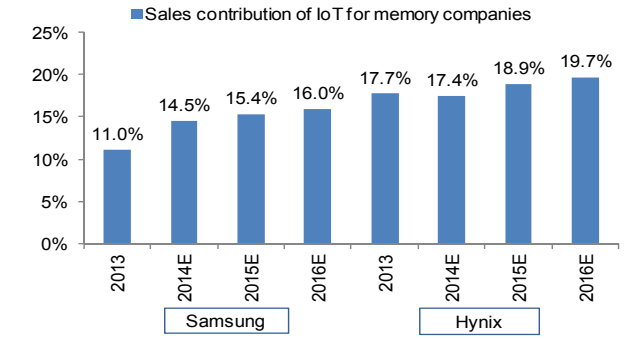
Source: Deutsche Bank estimates, Company data

Figure 4: Sales contribution of IoT for IC substrate/PCB/fabless companies



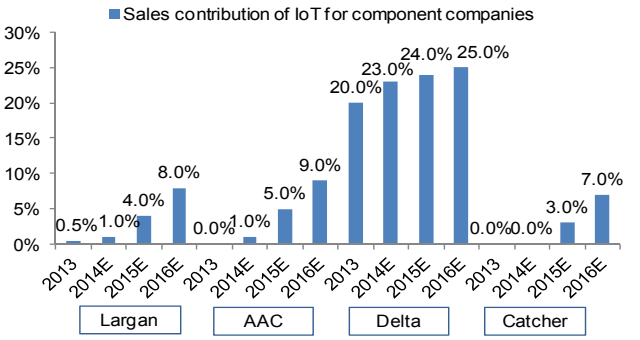
Source: Deutsche Bank estimates, Company data

Figure 5: Sales contribution of IoT for memory companies



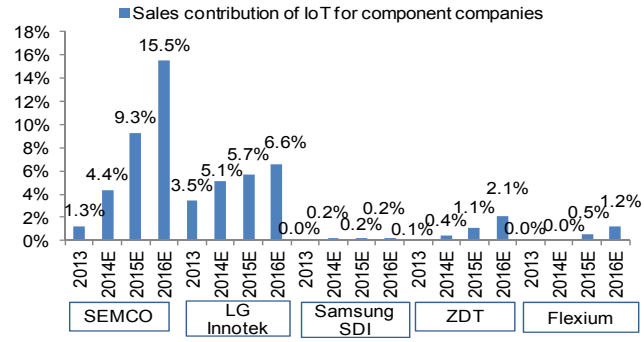
Source: Deutsche Bank estimates, Company data

Figure 6: Sales contribution of IoT for component companies



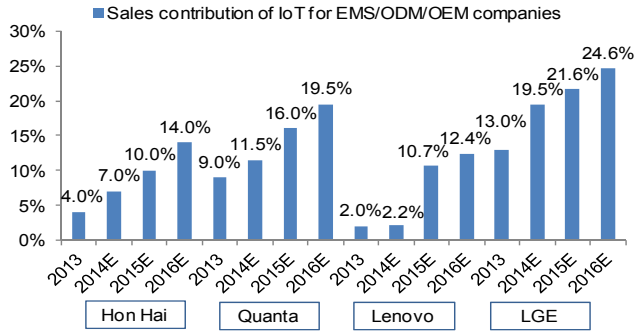
Source: Deutsche Bank estimates, Company data

Figure 7: Sales contribution of IoT for component companies



Source: Deutsche Bank estimates, Company data

Figure 8: Sales contribution of IoT for EMS/ODM/OEM companies



Source: Deutsche Bank estimates, Company data

Valuation

Valuation methodology

We adopt a P/B multiple as an asset-based valuation metric for the foundry/OSAT/memory sectors to reflect the significant capex requirements for capacity expansion and R&D. The scale and pace of yield rate improvement play important roles in the long-term earnings growth rate because of design complexity in advanced nodes for the foundry/OSAT/memory sectors. We use a P/E multiple as a valuation metric to evaluate the relatively asset-light fabless/substrate/component/EMS/ODM/OEM sectors.

Investment recommendations for our coverage universe

- **AAC Technology (2018.HK; Hold; TP HK$46; covered by Birdy Lu)** – Benefiting from proliferation of the MEMS microphones
- **ASE (2311.TW; Hold; TP NT$37; covered by Michael Chou)** – Benefiting from uptake of SiP technology
- **Catcher (2474.TW; Buy; TP NT$350; covered by Birdy Lu)** – Complex product design to further extend technology lead
- **Delta (2308.TW; Buy; TP NT$220; covered by Birdy Lu)** – Warming up to the IoT trend
- **Elan (2458.TW; Buy; TP NT$60; covered by Jessica Chang)** – Touch NB doing well; waiting for new catalysts in 2015
- **Flexium (6269.TW; Hold; TP NT$76; covered by Michael Chou)** – Limited contribution from wearable devices
- **Hon Hai (2317.TW; Buy; TP NT$116; covered by Andrew Chang)** – The leading EMS supplier for servers
- **Kinsus (3189.TW; Hold; TP NT$118; covered by Michael Chou)** – Benefiting from the rising demand for wearable devices
- **Largan (3008.TW; Buy; TP NT$2,870; covered by Birdy Lu)** – Entering another optical feature upgrade cycle
- **Lenovo (0992.HK; Buy; TP HK$13.2; covered by Andrew Chang)** – The leading runner-up brand in the space

- **LG Electronics (066570.KS; Hold; TP W84,000; covered by HanJoon Kim) –**. We see a lack of secular tailwinds to drive the stock in the foreseeable future and recommend Hold
- **LG Innotek (011070.KS; Hold; TP W135,000; covered by HanJoon Kim) –** Stock prices in earnings recovery expectation while positive catalyst such as iPhone6 launch is already priced into the stock; Hold.
- **MediaTek (2454.TW; Hold; NT$450.5; TP NT$510; covered by Jessica Chang)** – Intensifying pricing competition dampening mid-term margins outlook
- **PixArt (3227.TWO; Buy; TP NT$86; covered by Jessica Chang)** – Cash cow business supports base earnings before new products take off
- **Powertech (6239.TW; Sell; TP NT$42; covered by Michael Chou)** – Intensified competition in memory packaging/testing
- **Quanta (2382.TW; Buy; TP NT$88; covered by Andrew Chang)** – Transforming into a brand and solutions vendor
- **Realtek (2379.TW; Hold; TP NT$102; covered by Jessica Chang)** – WiFi softening but PC, ethernet, and multimedia doing fine
- **Samsung Electronics (005930.KS; Buy; TP W1,480,000; covered by SeungHoon Han) –** Component-driven recovery helping normalize valuation; we recommend Buy
- **Samsung SDI (006400.KS; Hold; TP W152,000; covered by HanJoon Kim) -** Downside risk to earnings in near term due to Samsung Electronics' struggling smartphone and tablet business; Hold
- **SEMCO (009150.KS; Hold; TP W61,000; covered by HanJoon Kim) –** Struggling to move beyond the early strong success of Samsung Electronics, which is now facing weakening handset demand; Hold.
- **SK Hynix (000660.KS; Buy; TP W59,400; covered by SeungHoon Han)-** Well positioned to benefit from favorable DRAM supply demand environment; Buy
- **Sony (6758.T; Hold; TP JPY1,850; covered by Yasuo Nakane)** – strong exposure to consumer electronic products
- **SPIL (2325.TW; Hold; TP NT$46; covered by Michael Chou)** – Benefiting from increasing demand for IoT and wearable devices
- **TSMC (2330.TW; Buy; TP NT$166; covered by Michael Chou)** – Secular market share gain with higher returns
- **UMC (2303.TW; Hold; TP NT$14; covered by Michael Chou)** – Structural issues could intensify in 2015
- **Unimicron (3037.TW; Hold; TP NT$21.5; covered by Michael Chou)** – Limited sales contribution from IoT
- **Zhen Ding Tech (4958.TW; Buy; TP NT$102; covered by Michael Chou)** – Rising demand for FPCBs due to uptake of wearable devices

Risks

Demand

The pace of adoption of standardized infrastructure buildup is unclear as there is no resolution of compatibility issues for communication among all IoT-based devices. There could be upside/downside risks to our sales estimates for the companies under our coverage if there is better/worse-than-expected resolution of IoT communication compatibility. The Institute of Electrical and Electronics Engineers (IEEE) is trying to build up standards for IoT. There are four alliance camps for IoT, which may cause compatibility issues among IoT devices. Each alliance camp's IoT products may not be fully compatible to others' IoT products if all alliance camps lack resolution of product compatibility.

WiFi, Bluetooth, NFC (near-field communication), and ZigBee should be the most cost-competitive methods for communication among IoT devices. However, each alliance camp may enhance security function, which may reduce product compatibility. As such, the coordination of all alliance camps for product compatibility will be crucial for IoT proliferation in the long run.

ASP

IC ASP usually drops 15-20% YoY a year. End-product ASP erosion depends on a product's design, popularity, and competition. If production commoditization accelerates due to intensified competition, we could see more than a 20% ASP contraction for ICs and end products each year. This could in turn lead to downside risks to our sales estimates for the companies under our coverage.

Internet of Things (IoT) - The next big thing

IoT describes things that are connected to the Internet or to other physical things (such as physical assets, machines, or consumer devices) through wireless communications and sensors. IoT requires massive computing capacity for data analysis and memory for data storage. In other words, the internet is expanding from a network of computers and mobile devices to a network of things.

Cisco predicts 25 billion devices will be connected by 2015, and 50 billion by 2020 vs. 12.5 billion devices in 2010. Intel expects the number of IoT objects to increase to 200 billion by 2020 from 2 billion in 2006. It anticipates there could be around 26 smart objects connected for every human being on earth in 2020. Gartner estimates that IoT will include 26 billion units installed by 2020. It also indicates that IoT product and service suppliers will generate incremental revenues of more than US$300bn in 2020 (mostly in services).

Based on the IoT infrastructure elaborated in the DB IoT FITT report published on 6 May 2014 by our US analyst, Brian Modoff, we provide the analysis of IoT implications and beneficiaries for the Asian technology sector in this report.

Figure 9: Major vendors' and third-party researchers' projects for IoT

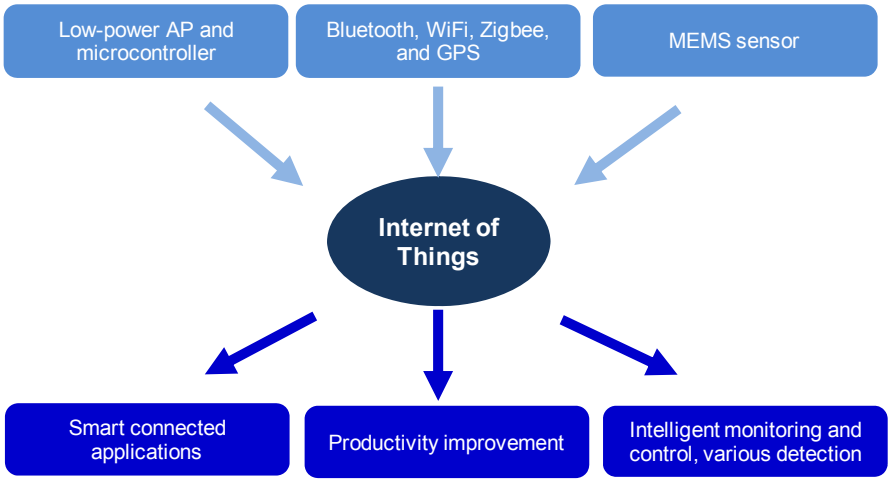
Company	Predictions and opinions on IoT (Internet of Things)
Cisco	- Cisco stated that 99.4% of physical objects that may one day be part of the IoT are still unconnected currently. - Cisco predicts 25 billion devices will be connected by 2015, and 50 billion by 2020 vs. 12.5 billion devices in 2010. - Cisco estimates that the IoT value (the combination of increased revenue and lower costs that is created) will be US$14.4 trillion for companies and industries between 2013 and 2022.
Intel	- IoT world is growing at a breathtaking pace from 2 billion objects in 2006 to a projected 200 billion by 2020. There could be around 26 smart objects connected for every human being on earth in 2020.
Ericsson	- More than 50 billion connected devices will see profound changes in the way people, businesses and society interact from 2010 to 2020.
Gartner	- The Internet of Things will include 26 billion units installed by 2020. - IoT product and service suppliers will generate incremental revenues of more than $300 billion in 2020 (mostly in services).

Source: Company data, Deutsche Bank

Uptake and applications of IoT

The concept of IoT has existed for years, with limited volumes of IoT devices (only 1% penetration rate in 2014). However, we expect IoT adoption to rise gradually in 2015-20 due to 1) 71% and 59% penetration rates for smartphones and tablet PCs in 2014, respectively; 2) improving speed performance and power consumption efficiency of mobile chips, which can enable better computing capabilities and a longer battery life for smartphones and tablet PCs; and 3) the cloud-based internet, which can provide more data computing, analysis and storage. Smartphones and tablet PCs can thus be connected to more devices and the IoT infrastructure with sustainable battery hours. We expect 1) low-power application processors (AP) and microcontrollers with connectivity and embedded memory, and 2) MEMS sensors to be the major growth drivers for the upstream semiconductor sector.

Figure 10: The impact of IoT on the upstream/downstream technology sectors



Source: Deutsche Bank

The key applications for IoT include smart cities, home automation, eHealth, retail, logistics, industrial control, smart metering, smart agriculture and animal farming for the downstream technology sector. In our view, IoT will provide benefits such as life quality improvement, productivity improvement, intelligent monitoring, and security enhancement (danger detection).

Figure 11: The key applications for IoT for the downstream technology sector

Smart City	Smart parking.
	Traffic congestion control
	Smart lighting
	Intelligent transportation systems
Home Automation	Automation of lights and temperature
	Remote control appliances
	Security monitor systems
	Energy and water monitor and control
eHealth	Structural health
	Medical fridges
	Patients surveillance
	Sport tracking
Retail	Supply chain control
	NFC payment
	Intelligent shopping applications
	Smart product management
Smart Vehicle and Transportation	Samrt information systems
	Driverless transportation
	Smart traffic signs
Logistics	Intelligent shipping
	Item location monitoring
	Fleet tracking
Industrial Control	M2M applications
	Air quality and temperature monitoring
	Manufacturing process monitor
	Vehicle auto-diagnosis
Smart Metering	Smart grid
	Tank level
	Water flow
Smart Agriculture and Animal Farming	Efficient resource usage
	Control of humidity and temperature
	Offspring care
	Animal tracking

Source: Deutsche Bank

Smart city

A smart city can incorporate a distributed network of intelligent sensors that provide more efficient management of security, energy and public transportation. The real-time data can be delivered wirelessly between citizens and the appropriate authorities. The ideal smart cities could improve convenience and efficiency for citizens. Applications for smart cities include smart parking, traffic congestion control, smart lighting, and intelligent transportation systems.

Home automation

Home automation involves connecting systems to each other for improved convenience, comfort, energy efficiency and security. This could provide a better quality of life. Home automation systems allow the control of lights, heating, ventilation, air conditioning and security system. They can conveniently switch electrical appliances on and off, and monitor the consumption of utilities and water. The system also shows which windows/doors are open and provides information for the current outdoor temperature and moisture. We expect the uptake of home automation to increase in 2015-20 due to the high penetration of smartphones, tablet PCs, smart TVs and internet-based cameras, which can all be connected to Internet.

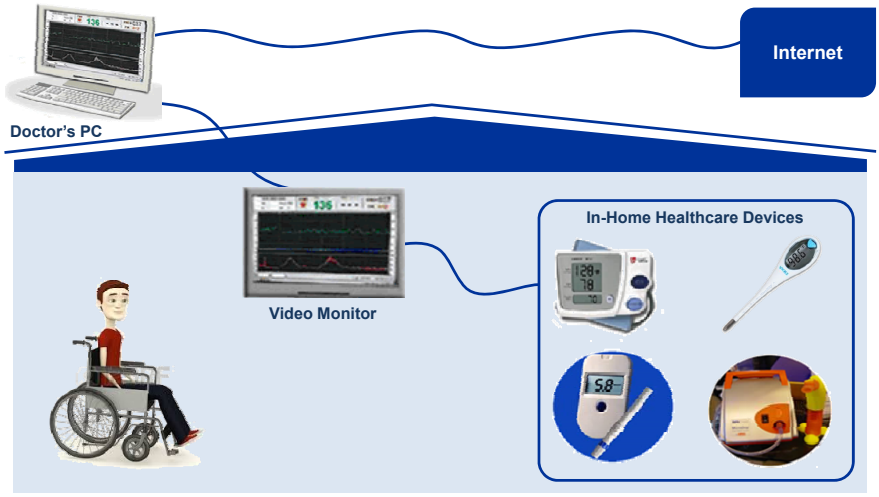
Figure 12: The concept of a digital home

Source: Industry data, Deutsche Bank

eHealth

eHealth involves electronically storing, transmitting and retrieving digital data for different purposes in the healthcare sector. eHealth could include the optimization of human capital in hospitals, cost reductions for clinical trials, sport tracking, and smart patient monitoring. It increases efficiency by improving communication and particularly enhances the quality of healthcare for elderly and disabled people. Applications of eHealth include e-prescribing, clinical data online systems, electronic medical records, digital imaging, and sport tracking. For instance, wearable devices can send online clinics records of a patient's heartbeat, blood pressure (wearable blood pressure machine), and calorie measures based on exercise and diet, allowing doctors to accumulate more data for e-diagnosis. In addition, eHealth apps can analyze the data they're being sent by wearable devices and reply with real-time warnings about someone's health.

Figure 13: eHealth can enable more at-home pathological diagnosis



Source: Industry data, Deutsche Bank

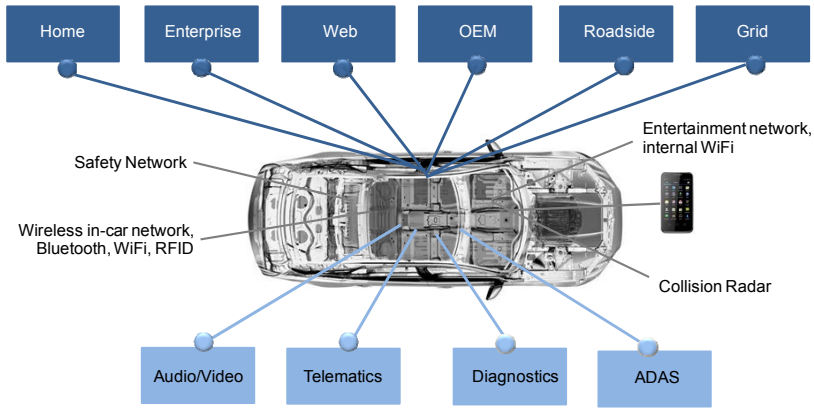
Smart retail

Software innovation and wireless devices propel smart retail. Smart retail is an idea that enables retailers to improve their profitability through accurate inventory management, efficient operations, a better shopping environment and customization. Applications for smart retail include supply chain control, NFC (near field communication) payment, intelligent shopping, smart product management, etc.

Smart vehicle and transportation

Smart vehicle and transportation can improve convenience and safety for car driving and traffic. Smart vehicle could receive additional information that could be processed on board to enhance the route or other aspects of driving. The data collected from Internet or cloud will be for historical analysis and predictive models. Every vehicle or transportation will be connected to share information simultaneously. This could make traffic and energy usage more efficient and effective. Applications for smart vehicle and transportation include smart information system, driverless transpiration, smart traffic signs, etc.

Figure 14: The eHealth can enable more at-home pathological diagnosis



Source: Industry data, Deutsche Bank

Smart logistics

Smart logistics provide convenient and efficient systems for logistic monitoring and control through internet connection. This can reduce costs and timeframes for companies and consumers. Applications for smart logistics include intelligent shipping, item location monitoring, fleet tracking, etc.

Smart industrial control

IoT in industrial control provides new industrial manufacturing processes in a highly integrated infrastructure. Various pieces of equipment are connected and products are manufactured with a high degree of automation. Smart industrial control could improve the manufacturing processes, enhance the operating efficiency of factories, introduce a highly integrated infrastructure and reduce operational costs. Applications for smart industrial control include M2M (machine to machine) applications, air quality and temperature monitoring, manufacturing process monitoring, vehicle auto-diagnosis, etc.

Smart metering

Smart metering records electric energy consumption and transmits the data to utility companies for the purposes of monitoring, distribution and billing, which can benefit utility authorities and consumers. In contrast to traditional meter readings, smart metering enables the utility authority to implement differential pricing based on energy consumption at each metered site. Smart metering can help consumers to control their energy usage by tracking and managing their consumption habits. Smart metering can be applied in various sectors such as electricity, gas, and water.

Smart agriculture and animal farming

Smart agriculture involves controlling humidity and temperature levels, monitoring soil moisture, and remote management. It could maximize the production and quality of fruits and vegetables. Internet connectivity for animal farming can help control the conditions in which animals are reared and identify and monitor the location of animals. It greatly improves the efficiency of farming management. Applications for smart agriculture and animal farming include intelligent shipping, item location monitoring, fleet tracking, etc.

Figure 15: Key beneficiaries of IoT applications in the Asian technology sector

Beneficiaries of IoT Applications	**Smart City and Home Automation**: Hon Hai (2317.TW, Robot), Microstar (2377.TW, Robot), Dynacolor (5489, surveillance camera), D-Link (2332.TW), Delta (2308.TW), Everlight (2393.TW) Acbel (6282.TW), Voltronics (6409.TW), Cybertan (3062.TW), Shilin (1503.TW), Chung Hsin (1513.TW), Allis (1514.TW), Fortune (1519.TW), Prolific (6233.TW), Gemtek (4906.TW), Sercomm (5388.TW), Teco (1504.TW, home appliance), Vivotek (3454.TW, surveillance camera), Samsung Electronics (005930.KS), LGE (066570.KS), SEMCO (009150.KS), Sony (6758.T), Sharp (6753.T), Panasonic (6752.T)
	Smart Factory/Smart Retail/Smart Medical: Hiwin (2049.TW), Advantech (2395.TW), Lumax (6192.TW), IEI integration (3022.TW), Flytech (6206.TW), XAC (5490.TW), Microstar (2377.TW), Axiomtek (3088.TW)
	Smart Vehicle and Transportation: Delta (2308.TW), Microstar (2377.TW), Acer (2353.TW), Pegatron (4938.TW), Yulon (2201.TW), Sunny Optical (2382 HK), LGE (066570.KS), LG Innotek (011070.KS)
	Semiconductor for End-Point: TSMC (2330.TW), UMC (2303.TW), MediaTek (2454.TW), Realtek (2379.TW), ASE (2311.TW), SPIL (2325.TW), KYEC (2449.TW), Kinsus (3189.TW), Samsung Electronics (005930.KS), SK Hynix (000660.KS), Simm Tech (036710.KS), Ibiden (4062.T), STATS ChipPAC (STTS.SI), GlobalFoundries (unlisted)

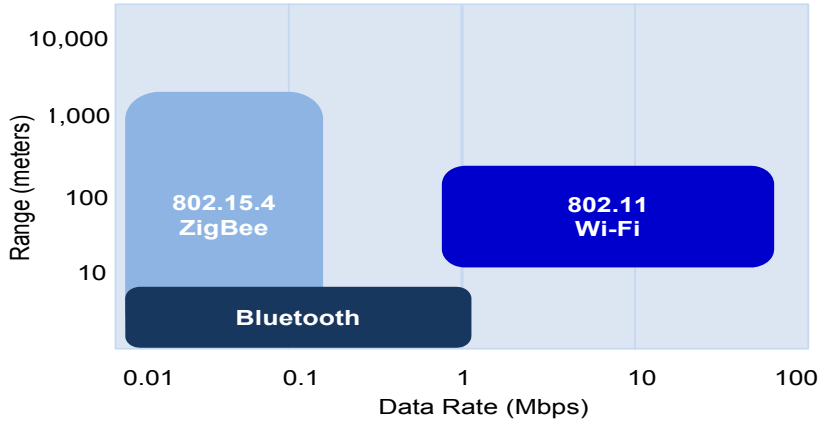
Source: Deutsche Bank

The foundry/OSAT/substrate sectors

Increasing demand for low-power wireless, controller, sensor ICs

We expect IoT to drive increasing demand for wireless ICs, low-power/cost application processors (AP), microcontroller ICs, and microelectromechanical systems (MEMS) sensors. Wireless ICs are used to implement IoT and connect devices. We anticipate that over 80% of IoT devices will be connected through Bluetooth, Wi-Fi, or ZigBee (802.15.4; 6-8 times the data transmission distance of Wi-Fi; Figure 16) chips due to their outstanding data transmission rate and low power consumption.

Figure 16: Range vs. data rate – comparison of ZigBee, Wi-Fi, and Bluetooth



Source: Atmel, Deutsche Bank

Low-power application processors (AP) are more likely to be adopted if IoT devices require processors. Power consumption is usually crucial for IoT devices. Most IoT devices do not require high performance as complicated data calculation and analysis can be performed by servers in the cloud.

Microcontroller ICs and MEMS sensors can provide functions such as intelligent monitoring and control, various types of detection, etc. The quality and reliability of these ICs are very important for IoT.

We expect a single-chip AP or microcontroller with integrated connectivity functions (Bluetooth, Wi-Fi and ZigBee) to be the mainstream product for IoT devices. Chip vendors could introduce a turnkey solution that contains this type of single-chip AP/microcontroller and MEMS sensors for various kinds of IoT devices. AllJoyn, the wireless protocol for IoT, now has 60 members, including Microsoft, Sony and Electrolux (which recently bought GE Appliances). Vuforia, the augmented reality platform for wearable glasses, is being used in successful products. Lego is one example: the toymaker now has a top selling product that leverages the Vuforia platform, allowing it to sell follow-on services along with its usual one-time product sale.

Low dollar content for foundry, OSAT and IC substrate sectors

The semiconductor dollar content of IoT-related ICs is not high as few ICs will adopt the most advanced technology vs. PCs and mobile devices. We estimate the dollar content per box is around US$9-11 for the semiconductor sector and US$3-4 for the foundry sector. It is only US$1-2 for the OSAT sector and US$0.5-1.0 for the IC substrate sector.

Figure 17: Supply chain (IC vendors and foundries)

Chips	Semiconductor ASP (US$)	Major chip vendors	Major foundries
Low-cost application processor	5.0	Intel, MediaTek, Marvell, Broadcom	TSMC, UMC, Samsung, GF
Microcontroller	1.0	Freescale, Texas Instruments	TSMC, UMC, Samsung, GF
WiFi	1.0	Broadcom, MediaTek	TSMC, UMC, Samsung, GF
Bluetooth	0.8	Broadcom, MediaTek	TSMC, UMC, Samsung, GF
ZigBee	0.8	Atmel, Texas Instruments	TSMC, UMC, Samsung, GF
MEMS sensor	1.0	Bosch, Texas Instruments, STM, Maxim	TSMC, UMC, Samsung, GF
GPS	1.0	Broadcom, NXP, Texas Instruments	TSMC, UMC, Samsung, GF
Baseband	2.5	MediaTek, Intel	TSMC, UMC, Samsung, GF

Source: Industry data, Deutsche Bank estimates

TSMC (foundry) – Strong capability to capture secular IoT growth

We expect IoT (excluding wearable devices and servers) to account for 1.4% and 2.2% of TSMC's sales in 2015 and 2016, respectively. TSMC's management is very positive on the uptake of IoT. Management indicated that IoT products require 1) the right performance, 2) attractive form factor, 3) low power, 4) integrated functionality, 5) cost effectiveness, and 6) tight security. This should lead IC chip vendors to focus more on power consumption efficiency, fast time to market, and technology co-optimization for their products. Management believes that ultra-low power, SiP (system in packaging) and MEMS capabilities will be key for semiconductor companies to monetize the IoT uptrend.

- TSMC's leadership in the ultra-low power foundry segment

  TSMC will provide 0.18um, 90nm, 55nm, 40nm, 28nm and 16nm FinFET ULP (ultra low power) solutions for IoT products. Compared with TSMC's Low Power technology, its Ultra Low Power technology could reduce operating voltage by 30%, active power by 40%-plus, and standby power by 75%-plus. It will enable significant increases in battery life by 2x to 10x for IoT applications. This is ahead of all other foundries by two years. The ultra-low power technology requires the production know-how for metal layers in the wafer production. Tier-two foundries have been weak in the current low power technology due to lack of R&D scale and execution. We believe it will be challenging for tier-two foundries to catch up with TSMC in 2017-20. **TSMC will enter pilot-run production for the ultra-low power products in 2015. We expect TSMC will expand its sales market share in IoT to 68% in 2016 from 65% in 2015 as it plans to start mass production of ultra-low power technology in 2016.**

TSMC's strength in ultra-low power should help it monetize IoT trend faster than the other foundries in 2016-20

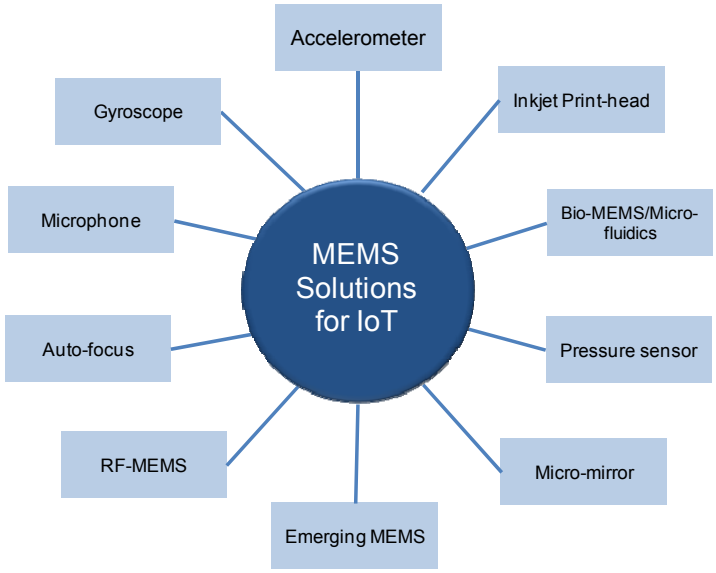
- TSMC's SiP solution may be a game changer

  TSMC's management expects its InFO (integrated fan-out) wafer level packaging solution to be adopted by IoT applications. TSMC can provide a turnkey solution from front-end wafer production to back-end InFO packaging/testing to reduce costs and cycle times for customers. This is better than OSAT companies' packaging/testing solutions.

- To gain more share in MEMS

  TSMC is the biggest MEMS foundry in the world and is 2-3 years ahead of other foundries. However, the outsourcing ratio of MEMS is below 30% currently. Most MEMS are manufactured by IDMs (integrated device manufacturers). We expect IDMs to continue to increase their outsourcing ratio in 2015-20 due to foundries' better price performance and the substantial volume of IoT devices, especially in 2017-20. We believe this should benefit TSMC the most given its leadership in MEMS technology.

Figure 18: MEMS solutions for IoT (Internet of Things)



Source: Deutsche Bank

Figure 19: Sales contribution of IoT (excluding wearable devices and servers) for foundries - TSMC and UMC

(US$m)	2013	2014E	2015E	2016E
Semiconductor market size for IoT				
Low cost application processor	100	129	204	274
Microcontroller	75	243	470	913
Baseband	90	116	183	246
PAN Wireless (WiFi, Bluetooth, and ZigBee)	75	243	470	913
MEMS sensor	50	162	314	608
GPS	30	39	61	82
Total semiconductor market size for IoT	420	931	1,703	3,036
Foundry revenue for IoT				
Low cost application processor	36	47	73	99
Microcontroller	27	87	169	329
Baseband	32	42	66	89
PAN Wireless (WiFi, Bluetooth, and ZigBee)	27	87	169	329
MEMS sensor	18	58	113	219
GPS	11	14	22	30
Total foundry revenue for IoT	151	335	613	1,093
Growth rate of foundry revenue for IoT	**36%**	**122%**	**83%**	**78%**
Market share for TSMC and UMC				
Market share for TSMC	60%	62%	65%	68%
Market share for UMC	10%	10%	10%	10%
IoT sales portion for TSMC and UMC				
TSMC	**0.5%**	**0.8%**	**1.4%**	**2.2%**
UMC	**0.4%**	**0.7%**	**1.3%**	**2.2%**

Source: Industry data, Deutsche Bank estimates

UMC (foundry) – one of the beneficiaries

We expect IoT (excluding wearable devices and servers) to account for 1.3% and 2.2% of UMC's sales in 2015 and 2016, respectively. UMC should benefit from IoT demand for 8-inch wafers. However, UMC's ultra-low power

technology is 2-3 years behind TSMC's. This means that UMC is unlikely to gain a significant share of the IoT foundry TAM (we forecast 10% in 2015-16).

ASE (OSAT) – The turnkey provider in back-end/EMS

We expect IoT (excluding wearable devices and servers) to account for 0.5% and 0.8% of ASE's sales in 2015 and 2016, respectively. ASE's management indicated that the key developments of IoT will be connectivity, end-to-end solutions, and technology. It also mentioned that the current challenges for IoT are how to develop end-to-end solutions within the current infrastructure and how to create a self-sustaining ecosystem. ASE's management believes each supply chain and vendor will face unique and different challenges. IoT products will require connectivity modules, which is the strength of ASE's EMS operation. As such, ASE's unique OSAT/EMS business model should enable the company to better monetize IoT than its peers in 2015-17.

SPIL (OSAT) – Rising IoT exposure in 2015-16

We expect IoT (excluding wearable devices and servers) to account for 1.0% and 1.6% of SPIL's sales in 2015-16, respectively. Its strength in wirebonding and flip-chip packaging/testing should help it penetrate the IoT market. However, we believe SPIL will not enter the EMS market due to low margins.

Powertech (OSAT) – An IoT beneficiary but…

We expect IoT (excluding wearable devices and servers) to account for 0.7% and 1.1% of Powertech's sales in 2015 and 2016, respectively. Powertech is one of the major memory packaging/testing vendors in the world. Its wirebonding technology for logic ICs should also meet the demand for IoT chips. We believe Powertech will benefit from the uptake of IoT in 2015-16. However, we forecast rising competition from ASE and ChipMOS in memory packaging/testing will result in more ASP/margin pressure and market share loss for Powertech in 2015-16.

Figure 20: IoT sales portion (excluding wearable devices and servers) for OSAT vendors - ASE, SPIL, and Powertech

(US$m)	2013	2014E	2015E	2016E
OSAT revenue for IoT (US$m)	-	-	-	-
Low cost application processor	18	23	37	49
Microcontroller	14	44	84	163
Baseband	16	21	33	44
PAN Wireless (WiFi, Bluetooth, and ZigBee)	14	44	84	163
MEMS sensor	9	29	56	108
GPS	5	7	11	15
Total OSAT revenue for IoT	76	168	305	541
Growth rate of OSAT revenue for IoT	**37%**	**121%**	**82%**	**77%**
Market share for ASE and SPIL	-	-	-	-
Market share for ASE	15%	15%	15%	15%
Market share for SPIL	9%	9%	9%	9%
Market share for Powertech	3%	3%	3%	3%
IoT sales portion for ASE and SPIL	-	-	-	-
ASE	**0.2%**	**0.3%**	**0.5%**	**0.8%**
SPIL	**0.3%**	**0.6%**	**1.0%**	**1.6%**
Powertech	**0.2%**	**0.4%**	**0.7%**	**1.1%**

Source: Industry data, Deutsche Bank estimates

Kinsus and Unimicron (substrate/PCB) – Incremental IoT exposure in 2015-16

We expect IoT (excluding wearable devices and servers) to account for 0.9% and 0.4% of Kinsus' and Unimicron's sales in 2016, respectively. Kinsus and Unimicron provide substrates and PCBs, which will be used in IoT chips.

However, most IoT chips will require only simplified substrates and PCBs. This implies low entry barriers and limited share for each substrate/PCB vendor.

Figure 21: Sales contribution of IoT (excluding wearable devices and servers) for substrate/PCB vendors – Kinsus and Unimicron

(US$m)	2013	2014E	2015E	2016E
IC substrate/PCB revenue for IoT (US$m)	-	-	-	-
Low cost application processor	6	8	12	16
Microcontroller	5	15	28	54
Baseband	5	7	11	15
PAN Wireless (WiFi, Bluetooth, and ZigBee)	5	15	28	54
MEMS sensor	3	10	19	36
GPS	2	2	4	5
Total IC substrate/PCB revenue for IoT	**25**	**56**	**102**	**179**
Growth rate of IC substrate/PCB revenue for IoT	**37%**	**122%**	**80%**	**76%**
Market share for Kinsus and Unimicron				
Market share for Kinsus	5%	5%	5%	5%
Market share for Unimicron	5%	5%	5%	5%
IoT sales portion for Kinsus and Unimicron				
Kinsus	**0.2%**	**0.3%**	**0.5%**	**0.9%**
Unimicron	**0.1%**	**0.1%**	**0.2%**	**0.4%**

Source: Industry data, Deutsche Bank estimates

Taiwan fabless sector

We view IoT as a long-term opportunity for the Asia fabless sector as a good number of fabless companies here, especially in Taiwan, provide most of the key chips for IoT products. These include application processor (AP), baseband, micro-controller, sensor, short-distance wireless communication ICs (mainly Bluetooth and Wi-Fi), display driver ICs, touch controller ICs, and analog power management ICs. However, as IoT remains in its early stage, the entire supply chain is still trying to figure out what products and business models will work. Therefore, we don't expect the volume per model to be significant given most of projects are in their trial-and-error phase.

Meanwhile, given the relatively low computing power required, semiconductor content per device would be less rich than for mainstream portable consumer products such as smartphones, tablet PCs, and NBs. We believe IoT volumes would need to expand rapidly for fabless companies to enjoy a more meaningful sales and earnings contribution from IoT. That said, it is relatively less demanding on R&D expenses as IoT leverages on most current key technologies. As such, most fabless companies' investment in IoT will not be as significant as before. Yet, we think the early product design-ins will need more FAE (field applications engineer) resources as they are largely project-specific and low volume in the beginning.

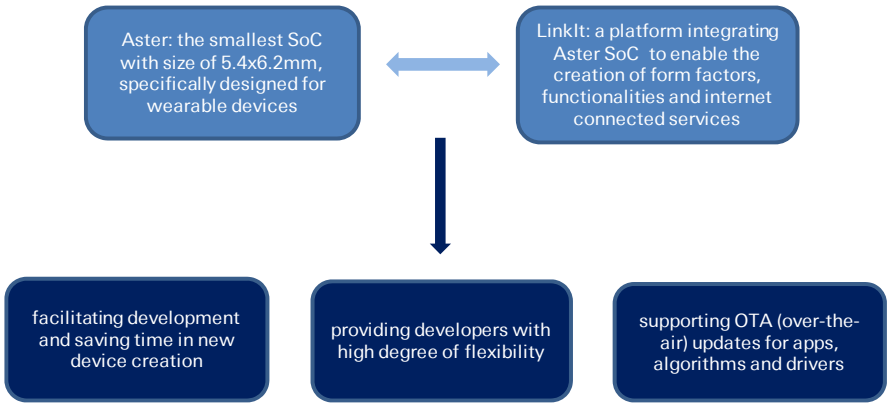
MediaTek

We view MediaTek as the major beneficiary in Asia of this long-term opportunity given its comprehensive technologies and strong FAE team. MediaTek is the only company in Asia to offer key main chips for IoT, including AP/CPU and wireless communication chips, based on an effective platform approach. MediaTek is sparing no effort to enter the wearable devices and IoT business, even though these segments currently still account for a tiny sales

percentage. MediaTek believes that GMs for wearable devices and IoT will surpass the company's overall GMs as new products are usually more lucrative.

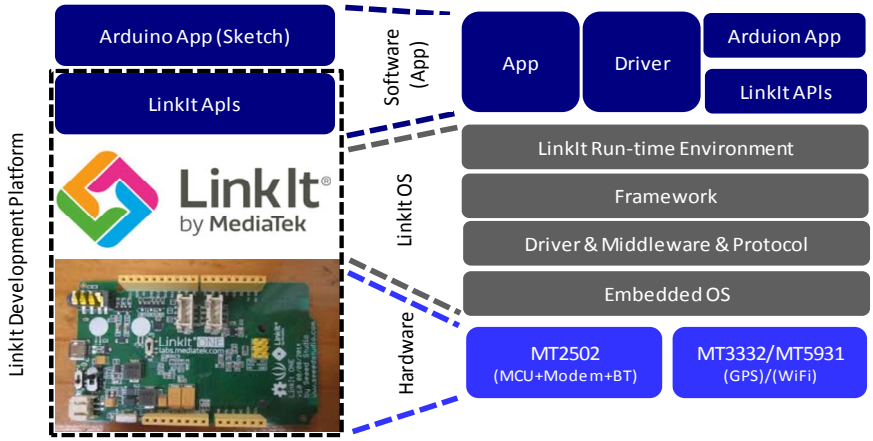
MediaTek has introduced LinkIt, its own platform to integrate Aster SoC, to accelerate its move into the wearable devices and IoT markets. MediaTek's Aster SoC enables the developer community to create a broad range of affordable wearable and IoT products and solutions.

Figure 22: MediaTek LinkIt platform and Aster SOC



Source: Deutsche Bank, company data

Figure 23: MediaTek LinkIt platform



Source: Deutsche Bank, DigiTimes

The distinguished 'Turnkey Solutions' of MediaTek may not be totally suitable for IoT markets, thus MediaTek has released the new 'Semi Turnkey Solutions' to assist developers in their work on new IoT products with the help of the LinkIT platform and MediaTek Labs ecosystem. LinkIT is a part of MediaTek Labs and is intended to propel the R&D of wearable devices and IoT and MediaTek Labs were open in 3Q14.

The recently released MT7688 chip is the SOC with the lowest power consumption, while MT7681 has mainly been used in some small home appliances such as lamps and locks due to its small size.

MediaTek is dedicated to cooperating with its ecosystem partners, including local fabless company Realtek and other industry players such as Baidu and

Acer, to strengthen its presence in the wearable devices and IoT markets. MediaTek wishes to build an ecosystem comprised of manufacturers, software developers and service suppliers to come up with brand new applications and experiences for Super-mid market users. We estimate that IoT revenue contribution for MediaTek should be below 1% and 2% in 2014 and 2015, respectively, given MediaTek's big revenue base, but the segment has good long-term potential.

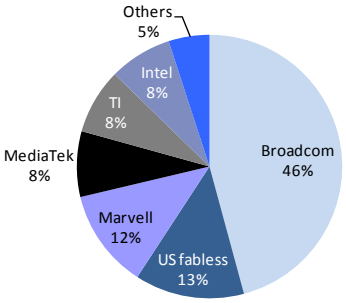
Realtek

We view Realtek as another IoT player with its unique focus on networking ICs, including both wired Ethernet and short-distance wireless communication WiFi and Bluetooth. Realtek expects the WiFi business to regain good growth momentum in the mid-term thanks to increasing new applications using WiFi and Bluetooth. Realtek recently announced its collaboration with Haier in intelligent home appliances with new low power consumption WiFi solutions. We note that Realtek introduced several new products in 2014 to address opportunities in smart home/IoT (RTL8189EM+MCU) and home media cloud systems (RTD1185 and RTD1034).

RTL8189EM+MCU is a home smart lighting and home smart safety IoT solution. Through handheld devices, users can access and set up scenarios for home lighting, temperature and security systems from wherever they may be. If there is any temperature anomaly or a stranger breaks-in, an alert will be sent to the users' smartphones. RTD 1185 is a highly integrated SoC for consumer electronics products requiring high definition media playback, wireless/wired networking, mass storage, and DTV capabilities. RTD1034 is a wireless audio solution for home music center products that streams music with high quality.

Realtek sees IoT as its big long-term opportunity. Besides the current integration of WiFi and MCU, Realtek set up a branch in Singapore in June 2014 to attract talent in Southeast Asia in software design, hardware design, and digital IC design, in order to grasp the opportunities in the IoT, intelligent home appliances, cloud server and big data markets. We estimate that IoT's revenue contribution should be below 1% and 3% in 2014 and 2015, respectively, but its long-term potential is promising.

Figure 24: WW WiFi chip market share in 2013



Source: Deutsche Bank, DigiTimes

Memory sector

Korean makers appear well positioned in key devices required for IoT

We believe Samsung Electronics and SK Hynix are well positioned for the IoT era, with a strong presence in the digital convergence world. Korean set makers currently have strong exposure to smart TVs, smartphones, tablets, and appliances, which may all play a key role in an IoT world. In addition to connected devices, IoT should lead to exponential growth in data traffic, which should help increase demand for DRAM and data center servers. Although wearable devices may be a new, fast-growing segment within IoT, our calculations show that the overall revenue impact from wearable may be limited within our memory coverage.

Our analysis concludes that SK Hynix currently has the highest exposure to IoT, mainly through server DRAM, which accounted for about 16.8% of total sales in 2013. In our definition of IoT in this report we have excluded revenue exposure to smart TVs, smartphones and tablets. As a result, the total sales

exposure of Samsung Electronics to IoT (excluding smart TVs, wearable devices and servers) was only 1.6% in 2013. If we include smart TVs the revenue exposure to IoT would increase to 11% in 2013. We estimate smart TVs accounted for 9% of total revenues in 2013 while server DRAMs accounted for 1%. We estimate smart TVs accounted for 9.4% of total revenues in 2013 while server DRAMs accounted for 1.4%.

Figure 25: Korean memory companies' exposure to IoT

	2013	2014E	2015E	2016E
Memory				
Sales contribution of Internet of Things for Samsung				
Internet of Things (excluding wearable devices and servers)	0.0%	0.0%	0.2%	0.4%
Smart TVs	9.4%	11.9%	12.4%	12.6%
Wearable devices	0.2%	0.6%	0.7%	0.9%
Server	1.4%	2.1%	2.1%	2.0%
Total sales contribution of IoT for Samsung (exclude smart TVs)	**1.6%**	**2.6%**	**3.0%**	**3.3%**
Total sales contribution of IoT for Samsung (include smart TVs)	**11.0%**	**14.5%**	**15.4%**	**16.0%**
Sales contribution of Internet of Things for Hynix				
Internet of Things (excluding wearable devices and servers)	0.0%	0.0%	0.0%	0.0%
Wearable devices	1.0%	1.3%	1.7%	2.3%
Server	16.8%	16.2%	17.1%	17.4%
Total sales contribution of Internet of Things for Hynix	**17.7%**	**17.4%**	**18.9%**	**19.7%**

Source: Deutsche Bank estimates, Industry data

Component and peripheral sector

SEMCO – biggest exposure to IoT among major Korean component makers

We see SEMCO as the biggest beneficiary of IoT among major component makers in Korea. Principally, SEMCO is making inroads into the ESL (electronic shelf label) market. SEMCO aims to reach W1tn in ESL revenue by 2016, an aggressive target from the W150bn that it is likely to achieve in 2014. Apart from ESL, SEMCO also supplies wireless connectivity modules in Samsung Electronics' connected home devices.

Figure 26: SEMCO exposure to IoT

	2013	2014E	2015E	2016E
Sales contribution of Internet of Things for SEMCO	1.3%	3.0%	7.5%	13.2%

Source: Deutsche Bank estimates, Industry data
Note: sales contribution of Internet of Things excludes wearable device and servers)

LG Innotek – focusing on non-consumer IT IoT, particularly automotive

LG Innotek is primarily focusing on growing IoT modules for connected automobile. Its primary sales driver has been 3G/4G wireless connectivity modules in automobiles. Based on our estimates, we believe this could grow to W350bn revenue by 2016, accounting for 5% of its consolidated revenue. LG Innotek also supplies WiFi modules to LG Electronics for its connected home appliances, which we believe should contribute another ~2% of consolidated revenue by 2016.

Figure 27: LG Innotek exposure to IoT

	2013	2014E	2015E	2016E
Sales contribution of Internet of Things for LG Innotek	3.5%	5.1%	5.6%	6.5%

Source: Deutsche Bank estimates, Company data
Note: sales contribution of Internet of Things excludes wearable device and servers)

D-Link (2332 TT, NR)

D-Link is a leading brand globally in the design, manufacture and marketing of advanced networking products, including switch, WLAN, broadband, and digital home. The company acts as a total solution provider among IoT sector by providing both hardware and relevant network related technical services. D-Link keeps enhancing machine-to-machine connectivity (M2M) that allows networked devices to exchange information and perform actions without the manual assistance of humans.

D-Link develops its own digital-home platform called My D-Link, which links all of its products (IP camera, IP storage, set-top box and media router) in the home and provides content for consumers. This enables consent sharing among different devices and between families which is the main idea that D-Link is focusing on. The My D-Link platform focuses on the demand for private cloud-computing at home, including real-time surveillance through IP cameras and private data storage on its IP storage system. Benefiting from the proliferation of IoT trend, D-Link continues to win users for its My D-Link platform which may accordingly trigger its digital home product shipment based on management's expectation.

SerComm Corporation (5388 TT, NR)

SerComm Corporation engages in the manufacturing of wireless network products and wired network products. The company's main products consist of fixed mobile convergence products, broadband access equipment, smart home control devices, enterprise use network equipment, home use network equipment and vehicle-carried communication equipment.

Rising proliferation of IoT would generate large quantities of data that need to be processed and analyzed in real time. This will change the workload of data centers, and triggers compute capacity and network/data security requirements. Therefore, SerComm intends to grow its LTE and networking related products on robust IoT, smart home and surveillance (mainly for IP camera) proliferation trend going forward.

UDE (3689 TT, NR)

UDE is the world's second largest integrated RJ45 connector producer with 20% global market share based on management's statement. The company mainly engages in the production of integrated RJ45 connector for application in PC (server, desktop, AIO), networking (home gateway, cable modem, switch, hub), and consumer electronics (game console, set-top-box, TV, printer, Blu-Ray Disc). Conventional RJ45 is defined as a connector socket and plug used in ethernet computer networks. Integrated RJ45 connector incorporates an additional filter to save space and boost efficiency that simplifies board design for PC/game console/server and networking system makers.

UDE expects the penetration rate of integrated RJ45 connector to increase sequentially on robust home gateway demand stems from the proliferation of IoT trend. Owing to the slimmer form factor and simplified board design of integrated RJ45 connector, UDE anticipates the migration from conventional connector to integrated RJ45 connector to accelerate in the long. The company also expects its networking business to expand persistently on rising multi-ports home gateway shipment driven by emerging smart city trend in the US.

EMS/ODM/OEM sectors

Hon Hai – aggressive in the Connected Cars, Smart Home and Smart Retail

As the leading EMS suppliers for smartphone, tablet, TV and game consoles products with more than one million manpower in China, Hon Hai is absolutely one of the key players and best partners for IoT brand vendors. While management has announced several big investments in key components, assembly factories and data centers in China for electronic auto industry and smart connected devices, we expect company to leverage its knowledge in manufacturing, vertical integration of key components, including networking, battery, PCB, camera modules, panel, and metal frame, distribution channels and relationship with global brands to grow its revenue for IoT products to 3% of its total sales in 2016.

LG Electronics – focus on smart TV and smart portable devices

LG Electronics continues to work on its IoT strategy, with a focus on smart TV and smart portable devices. Its primary focus is on leveraging the Android OS ecosystem. LG's acquisition of Palm's previous WebOS team is part of its desire to build a strong connected device platform. However, apart from an aggressive push in smart TV, we have not seen LG make significant progress in other parts of its business related to connected devices. Sales of connected home appliances (air conditioners, refrigerators, etc.) remain a small portion of its overall business.

Sony – leverage its strong exposure to consumer electronics products

Sony joined the AllSeen Alliance in Sep 2014. Open source of AllSeen Alliance provides the gateway for different companies to improve technologies and expand ecosystems. The strengths for Sony in the IoT area are its wide product lines for consumer devices and its brand value. Sony has strong exposure to smart TVs, smartphones, tablet PCs, Game consoles, and portable games, which could lead Sony to be well-positioned for consumer electronic products in the IoT market.

Industrial PC sector

IPC- the system integration and customization experts

To develop and to manufacture billion of IoT applications for smart home, smart medical, smart retail, smart cars, etc., industrial computers (IPC) vendors play important roles for the integration of software, hardware and apps through the connected environment. The market size of IPCs is smaller than that of consumer and commercial PC market. The sector in general requires greater customization, deeper model specification, higher product quality, and more extensive after-sales services than consumer PCs. This creates higher entry barriers and client loyalty. Competition is generally less intensive, as application specification creates niche, despite very fragmented market structure.

In addition, the product life cycle of IPCs is also longer at 3-7 years, subject to applications, compared to less than three years for consumer PCs. Therefore, market participants in IPC generally enjoy higher and more stable profit margins. The applications of IPCs have been expanded from production automation in factories to various functions in all business types, including retail, transportation, telecommunication, gaming, military, and healthcare, etc. The development of cloud computing and IoT are expected to be the market

drivers for the next decade. Forrester Research forecasted the market value of IoT in 2020 will 30 times that of today's internet. This provides tremendous growth opportunities for, but also rising technology risks to market participants. The line between consumer and applied PCs will be getting blurred; and only companies that can provide total solutions by the combination of hardware and software technologies can prevail.

Advantech (2395 TT, NR) – a leader in the IPC space

Established in 1981, Advantech is a global leading firm specialized in IPC and related products and services. The company principally engages in the manufacturing, assembling and distribution of IPCs and servers, related components including embedded motherboards and computer cases, among others, as well as providing total solutions and after-sales services. With headquarter and four manufacturing sites located in Taiwan, Advantech operates an extensive sales and marketing network in 18 countries and 39 major cities around the globe. Currently, the company runs it business by two product fields, six product groups, and many strategic business units (SBU) under the related groups. Business group under the "iPlanet Solutions" mainly provide products and solutions carrying Advantech's brand name. In contrast, the "Embedded Design-In Services" mainly cover the original design manufacture (ODM) type of business. Each SBU is equipped with the capability to provide services to clients independently.

Figure 28: Advantech product lines

Product	Business Group	Major products and services
iPlanet Solutions	Industrial Automation	Industrial I/O & controllers, Internet of Things (IoT), energy solutions, machine automation solutions
	Service Automation	Industrial vehicle computing, digital healthcare, digital signage, industrial portable
	Embedded Systems	Industrial computers and servers, box and panel computers, industrial communication, intelligent video platforms, transportation solutions
Embedded Design-in Services	Embedded Core Computing	Single board computers, industrial motherboards, computer-on-modules, embedded software services, industrial displays & peripherals
	Network & Communication (DMS)	High performance computing, blade computing & systems, network appliances, industrial switches
	Applied Computing (DMS)	Medical computing, embedded systems, gaming computing

Source: Deutsche Bank, company data
Note: sales contribution of Internet of Things excludes wearable device and servers)

Wearable devices to be the new wave of IoT

The uptrend and beneficiaries of wearable devices

Wearable devices are accessories or items of clothing that have wireless connectivity, independent processing, and advanced electronic systems with practical functions and features. Wearable devices belong to the concept of IoT but we treat them separately from IoT in our sales estimates. The major applications for wearable devices are entertainment, healthcare monitoring, service management, and mobile communication. Wearable devices include watches, glasses, wristlets, necklaces and clothing.

We expect smartwatches, wearable fitness devices, and smartglasses to be the main wearable device products. Most owners of wearable devices are the users of smartphones as wearable devices can connect and exchange data with smartphones. We estimate smartwatches and wearable fitness devices will account for 19% and 71% of total shipments of wearable devices in 2015 (Figure 29). We expect global shipments of wearable devices to grow to 400m in 2020, which implies a 25% unit CAGR in 2015-20. Figure 30 lists the major players for the wearable devices in the Asian technology supply chain.

Figure 29: We expect global shipments of wearable devices to grow to 400m in 2020 (a 25% unit CAGR in 2015-20)

	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Global shipments of wearable devices (units m)							
Smart Glasses	1	5	10	15	20	25	30
Smartwatch	10	25	45	60	80	100	120
Wearable fitness device	65	92	125	150	175	200	230
Other wearable devices	5	7	10	12	15	17	20
Total	**81**	**129**	**190**	**237**	**290**	**342**	**400**
Shipment growth rate							
Smart Glasses	nm	nm	100%	50%	33%	25%	20%
Smartwatch	nm	150%	80%	33%	33%	25%	20%
Wearable fitness device	41%	42%	36%	20%	17%	14%	15%
Other wearable devices	67%	40%	43%	20%	25%	13%	18%
Total	**62%**	**59%**	**47%**	**25%**	**22%**	**18%**	**17%**
Shipment breakdown							
Smart Glasses	1%	4%	5%	6%	7%	7%	8%
Smartwatch	12%	19%	24%	25%	28%	29%	30%
Wearable fitness device	80%	71%	66%	63%	60%	58%	58%
Other wearable devices	6%	5%	5%	5%	5%	5%	5%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Industry data, Deutsche Bank estimates

Figure 30: The major beneficiaries of wearable device in the Asian tech sector

Beneficiaries of Wearable Device	Largan (3008.TW), AAC (2018.HK), Catcher (2474.TW), Hon Hai (2317.TW), Quanta (2382.TW), Sony (6758.T), Murata Manufacturing (6981.T), Taiyo Yuden (6976.T), TDK (6762.T), Alps Electric (6770.T), Desay (000049.SZ), Goertek (002241.SZ), USI (601231.SS), Janus (300083.SZ), Everwin (200115.SZ)

Source: Deutsche Bank

Smartwatch

Many vendors have introduced smartwatches, with limited differentiation. However, we believe Apple Pay support for its Apple Watch will be a killer application to drive demand for Apple Watch. In addition, Apple gives consumers flexibility. Contrary to the typical "single model/single size/a few color options" product strategy, Apple Watch comes in two sizes (for men and women), three designs (classic, sport and premium) and six watch straps (of different materials). Consumers can also personalize the home screen (which is not possible on iPhone/iPad). A watch is more personal than a smartphone. We believe consumers will highly appreciate this change. Samsung and Sony are very aggressive in this market too. However, we believe more functionality innovation and improved battery life will be crucial for demand in the long run.

Figure 31: Comparison of smartwatches

Developer	Apple			Samsung				
Name	Apple Watch	Apple Watch Sport	Apple Watch Edition	Galaxy Gear	Gear 2	Gear 2 Neo	Gear live	Gear S
Price (US$)	From 345	From 345	From 345	170	299	199	199	N.A.
Release date	Early 2015	Early 2015	Early 2015	Sep-13	Apr-14	Apr-14	Jun-14	Oct-14
Wifi	Yes	Yes	Yes	No	Yes	Yes	No	N.A.
Connectivity	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	N.A.
Battery **Battery life**	750 mAh 350 hours	750 mAh 350 hours	750 mAh 350 hours	Li-ion 315mAh n.a	Li-ion 300mAh 2-3 days	Li-ion 300mAh 2-3 days	Li-ion 300 mAh 1 day	48 hours
CPU	S1	M7 Single-core 700 MHz	M7	Single-core 800 MHz ARM	Dual-Core 1.1GHz	Dual-Core	Single-core 1.2 GHz	N.A.
NFC	Yes	Yes	Yes	Yes	Yes	Yes	N.A.	N.A.
Camera	1.2 MP	1.2 MP	1.2 MP	1.9 MP	2 MP, BSI, 720p video recording	No	No	N.A.
Picture								

Source: Company data, Deutsche Bank

Figure 32: Comparison of smartwatches

Developer	Sony			Qualcomm	Pebble	
Name	SmartWatch	SmartWatch 2	SmartWatch 3	Toq Smartwatch	Pebble	Pebble steel
Price (US$)	228	200	N.A.	250	149	249
Release date	Apr-12	Sep-13	Coming soon	Dec-13	Jan-13	Jan-14
Wifi	No	No	N.A.	Yes	N.A.	N.A.
Connectivity	Bluetooth 3.0	Bluetooth 3.0	N.A.	Bluetooth 3.0	Bluetooth 4.0	Bluetooth 4.0
Battery **Battery life**	3-4 days	3-4 days	420 mAh	N.A.	5-7 days	5-7 days
CPU	N.A.	N.A.	1.2HZ Quad-coreARM Cortex A7	N.A.	STM32F205RE Cortex M3 CPU	Single-core 120 MHz
NFC	N.A.	Yes	N.A.	N.A.	N.A.	N.A.
Camera	N.A.	No	N.A.	No	No	No
Picture						

Source: Company data, Deutsche Bank

Wearable fitness devices

The major functions for wearable fitness devices are healthcare, sports and activity tracking. Smart wristband is the mainstream product in the wearable fitness device market. However, the specs of each brand are similar. We believe wearable fitness devices have the largest share of the wearable device market due to relatively low prices, and simple functions.

Figure 33: Comparison of wearable fitness devices

Developer	Samsung	Sony		Garmin	LG	Nike	Huawei	Xiaomi
Name	Gear fit	Sony Smartband SWR10	SmartBand Talk	Vivofit	LG FITNESS BAND	Nike + Fuelband SE	TalkBand B1	MiUI Band
Price (US$)	200	90	N.A.	130	150	99	145	13
Release date	Apr-14	May-14	Coming soon	Apr-14	May-14	Oct-14	Mar-14	Jul-14
Wifi	N.A.	Yes	Yes	N.A.	N.A.	N.A.	N.A.	N.A.
Connectivity	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 3.0	Bluetooth 4.0
Battery Battery life	Li-ion 210mAh 3-4 days	5 days	N.A.	> 1 year	2-3 days	4 days	Li-ion 90mAh 6 days	30 days
Picture								

Source: Company data, Deutsche Bank

Smartglasses

Google is the first vendor to release this wearable technology. Google Glass is the most unique pair of smartglasses currently, in our view. Google Glass offers a lot of features, including email and text messaging with built in alerts, Google maps, translation tools, and photo and video capturing and sharing. However, the price of most versions is US$1,890-1,940. We thus don't expect smartglasses to become a mainstream product in the wearable device market. Many brands are promising to release smartglasses in the near future. However, the smartglass industry is still in the early stages. Google Glass is in the beta phase and is taking the lead in smartglasses technology.

Figure 34: Comparison of smartglasses

Developer	Google				Baidu	lenovo
Name	Google Glass Classic Shades	Google Glass XE Explorer Edition	Google Glass Explorer Edition XE V2	Google glass 3	Baidu Eye	M100
Price (US$)	329	1890	1940	1940	N.A.	1300
Release date	Apr-14	N.A.	N.A.	N.A.	Coming soon	Jun-14
Wifi	Yes	Yes	Yes	Yes	N.A.	Yes
Connectivity	Bluetooth	Bluetooth	Bluetooth	Bluetooth	N.A.	Bluetooth
Battery Battery life	2.1 Wh	N.A.	N.A.	N.A.	12 hours	N.A.
CPU	OMAP 4430 SoC, dual-core	N.A.	N.A.	N.A.	N.A.	N.A.
Picture						

Source: Company data, Deutsche Bank

The foundry sector

The major requirement of ICs for wearable devices is wireless ICs, low-power/cost application processors, microcontroller ICs, and MEMS sensors. Power consumption efficiency is very important for wearable devices.

Figure 35: Semiconductor supply chain for wearable devices (chip vendors and foundries)

Chips	Semiconductor ASP (US$)	Major chip vendors	Major foundries
Application processor	3.0-15.0	Intel, Texas Instruments, MediaTek, Marvell	TSMC, UMC, Samsung, GlobalFoundries
Microcontroller	1.0	Freescale, Texas Instruments	TSMC, UMC, Samsung, GlobalFoundries
WiFi	1.0	Broadcom, MediaTek	TSMC, UMC, Samsung, GlobalFoundries
Bluetooth	0.8	Broadcom, MediaTek	TSMC, UMC, Samsung, GlobalFoundries
Power Management IC	1.0	Atmel, Texas Instruments	TSMC, UMC, Samsung, Vanguard
TFT driver IC	0.5	Novatek, Himax, Orise	TSMC, UMC, Vanguard
RGB Interface Serializer	1.0	National Semiconductor	TSMC, UMC
Audio Codec	1.0	Cirrus Logic	TSMC, UMC
MEMS sensor	1.0	Texas Instruments, STM, Maxim	TSMC, UMC, Samsung, GlobalFoundries
GPS	1.0	Broadcom, NXP, Texas Instruments	TSMC, UMC, Samsung, GlobalFoundries

Source: Industry data, Deutsche Bank estimates

We estimate wearable devices will account for only 1.7%/2.2% of TSMC's sales and 1.5%/2.1% of UMC's sales in 2015/16, respectively, making the sales contribution limited. This is attributable to relatively low shipments and dollar content per box for wearable devices.

Figure 36: We expect wearable devices to account for 1-2% of TSMC's and UMC's sales in 2015-16

	2013	2014E	2015E	2016E
Global shipments of wearable devices (units m)				
Smart Glasses	-	1	5	10
Smartwatch	1	10	25	45
Wearable fitness device	46	65	92	125
Other wearable devices	3	5	7	10
Total	50	81	129	190
Dollar content per box for foundry per device (US$)				
Smart Glasses	10.1	9.8	9.5	9.2
Smartwatch	7.5	7.2	7.0	6.8
Wearable fitness device	5.2	5.1	4.9	4.8
Other wearable devices	6.6	6.4	6.2	6.0
Blended dollar content per box of wearable device for foundry	**5.3**	**5.5**	**5.6**	**5.5**
Foundry revenue for wearable devices (US$m)				
Smart Glasses	0	9	48	92
Smartwatch	7	72	175	306
Wearable fitness device	240	328	451	594
Other wearable devices	20	32	43	60
Total	**266**	**441**	**717**	**1,053**
Growth rate of foundry revenue for wearable devices (%)	**44%**	**66%**	**62%**	**47%**
Market share of TSMC and UMC for wearable devices				
Market share for TSMC	60%	62%	65%	68%
Market share for UMC	10%	10%	10%	10%
Wearable device sales portion for TSMC and UMC				
TSMC	**0.8%**	**1.1%**	**1.7%**	**2.2%**
UMC	**0.6%**	**0.9%**	**1.5%**	**2.1%**

Source: Deutsche Bank estimates, Company data

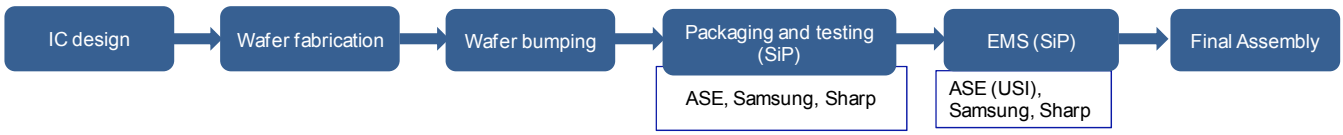
Rising demand for SiP in the OSAT sector

We expect the uptake of wearable devices to drive up demand for SiP (system in package) technology. The advantages of SiP include chip integration, mobility, low power consumption, and competitive costs. This technology is suitable for wearable devices given their small form factor and long usage time.

ASE a beneficiary due to its strength in SiP technology

SiP module requires the integrated manufacturing of packaging/testing and EMS (electronic manufacturing services) in one plant. It benefits from a better yield rate and lower cost than having different vendors for packaging/testing and EMS. Only ASE and IDMs (Samsung and Sharp) have the capability to provide this type of SiP modules. ASE appears well positioned to offer integrated solutions for packaging/testing and EMS. ASE's strengths in SiP are its technology leadership, industrial partnerships, and turnkey system design and business integration.

Figure 37: ASE has capability to provide SiP module due to its integrated manufacturing of packaging/testing and EMS



Source: Deutsche Bank

We estimate wearable devices will account for 1.6%/0.9%/0.5% and 3.0%/1.4%/0.9% of ASE's/SPIL's/Powertech's sales in 2015-16, respectively.

Figure 38: We expect wearable devices to account for 1-3% of ASE's, SPIL's, and Powertech's sales in 2015-16

	2013	2014E	2015E	2016E
Dollar content per box for OSAT companies (US$)				
Smart Glasses	5.0	5.9	6.7	7.4
Smartwatch	3.7	4.3	4.9	5.4
Wearable fitness device	2.6	3.0	3.4	3.8
Other wearable devices	3.3	3.8	4.3	4.8
Blended dollar content per box of wearable device for OSAT companies	**2.7**	**3.3**	**3.9**	**4.4**
OSAT companies' revenue for wearable devices (US$m)				
Smart Glasses	-	5	33	74
Smartwatch	3	43	123	245
Wearable fitness device	120	197	316	475
Other wearable devices	10	19	30	48
Total	133	265	502	842
Growth rate of OSAT companies revenue for wearable devices (%)	**44%**	**99%**	**90%**	**68%**
Market share of ASE and SPIL for wearable devices				
Market share for ASE	15%	21%	29%	35%
Market share for SPIL	5%	5%	5%	5%
Market share for Powertech	2%	2%	2%	2%
Wearable device sales portion for ASE and SPIL				
ASE	**0.3%**	**0.7%**	**1.6%**	**3.0%**
SPIL	**0.3%**	**0.5%**	**0.9%**	**1.4%**
Powertech	**0.2%**	**0.3%**	**0.5%**	**0.9%**

Source: Deutsche Bank estimates, Industry data

Substrate/PCB vendors

We expect wearable devices to account for 2.5%/4.0% of Kinsus' sales and 0.7%/1.2% of Unimicron's sales in 2015/16, respectively. The sales contribution for Kinsus and Unimicron is limited due to relatively low shipments and dollar content per box for wearable devices.

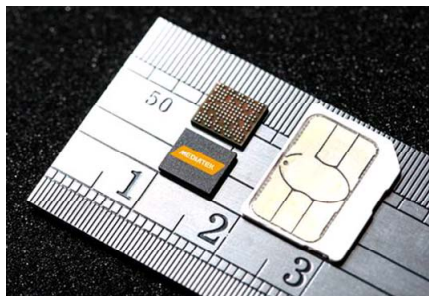
Taiwan fabless sector

Key IC components used for wearable devices include application processor (AP), MCU, wireless chips, LCD driver IC (where there is a display panel for the device), sensor ICs, and power management ICs (similar to for IoT devices). As a result, wearable devices are also a long-term growing opportunity for Taiwan's fables companies.

MediaTek

MediaTek introduced Aster SOC at Computex earlier this year, which consists of an MCU, Bluetooth, touch screen controller, memory chips and input/output interfaces. Mass production of this chip began in 3Q14. MediaTek's Aster SOC was developed based on its smartphone-like feature phone products, which were once a key product before the smartphone market took off. As most wearable devices don't require high computing performance but low power consumption is critical to give the device sufficient operating time (at least a week), conventional smartphone architecture isn't a good fit whereas a simpler feature phone architecture seems better suited to meeting the requirements of wearable devices.

Figure 39: MediaTek Aster Chip



Source: Deutsche Bank, company data

MediaTek aims to continue to improve its competitive edge by offering a complete platform of chips, software, firmware, and reference designs. MediaTek partners with Red Bend to deliver over-the air (FOTA) software as a Service (SaaS), designed to update wearable devices. When the smartphones connect Aster-based wearable devices, the outdated applications will be replaced by the updated versions automatically. FOTA provides the Aster-based portable devices with the latest firmware through over-the-air updates via the wireless links between phones, tablets, and wearable devices.

Realtek

Realtek could benefit from its WiFi or Bluetooth products as these are two widely used short-distance connectivity technologies. However, the increasing integration of connectivity chips into CPU/MCU platforms by MediaTek and US fabless could cap the potential for discrete connectivity chip vendors like Realtek.

Himax

Himax is famous for its early initiatives in LOCS mini projector technology. The company has spent tremendous early efforts in product development. Its LCOS solution has been adopted by Google Glasses as well as several other smartglasses customers. We view Himax's technology as competitive with high entry barriers, but it may take time for the volume to grow rapidly and consistently as smartglasses remain niche and expensive products for most consumers. Also, how soon the ecosystem can be developed into a more open and mature stage remains to be seen.

PixArt

PixArt has entered the wearable devices market via its first product, PAH8001, a heart rate monitor IC based on CMOS sensor technology. This product integrates a unique CMOS image sensor with an LED in a single package. It uses a photoplethymogram (PPG) technique to measure the pulse. The output data can be used to monitor heat rates and measure body stress levels. PixArt believes this product offers the industry's smallest form factor with low power consumption and excellent accuracy. We note that there are so far 20-30 customers in Asia designing their devices based on PixArt's PAH8001, suggesting positive market feedback on this product. Initial shipments have started in 3Q14 while PixArt expects more volume to come in 2015, when more customers enter mass production. So far shipments per model looks small as customers remain in the early stage of contemplating how to position and market their products well to attract consumer demand. PixArt is also developing other CMOS image sensor-based products for wearable devices.

Elan

Elan provides MCU and touch controller IC for smartwatches and smartglasses. Sony is one of its customers for wearable devices in 2014. Meanwhile, Elan has been working with other customers in Asia. Currently, revenue from wearable devices remains insignificant. Elan hopes to benefit more from growing wearable devices demand in the long term.

Figure 40: WW major chip suppliers for wearable devices

Company	Product Line
MediaTek	AP (MT2502, world's smallest SOC, high efficiency and low power consumption) BT, WiFi (MT5931), and GPS (MT3332)
Realtek	Ameba, WiFi (connectivity of 802.11ac) micro-module solution applied in end-products like intelligent socket, intelligent home appliances, security monitoring, environment sensor…
Elan	MCU (applications: wireless charger, power bank, glucose meter, security monitoring…)
	Touch panel controller
	Two types of fingerprint ICs based on 1) optical or 2) capacitive IC designs; Elan partners with Startek on Algorithm to provide total solutions.
PixArt	Heart rate monitor sensor, MediaTek is a key local partner of PixArt based on its Aster SOC.
Richtek	Collaborating with Dialog to develop MEMS, applied in smoke sensor, central air-conditioner…
Himax	LCOS (Google is the anchor customer in smartglasses, among many other customers)
Holtek	MCU
TI	AP, MCU, Sensor, BT, WiFi, DLP, Wireless Charger, Power Management
Broadcom	WiFi, BT, GPS, NFC, AP
Silicon Labs	MCU, Sensor (temperature, humidity, UV)
ST	MCU, Sensor
Freescale	MCU, Sensor, Sensor Hub
Rohm	MCU, Sensor, BT
Microchip	MCU, BT, Storage, Touch, Gesture Recognition
Atmel	MCU, Touch, IR, RFID, WiFi
Intel	Quark processor based on Edison platform
RDA	AP, BT, WiFi, GPS
Nordic	BT, ANT+ULP
Bosch	MEMS
InvenSense	MEMS

Source: Deutsche Bank, company data

Memory sector

Wearable device impact on memory to be fairly limited

While wearable devices may be a new, fast-growing segment within IoT, the overall revenue impact may be minimal, in our view. We expect the two main drivers of wearable devices to be 1) smartwatches and 2) wearable fitness devices. We forecast smartwatch shipments to reach 45mn by 2016 (three-year CAGR of 268%), while wearable fitness device shipments could reach 125mn (three-year CAGR of 40%). Our smartwatch shipment forecast implies that the attachment rate per smartphone may only reach 3.5% by 2016.

Samsung launched the first smartwatch device in 2009. Currently, total wearable device shipments (Galaxy Gear, Galaxy Fit) are around 1mn units per quarter, which implies a wearable device attachment rate per smartphone of still only about 1.2%.

In addition, these devices use substantially less memory than existing smartphones/tablets and hence the overall impact on the memory market should be limited. Recent smartwatches use about 256MB-512MB of DRAM and 4GB-32GB of NAND, while wearable fitness devices use only about 128MB of DRAM. As a result, we estimate that wearable-related memory sales may only account for about 0.7%/0.9% of Samsung revenues in 2015/2016 and 1.7%/2.3% of SK Hynix sales.

Figure 41: Korean memory companies' exposure to wearable devices

Wearable	2013	2014E	2015E	2016E
Samsung Electronics	-	-	-	-
Wearable sets	0.1%	0.4%	0.5%	0.6%
Wearable DRAM	0.1%	0.1%	0.1%	0.2%
Wearable NAND	0.0%	0.1%	0.1%	0.1%
Total sales contribution of wearable for Samsung	**0.2%**	**0.6%**	**0.7%**	**0.9%**
SK Hynix	-	-	-	-
Wearable DRAM	0.5%	0.7%	1.0%	1.4%
Wearable NAND	0.5%	0.6%	0.7%	0.9%
Total sales contribution of wearable for SK Hynix	**1.0%**	**1.3%**	**1.7%**	**2.3%**

Source: Deutsche Bank estimates, Company data

Component sector

Smartphone + wearable devices = more synergy ahead in hardware

A large portion of wearable devices are designed to work with smartphones or tablets. By connecting these gadgets with mobile devices, users can perform tasks such as answering phone calls and controlling smartphones through voice recognition functions (i.e., Siri). We have seen rising 1) voice recognition, 2) slim and fashionable product design, and 3) indoor positioning service requirements in wearable devices. As such, we believe component makers such as Largan (3008 TT, Buy), Catcher (2474 TT, Buy), and AAC Tech (2038 HK, Hold) are set to benefit from the trend.

AAC – Benefiting from the proliferation of MEMS microphone

By connecting with smartphones via Bluetooth, wearable devices are capable of answering phone calls. We highlight that once a user picks up a call via a wearable device, the distance between their month and the device's microphone can be as much as 15-20 cm, vs. only 2-3 cm when using a

smartphone. To reduce the noise in the background, we expect most wearable devices to adopt dual MEMS microphones for noise cancellation. MEMS microphone's smaller form factor and less power hungry characteristics also meet the requirements of wearable devices perfectly. While MEMS microphone carries a higher ASP of around US$0.5 vs. a traditional ECM microphone of only US$0.1, we view AAC as the major beneficiary of the ASP hike given its technology and capacity advantages.

Largan - Accelerating penetration of array camera

Google is keen to get eyes indoors these days with continued expansion of its mapping of indoor locations with street view cameras. The service claims to be able to locate a user when they're indoors. The service relies on existing wearable devices' hardware, such as camera and sensors, to power its location pinpointing mechanism. We believe the rising indoor positioning service will accelerate the penetration rate of array camera, which provides precise and in-depth location information. However, due to a low yield rate of lens manufacturing for array module, only lens makers with technology strength are set to benefit. Therefore, we think the accelerating penetration of array camera will further extend Largan's lead over peers as it is one of the few players with plastic lens based array camera technology and capacity.

Catcher – Complex product design to boost MIM technology demand

Current wearable devices are viewed as a symbol of leading fashion trends, so slim and complex product design is starting to become an important differentiating factor. We have seen the rising adoption of metal casing in high-end wearable devices (especially smartwatch), which could accordingly trigger demand for metal-injection technology (MIM). MIM is the best way to produce small components that require complex shapes and high precision with lower manufacturing costs. As such, we expect Catcher to benefit from rising MIM orders given its technical know-how and yield advantage. Despite the tiny sales contribution from wearable devices in the initial stage, we think the rising MIM orders will boost the company's utilization rate in the slower season and mitigate market concerns on its high sales exposure to traditional portable devices (notebook, handset, and tablet).

High ASP but low scale for Korean component makers

In theory, SEMCO could benefit from growing wearable device demand as we estimate it generates north of US$20/unit in the Galaxy Gear products, largely thanks to the high ASP for rigid-flex PCB, camera and WiFi module. However, due to the segment's low scale, its contribution to overall sales and earnings is likely to remain small.

Figure 42: Estimated BOM for wearable devices

Component	US$
Passive component	3
Rigid-flex PCB	7
FC CSP	2
WiFi module	8
Camera module	3
Total	**23**

Source: Deutsche Bank estimates

SEMCO – component provider for Samsung Electronics' wearable devices

SEMCO is a leading component provider for Samsung Electronics' wearable devices. Its estimated BOM in wearable devices is north of US$20 as it supplies passive components (MLCC, EMC), rigid-flex PCBs, package substrate (FC-CSP), camera and WiFi module. While profitability for wearable could be substantial, the contribution to overall profit should remain small given the small volumes forecast for Samsung Electronics' wearable devices.

Figure 43: SEMCO's exposure to wearable devices

	2013	2014E	2015E	2016E
Sales contribution of wearable devices for SEMCO	0.0%	1.4%	1.8%	2.3%

Source: Deutsche Bank estimates, Company data

Samsung SDI – minimal exposure to wearable devices

Samsung SDI has minimal exposure to IoT apart from providing polymer-type small cell rechargeable batteries for wearables. The estimated ASP for a 300mAh cell can reach US$2.5, which is materially higher on density basis than an estimated US$3.3 for the 2.2Ah prismatic battery that goes into a smartphone, due to design complexity. However, given the relatively small volume expected at Samsung Electronics, the contribution to consolidated revenue is negligible.

Figure 44: Samsung SDI's exposure to wearable devices

	2013	2014E	2015E	2016E
Sales contribution of Internet of Things for Samsung SDI	0.0%	0.2%	0.2%	0.2%

Source: Deutsche Bank estimates, Company data

FPCB vendors will be beneficiaries

More FPCBs (flexible printed circuit board) are adopted in wearable devices due to the requirements of better form factors in terms of weight, thickness and flexibility. A FPCB is composed of many thin metal lines, which can transmit a large stream of data. FPCBs have the advantages of being small (a FPCB is only 10-15% of a rigid PCB's size), light weight (10-15% of a rigid PCB's weight) and flexible and have a high line density. These factors make FPCBs suitable for small and thin wearable devices. We expect Apple Watch to become a mainstream product in the wearable device market.

The current major FPCB suppliers for Apple Watch are Career Tech and Nippon Mektron in 2014. However, we expect Zhen Ding Tech to become one of the major suppliers in 2015 due to its technology/cost advantages and good relationship with Apple. We estimate wearable device, including Apple Watch, will account for 1.1% of Zhen Ding Tech's sales in 2015 and 2.1% in 2016. We don't expect Flexium to enter the supply chain for Apple Watch due to its technology weakness and scale limitation. However, we anticipate Flexium will obtain some orders from non-Apple smartwatches. We estimate wearable devices will account for 0.5% of Flexium's sales in 2015 and 1.2% in 2016.

EMS/ODM/OEM sectors

Hon Hai – a new driver for business growth

We believe Hon Hai's wider investment and cost advantages in components from mechanical, wireless, optical and thermal parts and modules can easily help its expansion of business scope to wearable device market easily. While we believe Hon Hai would be one of the major assembly suppliers for Apple Watch in 2015, FIH Mobile, its 73-owned subsidiary, would help the group to penetrate into non-Apple camp gradually. We forecast Hon Hai's revenue contribution from wearable device business to come in at 3% in 2016, and Apple's success in the market will be the key upsides for its business momentum going forward.

Quanta – robust growth from Apple Watch

Apple reported that it would launch its first Smart wearable device, called Apple Watch, from 1Q15. As one of the major component and assembly suppliers for Apple Watch, we forecast its revenue contribution from this new product to come in at 4% in 2016, which can help ease the street's concerns about its slowing iPad touch shipments (2% sales contribution currently). We also expect Quanta to duplicate its success in vertical integration for NB business to grow component sales from metal casing and wireless modules, helping lift its margins and earnings momentum going forward.

Limited exposure to wearable devices for Korea OEMs

We believe wearable devices will have a minimal impact on LGE and Samsung Electronics. LGE has recently launched wearable devices such as LG G Watch. However, we estimate 1m shipment at best in 2014 and perhaps 2m by 2016. The contribution to overall revenue could be negligible in 2016 due to our conservative assumption of shipments. Likewise, we anticipate limited volume for Samsung Electronics in the range of 4m for 2014, possibly growing to 9m by 2016.

Sony – own brand for smartwatch and smartband

Sony has introduced many products, like Sony SmartWatch and Sony Smartband, in the wearable device market. Sony is one of the pioneers in smartwatch market, but their sales volume is assumed to be less than 3 million units per year, compared to Apple Watch to be expected to sell at least 10 million units at its launch in 2015. Sony's SmartWatch and Smartband have been sold as accessories of smartphones, but Sony's smartphone sales volumes is around 40 million units per year, less than 15% of Samsung's smartphones, which makes them difficult to lead the hardware market, though they have many competitive items in the contents side like music or game software.

IoT to drive server demand

We believe IoT infrastructure will be based on the current cloud architecture. Once IoT connects more objects, machines and networks for global cloud-based services, data will be routed through a server for applications and data analysis. This could enable more effective integration of labor, capital, and technology. Thus, the uptake of IoT should lead to growing demand for data analysis and storage in servers and continue to drive demand for servers in 2015-20. Figure 45 lists the major beneficiaries of server and data-center cloud in the Asian tech sector. We classify them into three categories including 1) assembly and brand, 2) memory and storage and 3) power, thermal module, controller and others.

Figure 45: Key beneficiaries of server and data-center cloud in the Asian tech sector

Beneficiaries of Server/Data-Center Cloud	**Assembly/Brand**: Hon Hai (2317.TW), Quanta (2382.TW), Inventec (2356.TW), MiTac (2315.TW), Wistron (3231.TW), Gigabyte (2376.TW), Acer (2353.TW), Syscom (2453.TW), Lenovo (0992.HK)
	Memory and Storage: Samsung Electronics (005930.KS), SK Hynix (000660.KS), Toshiba (6502.T)
	Power /Thermal Module/Controller/Others: Delta (2308.TW), CCIC (6230.TW), Auras (3324.TW), Kingslide (2059.TW), Promise (3057.TW), Aspeed (5274.TW), Zippy (2420.TW), Acbel (6282.TW), SEMCO (009150.KS)

Source: Deutsche Bank

The uptake of ARM-based server CPU could benefit TSMC, ASE, and SPIL

We expect the server CPU total addressable market (TAM) for the foundry sector to reach US$4.6bn in 2018 (a 3% sales CAGR in 2014-18; Figure 47). ARM's management projects its market share in the global server market to reach 7% in 2016. More CPU vendors are adopting ARM-based solutions, including AMD, Applied Micro, Broadcom, Cavium, etc. The uptake of ARM-based server CPU will expand the server CPU TAM for the foundry sector as Intel, the current dominant vendor, manufactures its own server CPUs. We expect server CPU vendors to launch ARM 64-bit server CPUs for low-end servers in 2015-16. These solutions will be based on ARM's Cortex A53 and A57 CPU architecture and produced by TSMC's 20nm/16nm processes in 2015-16. ARM-based CPUs can reduce the purchase and utility cost of servers. We believe this will enable TSMC to gain dollar content of semiconductor manufacturing in 2015-16. We don't expect UMC to benefit from the uptake of ARM-based server CPU given its weakness in advanced nodes.

Figure 46: Server-related vendors' comments and projects for ARM-based servers

Company	ARM-based server CPU project and announced products
Dell	- Dell began shipping ARM-based servers "Copper" to selective customers in May 2012, each Copper sled is powered by a 1.6 GHz quad-core Marvell Armada XP 32-bit ARM-based server CPUs. - Dell donated the "Zinc" ARM-based server concept running Calxeda EnergyCore technology to the Apache Software Foundation (ASF) in October 2012. - Dell unveiled a new server prototype "Iron", the 64-bit ARM-based servers in partnership with **Applied Micro** for the hyperscale data center market in January 2013 - Dell introduced a proof-of-concept 64-bit ARM server based on Applied Micro's X-Gene 64-bit ARM technology in February, 2014.
HP	- HP added a 34-bit and 64-bit ARM chip as one of the options for Moonshot in September 2014; **HP is the first big vendor that's selling ARM-based server as a standard product. HP's new Moonshot server could deliver up to 35% lower total cost of ownership (TCO) for scale-out web tier/caching environments compared to traditional servers** - HP's 64-bit ARM-based Moonshot server adopts **Applied Micro**'s ARM-based X-Gene system-on-chip. - HP's 32-bit ARM-based Moonshot server uses **Texas Instruments**' Keystone chip.
Linaro Enterprise Group	- The company has been well positioned to provide advance software standards for ARM-based server CPU ecosystem from 2013
Oracle	**- Oracle stated that it will focus on Sparc and Intel processors for the time being and will not adopt ARM servers initially** **- Oracle's Java fully supports ARM servers; Java apps are available for running on ARM-based servers**
Red Hat	- Red Hat is preparing for 64-bit ARM servers, but hasn't announced when it would release a version of Red Hat Enterprise Linux for ARM

Source: Company data, Deutsche Bank

We expect ASE and SPIL to benefit from the rising penetration of ARM-based server CPUs in 2015-16, thanks to their strength in flip-chip packaging/testing. However, the sales contribution could be limited for TSMC, ASE and SPIL as we assume a low market share for these companies in light of system complexity in servers (Figure 47). Server makers will have to overcome a lot of compatibility issues once they adopt ARM-based server CPUs.

Figure 47: We expect ARM to obtain a global server CPU market share of 4% in 2015 and 7% in 2016

Server CPU analysis	2013	2014E	2015E	2016E	2017E	2018E
Global server shipments (k units)	8,954	9,326	9,800	10,206	10,639	11,050
Market size of server CPU (US$m)	11,500	12,337	12,723	13,085	13,482	13,782
TAM for foundries (US$m)	**3,833**	**4,112**	**4,241**	**4,362**	**4,494**	**4,594**
Unit market share of ARM-based server CPU	0%	1%	4%	7%	10%	13%
TSMC's unit market share in ARM-based server CPU	90%	90%	90%	90%	90%	90%
TSMC's sales in ARM-based server CPU (US$m)	9	30	122	220	324	430
Sales contribution for TSMC (%)	**0.0%**	**0.1%**	**0.5%**	**0.7%**	**0.9%**	**1.1%**
TAM for OSAT companies (US$m)	**1,917**	**2,056**	**2,121**	**2,181**	**2,247**	**2,297**
ASE's unit market share in ARM-based server CPU	18%	18%	18%	18%	18%	18%
ASE's sales in ARM-based server CPU (US$m)	1	4	15	27	40	54
Sales contribution for ASE (%)	**0.0%**	**0.0%**	**0.2%**	**0.3%**	**0.4%**	**0.5%**
TAM for OSAT companies (US$m)	1,917	2,056	2,121	2,181	2,247	2,297
SPIL's unit market share in ARM-based server CPU	9%	9%	9%	9%	9%	9%
SPIL's sales in ARM-based server CPU (US$m)	1	2	8	14	20	27
Sales contribution for SPIL (%)	**0.0%**	**0.1%**	**0.3%**	**0.5%**	**0.6%**	**0.8%**

Source: IDC, Deutsche Bank estimates

Figure 48: Server CPU vendors' comments on and projects for ARM-based server CPUs

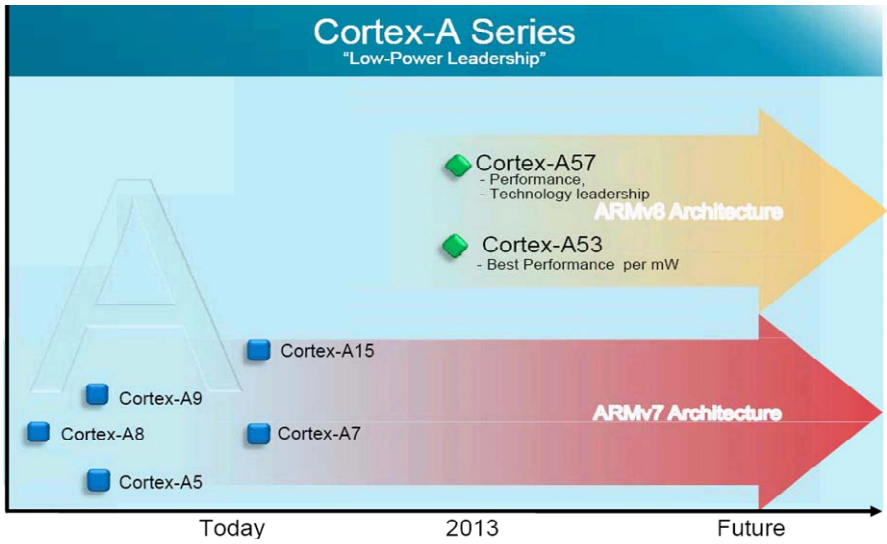
Company	Features of ARM-based server CPU	ARM-based server CPU project and announced products
ARM	- Power savings - Cost savings - Data centers are power-constrained;need more capacity without additional energy costs	- First ARM servers available in H2-2012 (Cortex-A9) - First ARM v8 (64-bit) servers (Cortex-A53, Cortex-A57) in 2014 - **Management expects its global market share to reach 10% in the server CPU market in 2017**
AMD	- Open Source ecosystem - Better compute-per-watt	**- AMD released ARM-based 64-bit server CPU, named "Seattle", in 1Q14 and planned for shipment in 4Q14.** "Seattle" or Opteron A1100 is an 8-core server CPU based on the ARM 64-bit Cortex-A57 core and 28nm manufacturing process, is expected to run at or greater than 2 GHz. **The "Seattle" server CPU is expected to offer 2-4X the performance of AMD's recently announced AMD Opteron X-Series CPU with significant improvement in compute-per-watt.** - AMD will establish **SkyBridge** during 2014 and 2016, combining X86 and ARM which are pin-compatible, targeting at a variety of markets, including APUs. - AMD plans to develop its own ARM chips in house (known as the **K12**) by 2016, based on the architectural license the company will take from ARM.
Applied Micro	- Low-power server chip for cloud computing - Power efficient	- **Applied Micro plans to start to produce the first 64-bit ARMv8 SoC (X-Gene) in partnership with HP and Facebook in 4Q14** X-Gene is based on 8-core Cortex-A57 and 40nm manufacturing process. X-Gene has 4x the density and 50% less power, and is based on ARMv8 64-bit cores running at up to 2.4 Ghz. The performance of its 64-bit ARMv8 SoC (X-Gene) is similar to Intel's E3 Xeons but the power assumption is lower than Intel's. Its ARMv8 SoC (X-Gene) is available to run on Linux, Java, Cloudera, Citrix. **- Applied Micro plans to release the second generation of X-Gene in 2Q14 and start production in late 2015** X-Gene 2 is based on 16-core Cortex-A57 and 28nm manufacturing process. X-Gene 2's operating frequencies is up to 3.0 Ghz.
Broadcom	- Energy efficient	**- Broadcom plans to start to manufacture ARM'S 64-bit Cortex-A50 server CPUs in 2015** The processor will be quad-issue, quad-threaded 64-bit ARMv8-A core based on 16nm FinFET technology. running at 3GHz frequency.
Calxeda	- 15x power/performance improvement; - Lower power consumption	- Calxeda launched EnergyCore ECX-1000 in 2012 which is based on ARM Cortex-A9 32-bit processor, has clock speed of 1.1-1.4GHz, and consumes 1.5 watts of power per core in mid-2012 - The ARM-based chips announced by Calxeda in 2011 with up to 480 cores for low-power servers was used in servers of Boston Ltd. and in Hewlett-Packard's Moonshot system at the end of 2013. - Calxeda's 64-bit ARM chips are in the pipeline and the operation will be shut down due to lack of funds.
Cavium	- Energy efficient	- Cavium introduced Thunder X in June 2014, which has 48 ARMv8 core running at 2.5GHz, and is based on a 28-nanometre process by GlobalFoundries. Cavium will start sampling ThunderX ARM SOCs in 4Q14.
Marvell	MV78460's energy consumption (32-bit, quad-core version of the Armada XP for Baidu) - Totals about 10 watts - Significantly less than Intel's Xeon X86 chips most servers typically used.	- Marvell announced **Armada XP** in November 2010, quad-core chip designed for use in servers. - The world's first commercial deployment of ARM-based server CPU: Marvell announced its customization of the 32-bit Armada XP specifically for Baidu's cloud storage requirements on Feb 25, 2013. - Marvell designed the platform to increase the amount of storage for conventional 2U chassis up to 96 TB, and to lower the total cost of ownership by 25 percent, compared with previous x86-based server solutions - Marvell introduced the **64-bit Armada Mobile PXA 1928** platform in February 2014. The SoC is based on a quad-core, 1.5GHz Cortex A53-based CPU.
Nvidia	- Power efficient - High performance server applications in 2015	- Nvidia's **Tegra K1 (quad-core version)** combines the GPU cores with a 32-bit, quad-core CPU based on the ARM Cortex-A15 design, running at up to 2.3GHz. The quad-core Tegra K1 will be released in 1H14. - Nvidia will introduce **Tegra K1 (Denver)** in 2H14**,** which combines the 192 graphics cores with the custom CPU which is a 64-bit, dual-core part based on the ARMv8 architecture, with the cores running at up to 2.5GHz.
Samsung	- Low-power processor	**- Samsung plans to launch an ARM-based server CPU in 2014**

Source: Company data, Deutsche Bank

Taiwan fabless sector

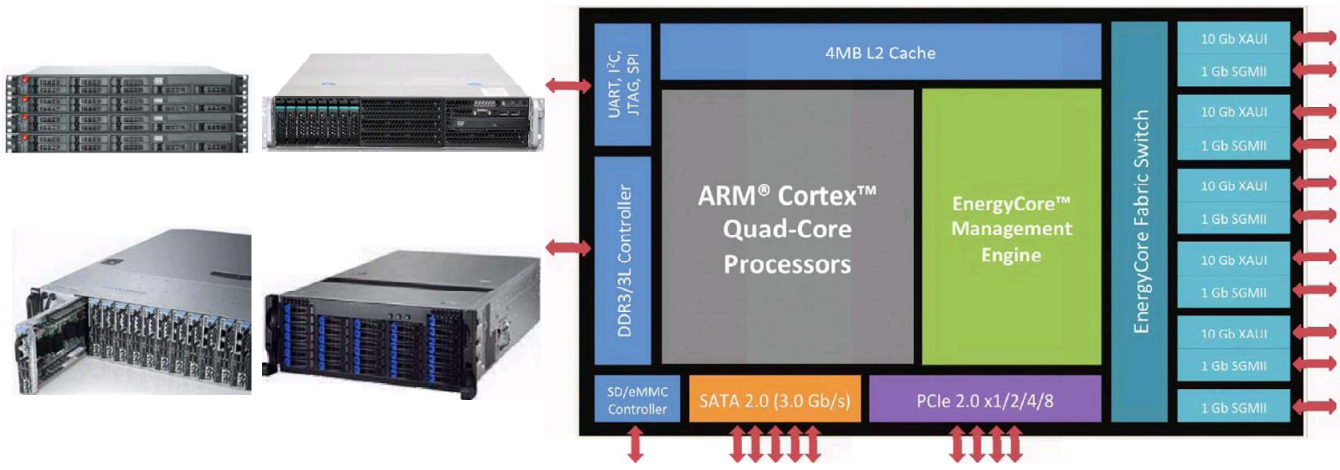
The Taiwan fabless sector has very limited exposure to the server segment so far. As cloud computing advances toward customer-specific solutions, build-ups of servers for data centers are becoming more versatile to meet highly specialized workloads. ARM entered the server space in 2012 with its 32-bit CPU architecture, which was adopted by several chip companies including Calxeda, ST, Marvell, AMD, HiSilicon, Samsung, and Applied Micro. Brands using ARM-based server CPU include HP, Mitac, Dell, Aaeon, Boston Viridis, and ZT Systems. ARM introduced its next generation 64-bit product in 2014, which we view as an important move to the next level. ARM continues to differentiate its products from mainstream Intel x86 CPU through its lower power consumption and more integrated SOC (which reduces the die size).

Figure 49: ARM technology for servers



Source: Deutsche Bank, company data

Figure 50: ARM in servers



Source: Deutsche Bank, company data

MediaTek

We think server could be a potential new opportunity for MediaTek. The company is a seasoned user of ARM CPU architecture. Server, a higher-end application compared to smartphone, therefore seems a good way to leverage its experience and large volume of ARM-based products accumulated over recent years. We believe smartphone will remain MediaTek's focus for the next 1-2 years, especially during the LTE transition, but server business could be a mid- to long-term development.

Memory sector

Server DRAM has the highest leverage to IoT within our memory coverage

The rise in data traffic from IoT should boost the demand for data center servers and DRAM content per server. According to Oracle/Cisco, worldwide data traffic is expected to double every 1.2 years, which implies a 125% annual increase in data traffic handled by data centers. IDC forecasts server shipments will increase at a 5% CAGR over the next three years, while DRAM content per server may rise 26%, which implies that server DRAM may account for 14% of the total DRAM market in 2016, up from 12% in 2013.

Within our memory coverage we believe SK Hynix currently has the highest leverage to growth in server DRAM, which accounted for about 17% of its total revenue in 2013. Server DRAM also accounts for about 22% of Samsung's DRAM revenues in 2013 but only 1% of total company revenues. Our analysis shows that server DRAM may show the highest leverage to the growth in IoT within our memory coverage.

Figure 51: Server DRAM market outlook, 2013-2016E

(MU, Gbyte)	2013	2014E	2015E	2016E	CAGR (%)
Server/workstation shipments (mn)	12	13	14	14	5%
GB/System	45	62	75	89	26%
Server DRAM (GB mn)	552	813	1,031	1,271	32%
Total DRAM	4,640	5,821	7,223	8,899	24%
% of Server/DRAM	12%	14%	14%	14%	

Source: IDC, Deutsche Bank estimates.

Figure 52: Korean memory companies' exposure to server

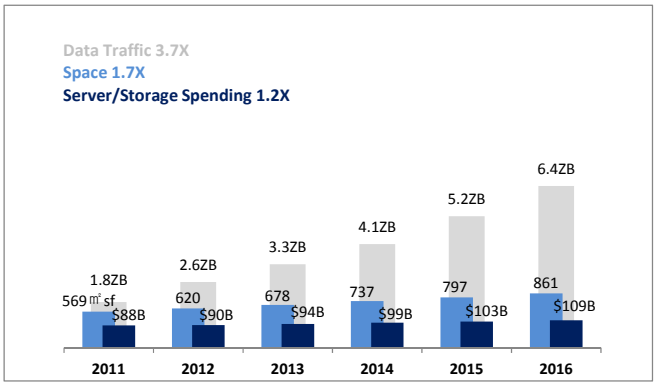
Server	2013	2014E	2015E	2016E
Sales contribution of server DRAM for Samsung	-	-	-	-
Server DRAM as % of DRAM revenue	22%	23%	23%	23%
Server DRAM as % of total revenue	**1%**	**2%**	**2%**	**2%**
Sales contribution of server DRAM for Hynix	-	-	-	-
Server DRAM as % of DRAM revenue	22%	20%	21%	21%
Server DRAM as % of total revenue	**17%**	**16%**	**17%**	**17%**

Source: Deutsche Bank estimates, Industry data

Another growth driver for the server market could be the need for lower power memory solutions to reduce the total cost of ownership. Samsung notes that there has been a wide disparity between future data traffic growth projections and actual data center infrastructure investments. Although data traffic is rising by 3.7x over five years, space and server storage spending is only increasing 1.7x and 1.2x.

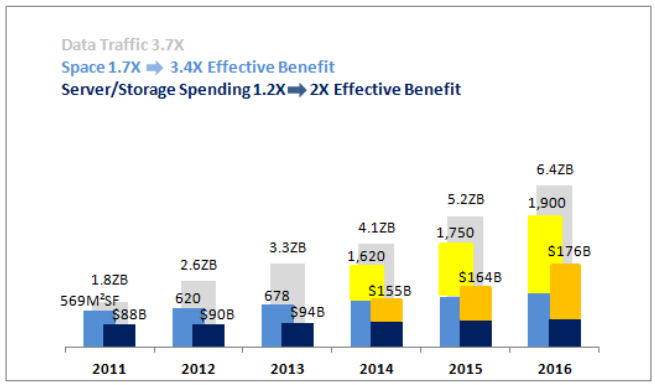
According to Samsung, power-related costs currently make up 31% of total data center costs. The memory and storage power portion (including cooling) is 32% of total data center power. Lower power solutions for server DRAM will be a key to reducing data center costs. TCO savings could result in a 3.4x improvement in space and 2x increase in server/storage.

Figure 53: Data traffic vs. infrastructure spending



Source: Company report

Figure 54: Benefits of low power DRAM



Source: Company report

Component sector

Delta – Warming up to IoT trend

- Rising integrated system orders on IoT trend to trigger cooling demand

  The rapid growth of data on the proliferation of IoT would drive greater demand for higher-density infrastructure and advanced power and cooling technologies. Integrated system and high-density blade implementations are projected to increase as a percentage of server implementations. This will lead to a shift to new cooling technologies to handle the increased heat load. We believe Delta is set to benefit from this trend given its expertise in the design and manufacture of a variety of high quality cooling systems (cooling towers, closed circuit cooling systems, packaged cooling systems, etc).

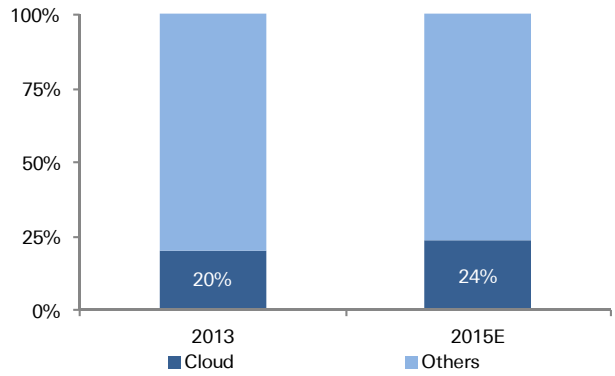
- More than just a component provider

  Due to rising quantities of data that need to be processed and analyzed in real time, many data centers are running out of power, physical space, and cooling capacity, yet they still need to expand their computing capacity. Data centers need to monitor and control the complex interactions of computing capacity and power consumption to achieve higher efficiencies, and Delta's datacenter infrastructure product (InfraSuite) is viewed as the best solution that covers the three major categories: 1) power systems, 2) server racks and accessories, and 3) environment management systems. We see strong incentives for data-center clients to adopt Delta's InfraSuite product thanks to the one-stop-shop solution it provides (clients only need to put their preferred server, storage, and software into InfraSuite).

- The best is yet to come

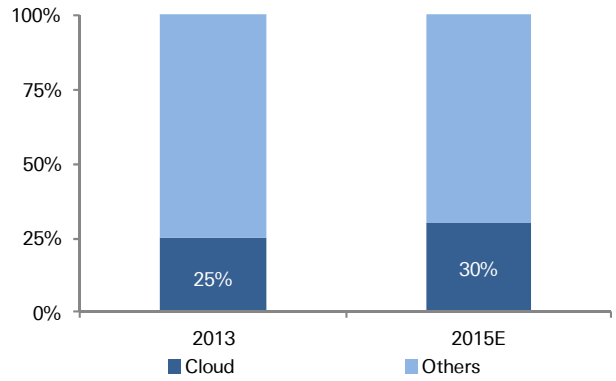
  As a customized datacenter infrastructure solutions provider, we expect the contribution of cloud-related sales to trend up to 24% of total revenue in 2015E vs. 20% in 2013, and the cloud profit contribution to ramp up to 30% of earnings in 2015E. Delta is in the process of transforming from a PC-centric to a cloud-centric play, and we believe this can mitigate market concerns on its sales exposure to the relatively mature PC products. We believe Delta's improving product mix with its shift from low-margin and standardized components to high-value-added products will drive a consensus upgrade. As such, we reiterate Buy on Delta.

Figure 55: Delta's sales contribution from cloud products



Source: Deutsche Bank estimates, Company data

Figure 56: Delta's profit contribution from cloud products



Source: Deutsche Bank estimates, Company data

EMS/ODM/OEM sectors

Key hardware sector beneficiaries of the exciting IoT business

The processing of large quantities of IoT data in real time will increase as a proportion of workloads for data center businesses. The rapidly growing demand for data storage and computing will push data center, app solution and platform vendors to increase their capex and investment in IT infrastructure and networking hardware products, including servers, storage and switches. Therefore, the leading brand and ODM/EMS suppliers, with their higher sales exposure to cloud hardware business (server, switch, and storage), stand to benefit significantly from the trend, in our view. Among the winners in the space, we prefer Lenovo (0992 HK), Hon Hai (2317 TW), Quanta (2382 TW), and Delta (2308 TW).

Servers: the core infrastructure investment for IoT

To support the rising demand for IoT business and offer effective and real-time computing capabilities for the huge data transformation, we expect more leading vendors to upgrade or purchase more server, storage and switch products in the coming years. According to IDC's survey, global server shipments (including x86 servers and Linux-based supercomputers) will rise from 9.3m units in 2014 to 11.1m in 2018E, with the x86 segment the key growth driver (+4.4% CAGR for 2014-2018, Figure 57). The total sector value will increase from US$53.2bn in 2014 to US$56.8bn in 2018 (+3.0% CAGR for x86 server in 2014-2018, Figure 57). We believe IDC's growth assumptions for x86 server shipments and values in coming years are likely too cautious, given 1) the recent rising demand for IoT business and its applications, 2) accelerated e-commerce (internet) sales, and 3) the ongoing replacement and upgrade needs of data center and leading platform (OS) suppliers.

Figure 57: Global server shipment, value and ASP trends

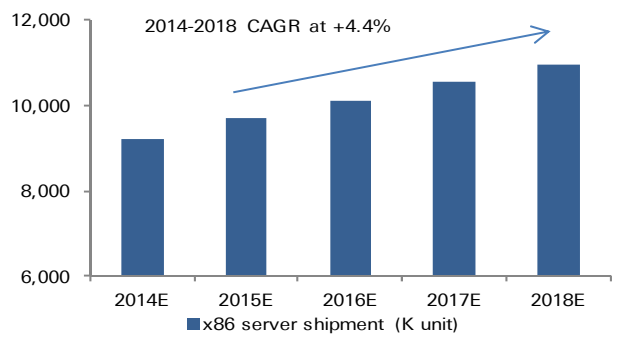
Total server shipment (K units)	2012	2013	2014E	2015E	2016E	2017E	2018E	2014-2018 CAGR %
x86 server shipment (K unit)	8,537	8,846	9,231	9,707	10,116	10,553	10,966	4.4%
Others	136	108	95	93	89	85	83	-3.3%
Total server shipment	**8,673**	**8,954**	**9,326**	**9,800**	**10,206**	**10,639**	**11,050**	**4.3%**
x86 server %	98.4%	98.8%	99.0%	99.1%	99.1%	99.2%	99.2%	

Total server value (US$mn)	2012	2013	2014E	2015E	2016E	2017E	2018E	2014-2018 CAGR %
x86 server value (US$M)	39,293	40,509	42,344	43,823	44,914	46,354	47,638	3.0%
Others	16,691	12,774	10,891	10,312	10,055	9,627	9,127	-4.3%
Total server value	**55,983**	**53,284**	**53,235**	**54,136**	**54,969**	**55,981**	**56,765**	**1.6%**
x86 server %	70.2%	76.0%	79.5%	81.0%	81.7%	82.8%	83.9%	

Server ASP (US$)	2012	2013	2014E	2015E	2016E	2017E	2018E	2014-2018 CAGR %
x86 server ASP (US$)	4,602	4,580	4,587	4,515	4,440	4,392	4,344	-1.4%
Others	122,991	118,207	114,536	111,071	112,410	112,792	109,671	-1.1%
Server ASP	6,455	5,951	5,708	5,524	5,386	5,262	5,137	**-2.6%**

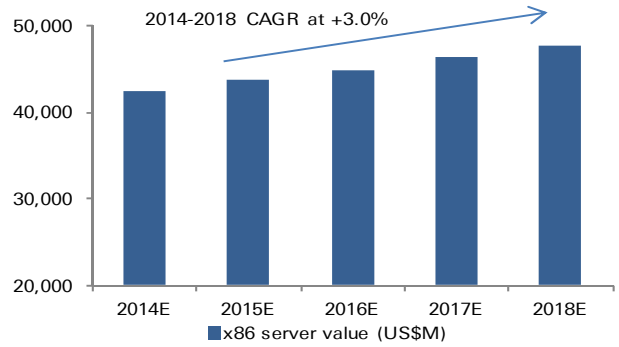
Source: Deutsche Bank, IDC

Figure 58: Global x86 server shipment forecast



Source: Deutsche Bank, IDC

Figure 59: Global x86 server value forecast



Source: Deutsche Bank, IDC

The developed countries – the major consumption region for server currently

We see stable server shipment growth in North America, EMEA and Japan, with their consumption shares at 44%, 23% and 5% in 2Q14, according to Gartner (Figure 61). The solid demand is mainly driven by global leading internet, e-commerce, and mobile device platform suppliers such as Apple, Google, Microsoft, Amazon, Facebook and NTT DoCoMo for their ongoing business expansion in the field. With demand consistently ramping up, the developed countries will continue to lead the server demand going forward.

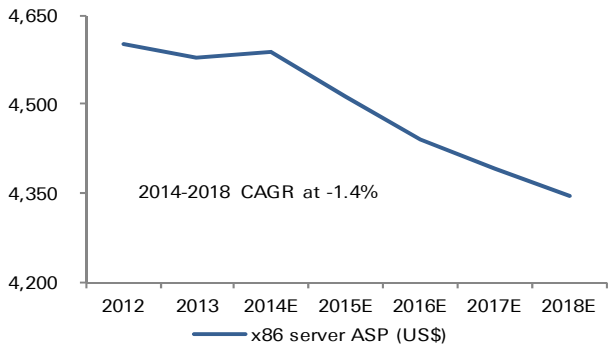
The emerging markets – the key to server business growth

While the developed countries consume more than 65% of total server shipments currently, we believe the robust demand from developing countries such as China, India, Indonesia, Brazil, etc, will be a key driver to support higher sales momentum in the coming years, given their 1) large population, 2) low penetration for server business, 3) rapidly growing investment in data center business, and 4) attractive government incentives/policy for investment in cloud business. Among these countries, China, which accounts for an 18% consumption share of server shipments (Figure 61, Gartner 2Q14), is one of the most important markets, in our view. Apple's cooperation with China Telecom to build its first iCloud data center in China, Hon Hai's strategic alliance with 21Vianet Group, and rising orders from Baidu and Tencent all echo our positive view on the strong demand in China.

Key supply chain beneficiaries in Asia

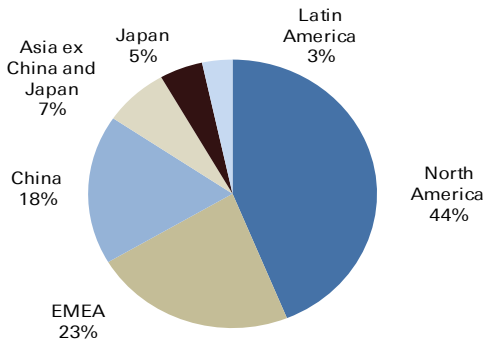
In the brand space, while there is no top-tier home brand for server business (similar to the PC/NB sector) in Europe (Figure 62), we expect some runner-up brands from China (such as Lenovo) to leverage their home market advantage in China to push sales and grow server business in Europe, helping to lift their shipment scale and market share and reduce their cost structure to compete against leading US or Japanese suppliers. Among the server ODM/EMS suppliers, we believe Hon Hai, Quanta and Delta have outstanding design capabilities, efficient assembly operations, and closer relationships with global and/or Chinese brands to support their business growth (vs. other competitors).

Figure 60: Global x86 server ASP forecast



Source: Deutsche Bank, IDC

Figure 61: x86 server shipment by region (2Q14)



Source: Deutsche Bank, Gartner

Figure 62: Top 10 x86 server brand shipments and market shares (2Q14)

Worldwide	shipment	market share
HP	544,306	23%
Dell	487,923	20%
IBM	**179,960**	**7%**
Huawei	84,725	4%
Cisco	70,910	3%
Lenovo	**59,707**	**2%**
Fujitsu	59,644	2%
Inspur	43,200	2%
Sugon	38,200	2%
SGI	31,852	1%
Others	802,718	33%
Total	**2,403,145**	100%
IBM + Lenovo		10%

China	shipment	market share
Dell	91,549	21%
Huawei	72,100	17%
IBM	**48,923**	**11%**
HP	48,500	11%
Lenovo	**45,100**	**10%**
Inspur	43,200	10%
Sugon	38,200	9%
Cisco	1,698	0%
Fujitsu	982	0%
SGI	420	0%
Others	42,147	10%
Total	**432,819**	100%
IBM + Lenovo		22%

North America	shipment	market share
Dell	202,781	19%
HP	167,091	16%
Cisco	45,000	4%
IBM	**27,941**	**3%**
SGI	21,500	2%
Lenovo	**11,300**	**1%**
Fujitsu	903	0%
Huawei	30	0%
Others	577,231	55%
Total	**1,053,777**	100%
IBM + Lenovo		4%

EMEA	shipment	market share
HP	212,500	39%
Dell	120,371	22%
IBM	**49,221**	**9%**
Fujitsu	27,318	5%
Cisco	15,800	3%
SGI	7,000	1%
Huawei	5,870	1%
Lenovo	**2,366**	**0%**
Others	103,764	19%
Total	**544,210**	100%
IBM + Lenovo		9%

Japan	shipment	market share
HP	27,000	23%
Fujitsu	26,600	23%
Dell	13,271	11%
IBM	**6,904**	**6%**
SGI	1,100	1%
Cisco	710	1%
Lenovo	**119**	**0%**
Huawei	80	0%
Others	40,260	35%
Total	**116,044**	100%
IBM + Lenovo		6%

Others	shipment	market share
HP	89,215	35%
Dell	59,951	23%
IBM	**46,971**	18%
Cisco	7,702	3%
Huawei	6,645	3%
Fujitsu	3,841	1%
SGI	1,832	1%
Lenovo	**822**	0%
Others	39,316	15%
Total	**256,295**	100%
IBM + Lenovo		19%

Source: Deutsche Bank, Gartner

Hon Hai – the leading EMS supplier for server

- The strategic alliance with 21Vianet and HP for China data center business

  We are seeing robust demand for data center business in China and believe Hon Hai's new partnership with 21 Vianet Group and HP (the joint venture) since 2014 to grow server, storage and switch orders from small and medium enterprises and system integrators will help boost its revenue and profit momentum in the cloud business. Through the alliance and cooperation, Hon Hai should upgrade its role in the sector from an EMS supplier to an ODM or total solution vendor. We believe this will improve its margins and market share in the server space. Its continuous investment in software and services could also raise the bar for competitors and newcomers.

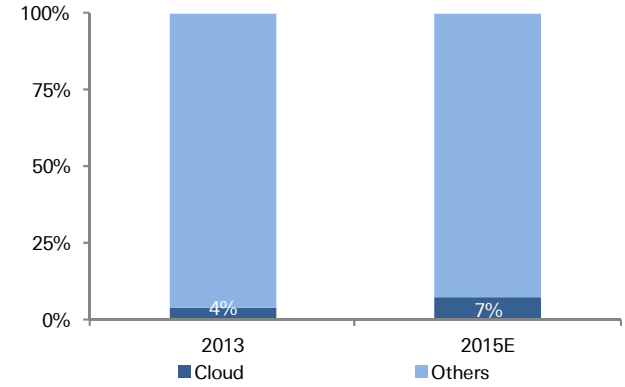
- The expansion into Korean cloud business

  We view Hon Hai's acquisition of 4.9% of SK C&C (the third largest IT services company in South Korea) as a milestone for its overseas market expansion in the server, storage and switches space. Through the deal, Hon Hai can supply its cloud products to SK group and its clients from 2014 and may have a greater opportunity to manufacture smartphone, tablet, LCD TV and networking equipment for SK Telecom (a subsidiary of SK C&C).

- Riding on the exciting cloud business trend, reiterating Buy

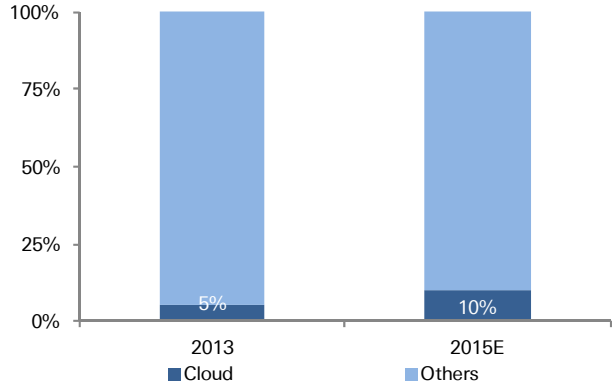
  We expect the cloud business' contribution to Hon Hai's revenue and profit to rise from 4% and 5% in 2013 to 7% and 10% in 2015 (Figures 63 and 64), helped by its alliance with 21Vianet and HP in China, SK group in South Korea and its own 4G telecom operator business (APT/Ambit) in Taiwan. Hon Hai is one of our top picks in the hardware ODM/EMS space. Its rising sales exposure to cloud business should help to gradually ease the street's concerns about its high Apple business risks.

Figure 63: Hon Hai's sales contribution from cloud products



Source: Deutsche Bank estimates, Company data

Figure 64: Hon Hai's profit contribution from cloud products



Source: Deutsche Bank estimates, Company data

Quanta – transforming into a brand and solution vendor

- Aggressive plan to grow server business in China

  In order to provide real-time and comprehensive after-sales service for Baidu, Tencent, and more local China customers, Quanta reported that it would upgrade its cloud operations in Beijing to a full-function business center in 2013 and establish new offices in Hangzhou and Shenzhen in 2014. While its solid orders for cloud business from global leading brands, including Google, Facebook, Microsoft and Amazon, are well-known by investors, we expect Quanta to benefit from the robust demand for cloud products in China. Unlike most ODM/EMS peers, which tend to supply assembly services for brand clients, more than 85% of Quanta's servers, storage and switches for sale are under its own QCT brand with its higher margins and barriers to entry. Hence, we are confident that the rising IoT business and its rapidly growing server shipments in China will support Quanta's sales and lead to upside risks to EPS going forward.

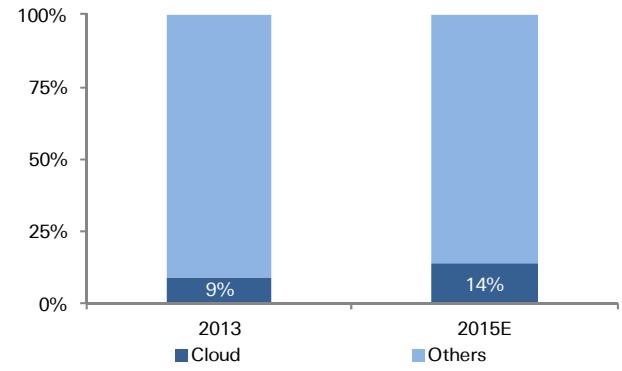
- Rising sales for its rack-type server and total solutions

  Unlike the major US-based server clients, which only ask Quanta to supply bare-bone servers (higher margins but lower ASP), most app and/or internet vendors in China ask it to ship full-system, rack-type server products with storage, switches and even software. This supports Quanta's revenue and margins given its higher ASP and sales for one-stop-shop solutions. The higher barriers to entry for full-system servers should help Quanta defend its leading position in the space against Wistron and Inventec, which intend to follow Quanta's business model to aggressively penetrate the sector.

- Improved cloud business exposure, reiterating Buy

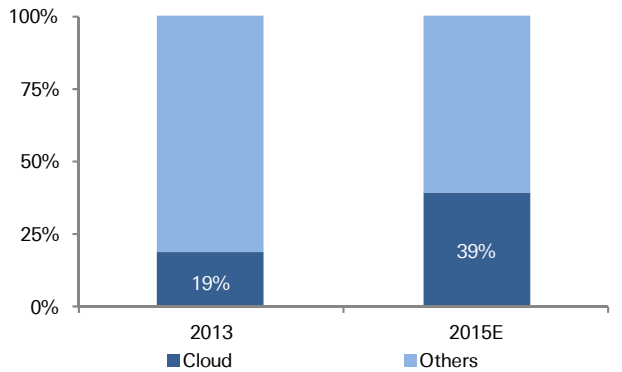
  We expect the cloud business' contribution to Quanta's revenue and profit to grow from 9% and 19% in 2013 to 14% and 39% in 2014 (Figures 65 and 66), thanks to its ongoing order gains from Google, Facebook and Microsoft and new shipments to Baidu, Tencent, and local China brands. We like Quanta's execution capabilities and impressive own-brand strategies to expand in the rapidly growing cloud business.

Figure 65: Quanta's sales contribution from cloud products



Source: Deutsche Bank estimates, Company data

Figure 66: Quanta's profit contribution from cloud products



Source: Deutsche Bank estimates, Company data

Lenovo – the leading runner-up brand in the space

- Synergies from the acquisition of IBM x86 servers

  We are positive on Lenovo's efforts to strengthen its product portfolio, upgrade its R&D, software and service capabilities, and enlarge its intellectual property (IP) rights through the acquisition of the IBM x86 server business. This should not only help Lenovo expand its business scope for servers from the China market to overseas countries but also easily lift its earnings from the current breakeven in the business. After the deal, Lenovo will become one of the leading server brands, taking third place in worldwide shipments with a market share of ~10%. Hence, we expect Lenovo to benefit from robust server shipment growth in the exciting IoT age.

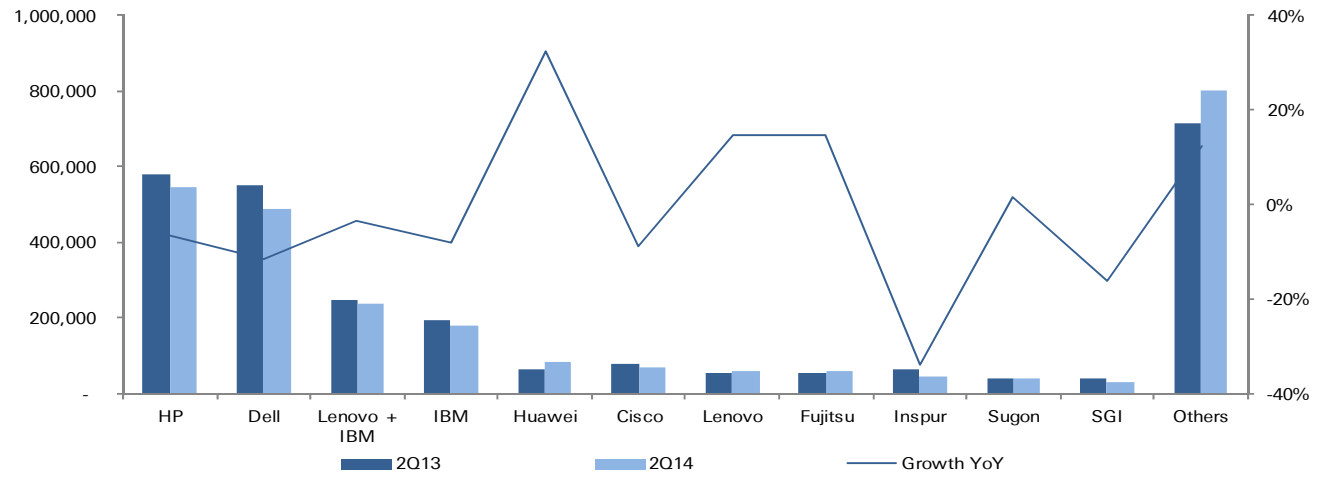
- Becoming the leading brand in China and Europe soon

  With the acquisition of IBM x86 server operations and support from the local government, we expect Lenovo to easily be the leader in terms of server market share in China. We are also confident that Lenovo can leverage its strength in commercial PC markets (distribution channel, relationships with clients, and service systems) to grow Europe as its secondary home market, supporting its business momentum. Similar to the PC business, the combination of sales in China, Europe and other emerging countries can help increase Lenovo's shipment scale, reduce its cost structure, and improve its competitiveness against leading US and Japanese peers.

- Rising profit exposure from the cloud business, reiterating Buy

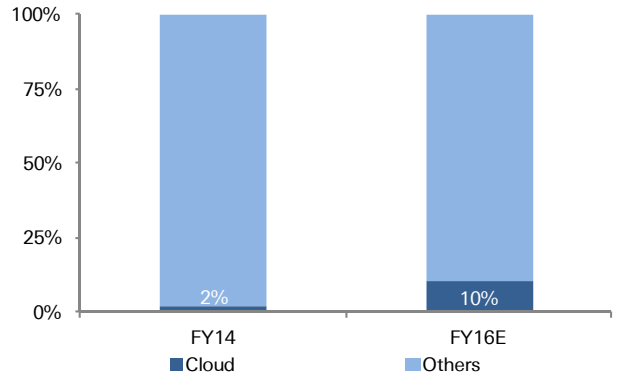
  Given our revenue and OPM assumptions (US$4.9bn and 4.9% for FY16) for its newly acquired IBM server business, we forecast Lenovo's sales and profit contribution from cloud products rising from 2% and 0% in FY14 to 10% and 16% in FY16 (Figures 68 and 69). This explains why our target P/E multiple for our valuation of Lenovo (16x) is higher than that for its peers (10-14x). Lenovo is our top pick in the PC/NB brand space and we rate the stock a Buy.

Figure 67: Top 10 global x86 server brand shipment and growth



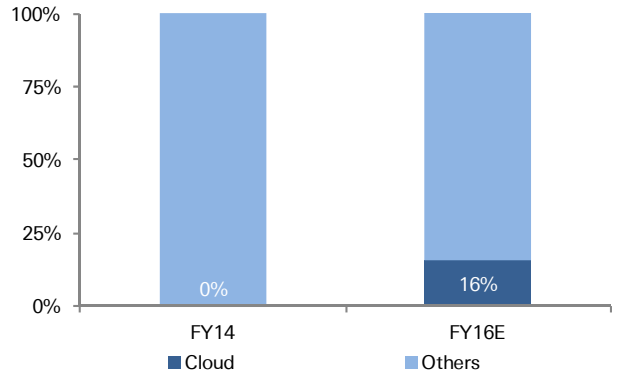
Source: Deutsche Bank, Gartner

Figure 68: Lenovo's sales contribution from cloud products



Source: Deutsche Bank estimates, Company data

Figure 69: Lenovo's profit contribution from cloud products



Source: Deutsche Bank estimates, Company data

Valuation and risks

Valuation methodology

We adopt a P/B multiple as an asset-based valuation metric for the foundry/OSAT/memory sectors to reflect the massive capex requirements for capacity expansion and R&D; the scale and pace of yield rate improvement play important roles in long-term growth because of design complexity in advanced nodes. We use a P/E multiple as a valuation metric to evaluate the relatively asset-light fabless/substrate/component/EMS/ODM/OEM sectors.

Sector and company risks; basis for target prices

Sector risk

Sector upside risks include an order snapback led by stronger demand, more moderate NTD appreciation, less severe price erosion and better capex discipline. Sector downside risks include further order cancellations stemming from additional demand softness, more severe NTD appreciation, a sharper price contraction and continued capex increases in 2014-15.

Notably, the compatibility of communication standards among all IoT devices could hinder IoT proliferation in the long term if the common standards are not built up comprehensively. The Institute of Electrical and Electronics Engineers (IEEE) is trying to build up standards for IoT. There are four major IoT alliance camps, which have several big upstream/downstream companies as key members (Figure 70). The coordination of these alliance camps will be crucial for the pace of IoT uptake, in our view.

Figure 70: IoT alliance camps

IoT alliance camp	Key members
AllSeen Alliance	Haier, LG, Microsoft, Panasonic, and Sony
Industrial Internet Consortium	AT&T, Cisco, GE, IBM and Intel
Open Interconnect Consortium	Broadcom, Dell, and Samsung
Home Kit	Apple

Source: Deutsche Bank

Company valuation and risks

- **AAC Technology (Hold)** – Our target price of HK$46 is based on 16x FY15E P/E, in line with the four-year trading average. However, most of the good news might have already been priced in after the meaningful share price ramp-up following its 2Q14 analyst meeting. AAC's fundamentals remain solid, but the valuation is unattractive at the current stage. As such, we reiterate Hold on the stock. Upside/downside risks include fast/slow upgrades in smartphone acoustics, market gains/losses with key clients (Apple and Samsung), and USD appreciation/depreciation.
- **ASE (Hold)** – Our target price of NT$37 is based on 2.2x 2014-15E average P/B, higher than the 2007-13 average of 1.7x. We believe this is justified as our 2014-15 average ROE forecast of 16% is higher than the 2007-13 average ROE of 14%. Upside/downside risks relate to the pace of ASP contraction, demand, and the ramp-up of TSMC's interposer-based back-end solutions.

- **Catcher (Buy)** – Our target price of NT$350 is based on 14x FY15E P/E, which is higher than the stock's historical trading average of 12x. We expect a re-rating to take place, with ROE expansion (from high teens to low twenties), core EPS growth acceleration (from 15% in 2013 to 25%+ in 2014 and 2015), and business diversification (from PC to mobile device) in sight. Downside risks relate to intense price competition, lower yield ramp-up on new projects, and weak smartphone demand.
- **Delta (Buy)** – Our target price of NT$220 is based on 20x 2015 P/E. This implies 0.9x PEG, which is in line with global and regional IA system/solution peers. The 20x P/E is higher than the stock's historical trading average of 16x over the past four years. We believe Delta's valuation will be further re-rated, with its product portfolio quickly diversifying from stagnant, low-margin PC components to high-growth, high-margin categories, including IA products, server/telecom power supply and thermo modules, high-end passive components (compact power choke), and telecom-grade networking devices. Downside risks include forex fluctuation, slower 4G network upgrades in China, and stagnant IA capex.
- **Elan (Buy)** – Our target price of NT$60 is based on 14.5x FY15E EPS. Downside risks: 1) weak demand for touch IC for NB; 2) slow ramps of Chromebook and fingerprint chips; and 3) intense competition.
- **Flexium (Hold)** - Our target price of NT$76 is based on 12x 2014-15E average P/E. This is in line with the historical average (2004-13) of 12x. Upside/downside risks: pace of market share gains, ASP and demand for smartphones and tablet PCs.
- **Hon Hai (Buy)** – Our target price of NT$116 is based on a 12x 2015 P/E multiple, in line with our average target P/E multiple for the ODM/EMS peers (10-14x). We expect its strong sales and earnings growth, helped by robust iPhone 6 and 6 Plus, iPad, PC and consumer electronics sales, to continue to support its share price performance. Downside risks include weaker demand from brand clients, the loss of orders to competitors, and labor cost hikes in China.
- **Kinsus (Hold)** – Our target price of NT$118 is based on 12x 2014-15E average P/E, roughly in line with the company's average multiple between 2004 and 2013. Upside/downside risks relate to: 1) the pace of customers' shift to embedded passive substrates (EPS) from core-less FCCSP substrates; 2) market share in Apple; 3) currency; and 4) demand.
- **Largan (Buy)** – Our target price of NT$2,870 is based on 16x 2015E P/E, which is in line with the stock's historical trading average over the past four years. Largan is our top pick in the smartphone hardware space. Potential key near-term share price catalysts for Largan include strong lens orders for iPhone 6/6Plus and new Xiaomi phones (Mi4, etc). Potential long-term share price catalysts include continual upgrades in smartphone cameras' optical features (large aperture, longer focal length, extended depth of field, etc.) and increased adoption of the slim lens module. We also like the company's strong balance sheet (sitting on net cash of NT$13.5bn), stable free cash flow and sustainable high ROE (40%+). Downside risks relate to fiercer-than-expected price competition in the lens space and weaker new iPhone demand.

- **Lenovo (Buy)** – Our target price of HK$13.2 is based on 16x FY15E EPS, which is in line with its historical average P/E multiple since 2009, when its earnings turned positive. We award a higher target P/E to Lenovo than to its peers (10-14x) because of its solid leading position and robust shipment and EPS growth in the PC space, potential upside from its server, smartphone and tablet business, and higher ROE. Downside risks relate to weaker demand in channel and intensified competition from its peers, which could lead to higher inventory and potential write-downs.
- **LG Electronics (Hold)** – Our target price is based on a SOTP valuation comprising its TV, handset and home appliance divisions and its stake in LG Display. We value the company's core business at W17.8tn and its investment assets at W3tn for an enterprise value of W21.8tn. We treat its preferred shares as equity rather than debt. Upside risks include: 1) earnings surprise in the handset division and 2) LGE benefiting from a faster-than-expected housing market recovery in developed markets. Downside risks include: 1) KRW/USD depreciation; and 2) weak sell-through in smartphones.
- **LG Innotek (Hold)** – We value LG Innotek at 1.5x 2015 P/B, its historical average P/B, to reflect the company's turnaround prospects. We anticipate low-teens ROE in the coming years, which supports our 1.5x valuation multiple. Key upside risks include stronger-than-expected shipment growth for LGE/LGD and Apple-related components. Key downside risks include earnings misses, weak end demand, and KRW/USD appreciation.
- **MediaTek (Hold)** – Our target price of NT$510 is based on 15x FY15E EPS. We think MediaTek has a chance to regain momentum in 2H15 if it can roll out new LTE products focusing on the right segments ahead of rivals. Risks: faster/slower margin improvement and stronger/weaker smartphone demand.
- **PixArt (Buy)** – Our target price of NT$86 is based on 20x FY15E EPS. We maintain our target P/E multiple of 20x as we believe PixArt's unique CMOS image sensor technology and product roadmap pave the way for it to address a broad range of new applications in the coming years, including mobile phone, surveillance and wearable devices (especially with healthcare features). Downside risks: 1) slow ramp-up of surveillance and wearable sensor businesses; 2) soft game and wireless mouse demand; 3) slow optical touch penetration in AIO PC; and 4) weak demand for Wii.
- **Powertech (Sell)** – Our target price of NT$42 is based on 1x 2014-15E average P/B, below the 2008-13 trough average of 1.2x. We use the Gordon Growth Model to generate our target multiple, assuming a long-term ROE of 8%, cost of equity of 7.4% and long-term industry growth rate of 2%. Upside risks: 1) stronger-than-expected demand for mobile DRAM and flash in smartphones and tablet PCs; and 2) faster-than-expected market share gains in flip-chip packaging.
- **Quanta (Buy)** – Our target price of NT$88 is based on 14x FY15E EPS, which is higher than that for other ODM/EMS peers (10-14x) and its historical average P/E of 11x since 2009, given its exciting server business story, better NB business momentum, higher-than-peer ROE, and improving cash position, which is likely to support a higher cash dividend payout. Downside risks relate to weaker demand for NB, server, and tablet products, labor cost hikes, and currency.

- **Realtek (Hold)** – Our target price of NT$102 is based on 14.5x FY15E EPS. While we expect 3Q14 to be broadly healthy, we feel the stock is fairly priced and thus we maintain Hold. Risks: 1) strong/weak demand for WiFi chip, PC and TV SOC; and 2) easing/intensifying competition.
- **Samsung Electronics (Buy)** – Our target price for SEC is based on 1.6x ex-cash P/B, the average multiple before the Samsung smartphone boom. Key risks: 1) weaker global demand, 2) stronger memory supply, 3) high earnings dependency on smartphones, and 4) litigation.
- **Samsung SDI (Hold)** – We value SDI based on SOTP, separately valuing SDI's small battery cell and mid/large battery cell businesses, along with its chemical business and various investment assets. Key risks include weaker-than-expected demand in xEV and ESS. Any earnings shortfall vs. expectations would also be a risk to the stock. Upside risks include a depreciating KRW/USD and better-than-expected consumer IT demand.
- **SEMCO (Hold)** – Our target price is based on a 2015 P/B of 1.1x vs. its historical average is 1.9x and a trough of 1.0x. Upside risk is better-than-expected end demand for Samsung smartphones Downside risks include weaker-than-expected end demand and KRW/USD appreciation.
- **SK Hynix (Buy)** – Our 12-month target price is based on 2.2x forward P/B, the median of the P/B band Hynix achieved during an industry upturn. Our P/B band analysis shows that historically the P/B multiple peaks or troughs when book value reaches inflection points. Our analysis further reveals that Hynix's share price tends to outperform during multiple-expansion periods and underperform during multiple-contraction periods. Key risks include: 1) continued sluggish global demand, 2) stronger-than-expected industry supply, 3) won appreciation, and 4) a share overhang.
- **SPIL (Hold)** – Our target price of NT$46 is based on 2.2x 2014-15E average P/B, higher than the 2003-13 average of 1.8x. We use a Gordon Growth Model to generate our target multiple, assuming a long-term return on equity of 14%, cost of equity of 7.6%, and long-term industry growth rate of 2.5%. Upside/downside risks include faster-/slower-than-expected market share gains, gold prices, currency, and demand.
- **TSMC (Buy)** – Our target price of NT$166 is based on 3.5x 2014-15E average P/B, in line with the fair P/B of 3.5x generated by the Gordon Growth Model (20% ROE, 2.5% long-term industry growth rate, and 7.4% cost of equity).
- **UMC (Hold)** – Our target price of NT$14 is based on 0.8x 2014-15E average P/B, in line with the 2004-13 trough average. This reflects our concern over UMC's long-term growth prospects. Upside/downside risks relate to 1) the pace of 28nm ramp-ups; 2) the magnitude of wafer price declines; 3) stronger/weaker demand; and 4) the magnitude of NTD appreciation vs. the USD.
- **Unimicron (Hold)** – Our target price of NT$21.5 is based on 0.7x 2014-15E average P/B, in line with its fair P/B multiple of 0.7x. We use the Gordon Growth Model to generate fair P/B multiples, assuming a long-term ROE of 6%, a cost of equity of 7.4%, and a long-term industry growth rate of 2%. Upside/downside risks relate to 1) supply/demand conditions for HDI PCB; 2) demand; 3) ASP erosion; 4) gold/copper prices; and 5) currency.
- **Zhen Ding Tech (Buy)** – Our target price of NT$102 is based on 12x 2014-15E average P/E. This is in line with the historical average P/E of 12x. Downside risks: demand for smartphones and tablet PCs; ASP; raw material costs; labor costs in China; and currency.

Asian and global tech valuation comp sheet

Figure 71: Asian and global semiconductor valuation comp sheet

Ticker	Name	Rating	Currency	Target Price	Share Price	Market Cap (US$m)	EPS 2014E	EPS 2015E	EPS growth (%) 2014E	EPS growth (%) 2015E	PE (x) 2014E	PE (x) 2015E	PB (x) 2014E	PB (x) 2015E	ROE (%) 2014E	ROE (%) 2015E	Dividend yield (%) 2014E	Dividend yield (%) 2015E
Foundry																		
2330.TW	TSMC	Buy	NT$	166.00	129.00	110,134	10.05	11.05	38%	10%	12.8	11.7	3.3	2.8	28	26	3.2	3.2
2303.TW	UMC	Hold	NT$	14.00	12.45	5,211	0.79	0.70	-21%	-12%	15.7	17.9	0.7	0.7	5	4	3.3	2.8
Average (Foundry)											***14.3***	***14.8***	***2.0***	***1.7***	***16.2***	***14.8***	***3.2***	***3.0***
OSAT																		
2311.TW	ASE	Hold	NT$	37.00	35.40	9,120	2.68	2.74	33%	2%	13.2	12.9	2.1	2.0	17	16	5.2	5.3
AMKR.OQ	Amkor	Hold	US$	10.00	7.40	1,755	0.70	NA	43%	NA	10.5	NA	1.4	NA	16	NA	0.0	NA
6239.TW	Powertech	Sell	NT$	42.00	48.15	1,235	3.76	3.33	-172%	-11%	12.8	14.5	1.2	1.2	10	8	5.0	4.4
2325.TW	SPIL	Hold	NT$	46.00	40.40	4,145	3.55	3.24	89%	-9%	11.4	12.5	1.9	1.9	17	15	8.6	7.9
Average (OSAT)											***12.0***	***13.3***	***1.6***	***1.7***	***14.7***	***13.2***	***4.7***	***5.9***
Wafer fab equipment																		
3658.TWO	HMI	Buy	NT$	1600.00	1375.00	3,214	43.91	61.33	25%	40%	31.3	22.4	8.0	6.4	28	32	1.4	2.0
KLAC.OQ	KLA-Tencor*	NR	US$	NA	71.38	11,767	3.80	4.77	15%	25%	18.8	15.0	2.9	2.9	15	19	2.5	2.6
AMAT.OQ	Applied Materials	Hold	US$	22.00	20.78	25,298	1.03	1.29	74%	26%	20.3	16.1	3.2	2.9	16	18	1.9	1.9
ASML.AS	ASML	Buy	US$	100.00	93.56	41,805	2.60	4.02	1%	55%	36.0	23.3	5.6	5.6	15	23	0.8	1.1
LRCX.OQ	Lam Research	Buy	US$	81.00	73.20	11,891	3.47	4.23	56%	22%	21.1	17.3	2.6	2.4	12	14	0.0	0.0
8036.T	Hitachi High-Tech*	NR	JPY$	NA	3055.00	3,936	185.5	201.8	30%	9%	16.5	15.1	1.4	1.3	9	9	0.8	0.0
Average (Wafer fab equipment)											***24.0***	***18.2***	***3.9***	***3.6***	***15.9***	***19.1***	***1.3***	***1.3***
Back-end equipment maker																		
0522.HK	ASM Pacific	Hold	HK$	80.00	75.30	3,889	3.93	3.89	181%	-1%	19.2	19.4	3.6	3.4	21	18	3.0	3.0
KLIC.OQ	Kulicke & Soffa*	NR	US$	NA	13.35	1,023	0.81	0.94	1%	15%	16.4	14.3	1.4	1.2	8	9	0.0	0.0
Average (Back-end equipment maker)											***17.8***	***16.8***	***2.5***	***2.3***	***14.5***	***13.5***	***1.5***	***1.5***
US & EU Logic IDM																		
FSL.N	Freescale	Buy	US$	30.00	17.83	5,417	0.98	1.90	NM	NM	18.2	9.4	(1.5)	(2.0)	NM	NM	0.0	0.0
INTC.OQ	Intel	Buy	US$	40.00	32.61	161,452	2.24	2.40	19%	7%	14.6	13.6	2.8	2.8	20	21	2.8	2.8
IFXGn.DE	Infineon	Hold	EU$	8.70	7.35	10,556	0.46	0.58	56%	25%	15.9	12.7	2.0	1.9	13	14	1.9	2.4
STM.PA	STMicroelectronics	Sell	EU$	4.50	5.36	6,216	0.08	0.28	NM	NM	63.3	19.4	0.9	0.9	NA	NA	5.8	5.8
TXN.N	Texas Instrucments	Hold	US$	28.00	46.77	49,930	2.53	2.85	30%	13%	18.5	16.4	4.8	4.8	26	29	2.7	3.0
Average (US & EU Logic IDM)											***28.1***	***15.5***	***2.6***	***2.6***	***19.4***	***21.5***	***3.3***	***3.5***
US Analog IDM																		
FCS.N	Fairchild Semiconductor	Buy	US$	15.00	46.72	14,678	0.69	0.95	154%	38%	68.1	49.4	4.6	4.2	0	5	0.0	0.0
ISIL.OQ	Intersil	Buy	US$	16.00	14.07	1,690	0.64	0.80	38%	25%	21.9	17.5	1.8	1.7	5	8	3.8	3.8
LLTC.OQ	Linear Technology	Hold	US$	38.00	12.80	1,658	1.96	2.06	10%	5%	6.5	6.2	2.3	2.1	40	35	2.5	2.7
MPWR.OQ	Monolithic Power Systems	Buy	US$	48.00	40.88	9,977	0.93	1.23	55%	31%	43.8	33.3	4.2	3.4	18	19	1.1	1.5
MXIM.OQ	Maxim	Hold	US$	30.00	39.39	1,525	1.62	1.65	-8%	2%	24.3	23.8	4.6	4.7	13	16	3.4	4.1
2018.HK	AAC	Hold	HK$	46.00	27.60	7,837	1.99	2.55	-5%	29%	13.9	10.8	7	9	0.9	0.9	2.4	3.1
POWI.OQ	Power Integration	Buy	US$	60.00	49.72	1,497	1.98	2.16	5%	9%	25.1	23.1	3.1	2.9	13	13	0.9	1.1
Average (US Analog IDM)											***29.1***	***23.5***	***4.0***	***4.0***	***13.0***	***14.0***	***2.0***	***2.3***
Taiwan Fabless																		
2458.TW	Elan	Buy	NT$	60.00	47.10	681	3.71	4.14	-3%	12%	12.7	11.4	3.3	3.1	24	28	7.4	7.5
8081.TW	GMT	Buy	NT$	107.50	81.20	230	6.94	7.68	10%	11%	11.7	10.6	1.7	1.7	15	16	7.0	7.7
2454.TW	MediaTek	Hold	NT$	510.00	425.50	22,016	30.71	34.01	50%	11%	13.9	12.5	2.8	2.6	22	21	3.6	5.4
3034.TW	Novatek	Buy	NT$	196.00	151.00	3,025	11.20	13.05	44%	17%	13.5	11.6	3.3	3.0	26	27	4.0	5.9
3545.TW	Orise	Buy	NT$	68.00	39.15	181	4.42	4.81	69%	9%	8.9	8.1	1.9	1.7	22	22	5.1	6.9
3227.TWO	Pixart	Buy	NT$	86.00	67.80	300	3.02	4.29	49%	42%	22.4	15.8	1.5	1.5	7	10	3.1	4.9
8299.TWO	Phison	Buy	NT$	269.00	195.50	1,194	18.18	19.21	3%	6%	10.8	10.2	2.2	2.0	22	21	5.3	5.7
2379.TW	Realtek	Hold	NT$	102.00	107.50	1,787	6.37	7.03	6%	10%	16.9	15.3	2.5	2.5	19	16	4.3	5.4
6286.TW	Richtek	Hold	NT$	176.00	144.00	704	10.22	11.72	10%	15%	14.1	12.3	3.0	2.7	22	23	4.5	5.0
Average (Fabless)											***13.9***	***12.0***	***2.5***	***2.3***	***19.9***	***20.5***	***4.9***	***6.1***
US & EU Fabless																		
ALTR.OQ	Altera Corp	Hold	US$	36.00	33.71	10,416	1.51	1.75	11%	16%	22.3	19.3	3.1	2.8	14	15	1.9	2.1
AMD.N	AMD	Hold	US$	2.75	2.77	2,120	0.07	0.10	NM	51%	40.1	26.7	3.8	2.9	(17)	9	0.0	0.0
ARM.L	ARM	Hold	GB$	900.00	806.00	18,270	23.64	28.96	15%	23%	34.1	27.8	7.6	6.6	19	21	0.9	1.2
BRCM.OQ	Broadcom Corporation	Buy	US$	47.00	37.33	22,099	0.96	2.28	31%	138%	39.0	16.4	2.5	2.3	4	13	1.3	1.4
MRVL.OQ	Marvell Technology	Hold	US$	16.00	12.75	6,559	0.64	0.88	21%	38%	20.0	14.5	1.4	1.3	7	9	2.0	1.9
NVDA.OQ	Nvidia Corp	Hold	US$	17.00	18.32	9,928	0.74	1.01	-21%	37%	24.7	18.1	2.4	2.3	9	13	2.2	1.9
XLNX.OQ	Xilinx Inc	Hold	US$	43.00	43.21	11,601	2.23	2.41	25%	8%	19.3	17.9	4.2	4.0	22	24	2.2	2.7
Average (US & EU Fabless; excl. ARM)											***25.9***	***18.2***	***2.7***	***2.5***	***8.7***	***15.0***	***1.7***	***1.7***
IC distribution																		
ARW.N	Arrow	Hold	US$	60.00	51.98	5,138	5.67	6.25	17%	10%	9.2	8.3	1.1	1.0	12	12	0.0	0.0
AVT.N	Avnet	Hold	NT$	47.00	40.79	5,639	4.24	4.65	22%	10%	9.6	8.8	1.2	1.1	12	13	1.4	1.5
3702.TW	WPG	Buy	US$	49.30	35.65	1,943	3.29	3.65	14%	11%	10.8	9.8	1.5	1.4	14	15	6.0	6.9
Average (IC distribution)											***9.9***	***9.0***	***1.3***	***1.2***	***12.7***	***13.3***	***2.5***	***2.8***
IC substrate / PCB																		
ATSV.VI	AT&S	Hold	EU$	10.00	8.35	413	1.32	0.75	119%	-43%	6.3	11.1	0.7	0.8	11	7	2.7	2.4
4062.T	Ibiden*	NR	JPY$	NA	1,682	2,373	118.5	135.7	-3%	15%	14.2	12.4	0.7	0.7	5	6	1.9	2.0
3189.TW	Kinsus	Hold	NT$	118.00	112.50	1,652	9.57	9.98	32%	4%	11.8	11.3	1.8	1.7	16	15	4.3	4.3
8046.TW	Nan Ya PCB*	NR	NT$	NA	41.50	883	0.81	1.12	NM	39%	51.2	36.9	0.8	0.8	2	2	0.9	1.3
009150.KS	SEMCO	Hold	KRW$	61,000	40,650	2,888	673	1,959	-84%	191%	60.4	20.8	0.8	0.7	1	4	0.3	1.0
6967.T	Shinko*	NR	JPY$	NA	690.00	872	49.66	53.63	-27%	8%	13.9	12.9	0.7	0.6	5	5	2.9	3.0
3044.TW	Tripod*	NR	NT$	NA	55.00	952	5.28	6.06	17%	15%	10.4	9.1	1.1	1.0	10	11	4.6	5.3
3037.TW	Unimicron	Hold	NT$	21.50	22.40	1,135	1.35	1.46	77%	8%	16.6	15.4	0.7	0.7	5	5	3.2	3.4
Average (IC substrate / PCB)											***23.1***	***16.2***	***0.9***	***0.9***	***6.8***	***6.9***	***2.6***	***2.8***

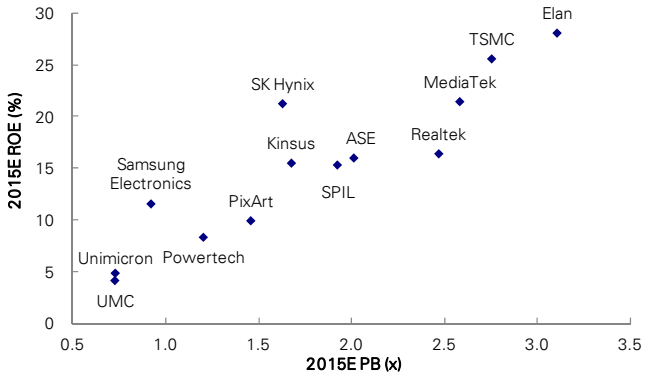
Source: Bloomberg Finance LP, Deutsche Bank estimates
*Note: *represents the stocks not covered by DB, market cap date on 2014/10/22*

Figure 72: Asian and global semiconductor valuation comp sheet

Ticker	Name	Rating	Currency	Target Price	Share Price	Market Cap (US$m)	EPS 2014E	EPS 2015E	EPS growth (%) 2014E	EPS growth (%) 2015E	PE (x) 2014E	PE (x) 2015E	ROE (%) 2014E	ROE (%) 2015E	PB (x) 2014E	PB (x) 2015E	Dividend yield (%) 2014E	Dividend yield (%) 2015E
Memory																		
MU.OQ	Micron	Buy	KRW$	40.00	31.19	33,399	3.24	3.86	NM	19%	9.6	8.1	31	33	3.5	2.5	0.0	0.0
005930.KS	Samsung Electronics	Buy	KRW$	1,480,000	1,100,000	154,108	141,736	131,307	-30%	-7%	7.8	8.4	14	12	1.0	0.9	1.4	1.4
000660.KS	SK Hynix	Buy	KRW$	59,400	46,300	32,059	4,758	5,426	21%	14%	9.7	8.5	23	21	2.0	1.6	0.0	0.0
6502.T	Toshiba	Buy	KRW$	610.00	442.90	17,554	12.00	28.81	-34%	140%	36.9	15.4	4	10	1.5	1.4	1.8	1.7
Average (Memory)											***16.0***	***10.1***	***18.0***	***18.8***	***2.0***	***1.6***	***0.8***	***0.8***
EMS & ODM																		
2324.TW	Compal	Hold	NT$	26.00	20.80	3,024	1.45	2.56	160%	76%	14.3	8.1	7	12	1.0	0.9	3.9	6.8
FLEX.OQ	Flextronics	Hold	US$	12.00	9.18	5,399	0.83	0.94	5%	13%	11.1	9.8	16	23	2.6	2.0	0.0	0.0
2317.TW	Hon Hai	Buy	NT$	116.00	94.00	45,786	8.17	9.63	2%	18%	11.5	9.8	16	17	1.7	1.6	2.0	2.3
2382.TW	Quanta	Buy	NT$	88.00	74.20	9,437	5.65	6.30	17%	11%	13.1	11.8	17	18	2.2	2.0	5.4	6.0
3231.TW	Wistron	Hold	NT$	30.00	30.45	2,454	2.18	2.99	-10%	37%	14.0	10.2	8	11	1.2	1.2	3.6	4.9
Average (EMS & ODM)											***12.8***	***9.9***	***12.8***	***16.3***	***1.7***	***1.5***	***3.0***	***4.0***
Notebook																		
2353.TW	Acer	Hold	US$	22.50	20.70	1,906	0.58	0.74	NM	NM	35.9	27.9	3	3	1.0	0.9	0.0	0.0
2357.TW	Asustek	Sell	NT$	260.00	295.50	7,227	26.38	25.97	-9%	-2%	11.2	11.4	14	13	1.5	1.5	6.0	5.9
HPQ.N	HP	Buy	US$	40.00	34.74	64,834	3.74	3.95	5%	6%	9.3	8.8	19	21	2.2	1.8	1.8	1.8
0992.HK	Lenovo	Buy	HK$	13.20	11.32	15,455	0.08	0.09	29%	11%	18.6	16.8	29	29	5.0	4.5	3.0	2.3
Average (Notebook)											***18.7***	***16.2***	***16.0***	***16.5***	***2.4***	***2.2***	***2.7***	***2.5***
Handset																		
AAPL.OQ	Apple	Hold	US$	102.00	102.47	601,106	6.45	7.60	14%	18%	15.9	13.5	34	38	5.6	4.8	2.2	1.9
2498.TW	HTC	Hold	NT$	130.00	133.00	3,680	1.55	4.15	-199%	168%	85.8	32.0	2	4	1.4	1.3	0.6	1.6
066570.KS	LG Electronics	Hold	KRW$	84,000	64,000	9,961	5,372	6,868	NM	28%	11.9	9.3	8	9	0.9	0.8	0.3	0.3
NOK1V.HE	Nokia	Hold	EU$	5.80	6.44	30,697	0.25	0.33	234%	28%	NM	NM	34	43	3.9	3.7	1.7	1.7
BBRY.OQ	RIMM	Hold	US$	9.00	10.15	5,353	(11.18)	(0.55)	NM	NM	NM	NM	(90)	(6)	1.5	1.6	0.0	0.0
Average (Handset)											***37.9***	***18.3***	***(2.6)***	***17.7***	***2.7***	***2.4***	***1.0***	***1.1***
Touch Panel																		
3673.TW	TPK	Sell	NT$	158.00	157.00	1,712	4.61	12.17	-79%	164%	34.0	12.9	3	9	1.2	1.1	3.0	2.4
2384.TW	Wintek	Sell	NT$	2.57	3.17	214	(3.06)	(2.59)	NM	NM	NM	NM	(26)	(27)	0.3	0.4	0.0	0.0
Average (Touch Panel)											***34.0***	***12.9***	***(11.4)***	***(9.1)***	***0.7***	***0.7***	***1.5***	***1.2***
Components																		
2018.HK	AAC	Hold	HK$	46.00	43.90	6,950	1.99	2.55	-5%	29%	22.1	17.2	30	32	6.1	4.9	2.4	3.1
2474.TW	Catcher	Buy	NT$	350.00	255.00	6,385	22.55	27.10	23%	20%	11.3	9.4	21	22	2.2	1.9	3.6	4.3
2308.TW	Delta	Buy	NT$	220.00	185.50	14,888	8.96	10.97	23%	22%	20.7	16.9	27	30	5.3	4.8	3.9	4.8
2354.TW	Foxconn Tech	Sell	NT$	64.00	75.00	3,400	5.14	5.45	-4%	6%	14.6	13.8	9	9	1.3	1.2	1.0	1.1
3008.TW	Largan	Buy	NT$	2,870.00	2050.00	9,054	135.65	179.58	89%	32%	15.1	11.4	48	45	6.1	4.5	2.5	3.5
011070.KS	LG Innotek	Hold	KRW$	135,000	119,000	2,679	8,067	10,822	NM	34%	14.8	11.0	12	13	1.5	1.3	1.0	1.4
006400.KS	Samsung SDI	Hold	KRW$	152,000	116,000	7,587	3,140	4,730	13%	51%	36.9	24.5	2	3	0.7	0.7	1.3	1.3
2347.TW	Synnex*	NR	NT$	NA	42.50	2,223	4.08	4.59	24%	12%	10.4	9.3	14	15	1.4	1.4	6.2	7.0
6121.TWO	Simplo	Buy	NT$	178.00	145.00	1,472	11.81	13.16	13%	11%	12.3	11.0	19	19	2.2	2.0	4.9	5.5
Average (Components)											***17.0***	***13.4***	***19.1***	***19.5***	***2.6***	***2.2***	***3.1***	***3.6***
FPCB																		
6153.TW	Career*	NR	NT$	NA	34.2	365	2.57	2.79	27%	9%	13.3	12.2	3.3	3.2	25	27	3.8	4.5
6269.TW	Flexium	Hold	NT$	76.00	63.0	461	5.54	6.98	-29%	26%	11.4	9.0	3.8	3.4	35	40	2.9	3.7
5803.T	Fujikura*	NR	JPY$	NA	475.0	1,603	34.55	39.59	143%	15%	13.7	12.0	0.8	0.7	6	6	1.6	2.0
2402.TW	Ichia*	NR	NT$	NA	32.3	361	1.8	2.5	75%	41%	18.1	12.8	1.6	1.4	9	11	1.6	2.5
051370.KS	Interflex*	NR	KRW$	NA	11,250	175	1,998	2,857	72%	43%	5.6	3.9	0.5	0.4	8	11	1.2	1.5
MFLX.OQ	M-FLEX*	NR	US$	NA	9.1	219	(1.89)	0.26	NM	NM	NM	34.9	0.7	0.7	(14)	2	0.0	0.0
7240.T	Nippon Mektron*	NR	JPY$	NA	2,474	4,006	137	158	3%	15%	18.1	15.7	1.3	1.2	7	8	0.9	1.0
6988.T	Nitto Denko*	NR	JPY$	NA	5,691	9,249	305	324	11%	6%	18.6	17.6	1.7	1.6	9	9	1.8	1.8
5802.T	Sumitomo*	NR	JPY$	NA	1,459	10,834	117.1	132.3	23%	13%	12.5	11.0	0.9	0.9	7	8	1.8	1.9
4958.TW	ZDT	Buy	NT$	102.00	80.6	1,960	7.80	8.64	5%	11%	10.3	9.3	3.6	3.5	36	40	4.3	5.4
Average (FPCB)											***13.5***	***13.9***	***1.8***	***1.7***	***13.0***	***16.1***	***2.0***	***2.4***

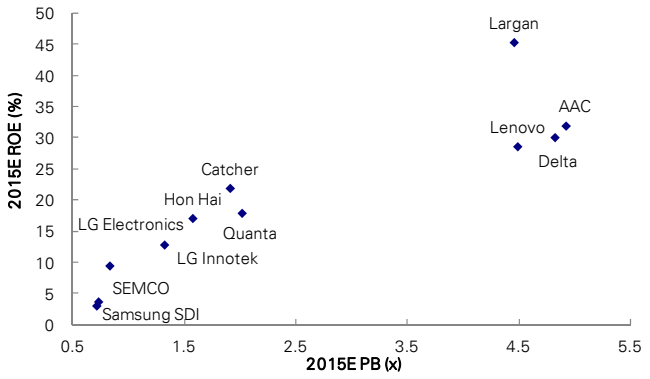
Source: Bloomberg Finance LP, Deutsche Bank estimates
*Note: *represents the stocks not covered by DB, market cap date on 2014/10/22*

Figure 73: 2015E P/B vs. ROE for upstream tech



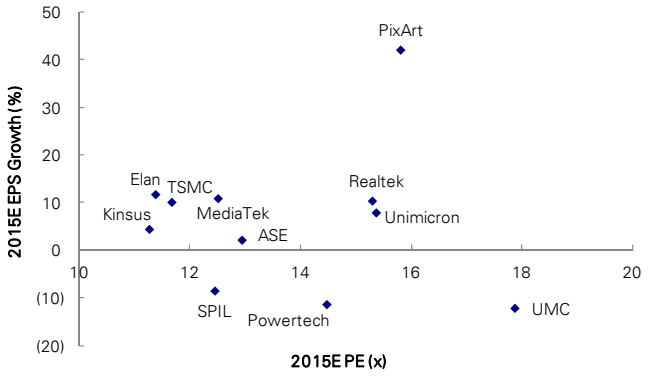
Source: Bloomberg Finance LP, Deutsche Bank estimates

Figure 74: 2015E P/B vs. ROE for downstream tech



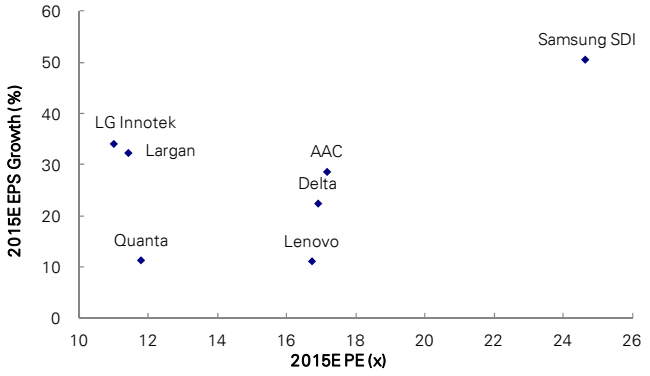
Source: Bloomberg Finance LP, Deutsche Bank estimates

Figure 75: 2015E P/E vs. EPS growth for upstream tech



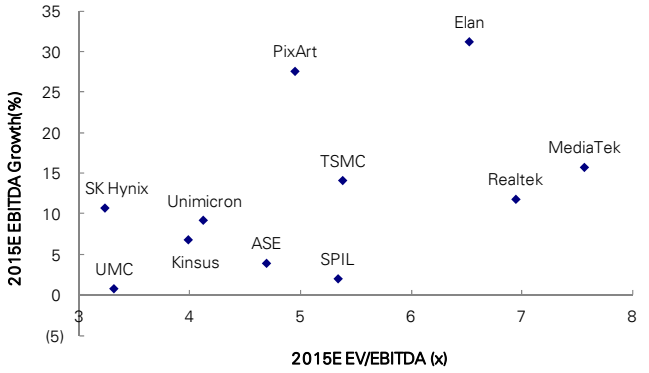
Source: Bloomberg Finance LP, Deutsche Bank estimates

Figure 76: 2015E P/E vs. EPS growth for downstream tech



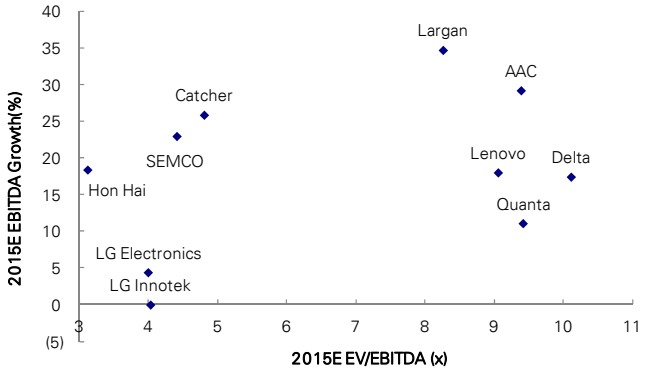
Source: Bloomberg Finance LP, Deutsche Bank estimates

Figure 77: 2015E EV/EBITDA vs. EBITDA growth for upstream tech



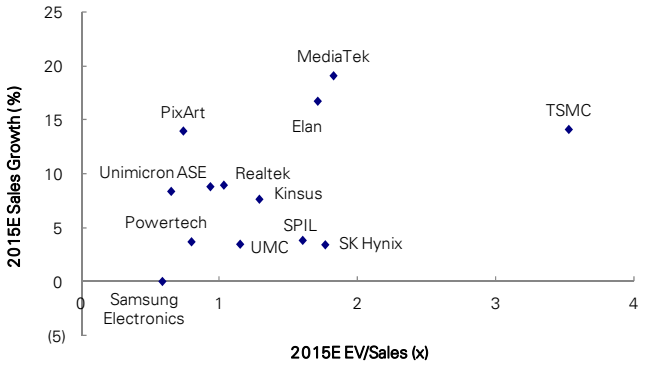
Source: Bloomberg Finance LP, Deutsche Bank estimates

Figure 78: 2015E EV/EBITDA vs. EBITDA growth for downstream tech



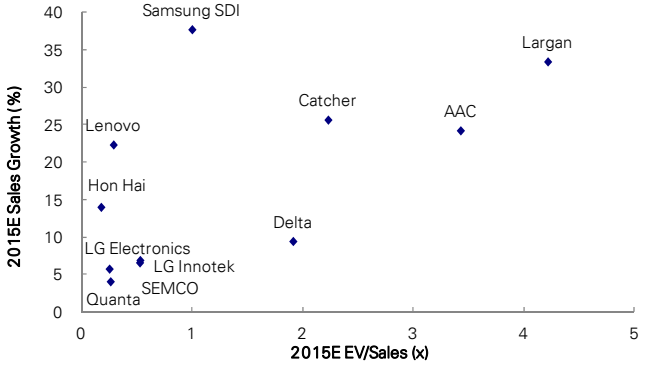
Source: Bloomberg Finance LP, Deutsche Bank estimates

Figure 79: 2015E EV/sales vs. sales growth for upstream tech



Source: Bloomberg Finance LP, Deutsche Bank estimates

Figure 80: 2015E EV/sales vs. sales growth for downstream tech



Source: Bloomberg Finance LP, Deutsche Bank estimates

Appendix A

Figure 81: Sales contribution of IoT, wearable devices, and servers for upstream companies under our coverage

	2013	2014E	2015E	2016E
Foundry				
Sales contribution of Internet of Things for TSMC	-	-	-	-
Internet of Things (excluding wearable devices and servers)	0.5%	0.8%	1.4%	2.2%
Wearable devices	0.8%	1.1%	1.7%	2.2%
Server CPUs	0.0%	0.1%	0.4%	0.7%
Total sales contribution of Internet of Things for TSMC	**1.3%**	**2.1%**	**3.5%**	**5.1%**
Sales contribution of Internet of Things for UMC				
Internet of Things (excluding wearable devices and servers)	0.4%	0.7%	1.3%	2.2%
Wearable devices	0.6%	0.9%	1.5%	2.1%
Server CPUs	0.0%	0.0%	0.0%	0.0%
Total sales contribution of Internet of Things for UMC	**1.0%**	**1.6%**	**2.7%**	**4.2%**
OSAT				
Sales contribution of Internet of Things for ASE				
Internet of Things (excluding wearable devices and servers)	0.2%	0.3%	0.5%	0.8%
Wearable devices	0.3%	0.7%	1.6%	3.0%
Server CPUs	0.0%	0.0%	0.2%	0.3%
Total sales contribution of Internet of Things for ASE	**0.4%**	**1.0%**	**2.2%**	**4.0%**
Sales contribution of Internet of Things for SPIL				
Internet of Things (excluding wearable devices and servers)	0.3%	0.6%	1.0%	1.6%
Wearable devices	0.3%	0.5%	0.9%	1.4%
Server CPUs	0.0%	0.1%	0.3%	0.5%
Total sales contribution of Internet of Things for SPIL	**0.6%**	**1.1%**	**2.1%**	**3.5%**
Sales contribution of Internet of Things for Powertech				
Internet of Things (excluding wearable devices and servers)	0.2%	0.4%	0.7%	1.1%
Wearable devices	0.2%	0.3%	0.5%	0.9%
Server CPUs	0.0%	0.0%	0.0%	0.0%
Total sales contribution of Internet of Things for Powertech	**0.4%**	**0.7%**	**1.2%**	**2.0%**
Substrate/PCB				
Sales contribution of Internet of Things for Kinsus				
Internet of Things (excluding wearable devices and servers)	0.2%	0.3%	0.5%	0.9%
Wearable devices	0.8%	1.4%	2.5%	4.0%
Server CPUs	0.0%	0.0%	0.0%	0.0%
Total sales contribution of Internet of Things for Kinsus	**1.0%**	**1.8%**	**3.1%**	**5.0%**
Sales contribution of Internet of Things for Unimicron				
Internet of Things (excluding wearable devices and servers)	0.1%	0.1%	0.2%	0.4%
Wearable devices	0.2%	0.4%	0.7%	1.2%
Server CPUs	0.0%	0.0%	0.0%	0.0%
Total sales contribution of Internet of Things for Unimicron	**0.3%**	**0.6%**	**1.0%**	**1.6%**
Fabless				
Sales contribution of Internet of Things for MediaTek				
Internet of Things (excluding wearable devices and servers)	0.0%	0.0%	0.1%	0.3%
Wearable devices	0.0%	0.0%	0.3%	0.6%
Total sales contribution of Internet of Things for MediaTek	**0.0%**	**0.0%**	**0.4%**	**0.9%**
Sales contribution of Internet of Things for Realtek				
Internet of Things (excluding wearable devices and servers)	0.0%	0.1%	0.6%	1.4%
Wearable devices	0.0%	0.0%	0.1%	0.2%
Total sales contribution of Internet of Things for Realtek	**0.0%**	**0.1%**	**0.7%**	**1.6%**

Source: Deutsche Bank estimates, Industry data

Figure 82: Sales contribution of IoT, wearable devices, and servers for memory and component companies under our coverage

	2013	2014E	2015E	2016E
Memory				
Sales contribution of Internet of Things for Samsung	-	-	-	-
Internet of Things (excluding wearable devices and servers)	0.0%	0.0%	0.2%	0.4%
Digital Home (mainly smart TVs)	9.4%	11.9%	12.4%	12.6%
Wearable devices	0.2%	0.6%	0.7%	0.9%
Server	1.4%	2.1%	2.1%	2.0%
Total sales contribution of IoT for Samsung (exclude smart TV)	**1.6%**	**2.6%**	**3.0%**	**3.3%**
Total sales contribution of IoT for Samsung (include smart TV)	**11.0%**	**14.5%**	**15.4%**	**16.0%**
Sales contribution of Internet of Things for Hynix				
Wearable devices	1.0%	1.3%	1.7%	2.3%
Servers	16.8%	16.2%	17.1%	17.4%
Total sales contribution of Internet of Things for Hynix	**17.7%**	**17.4%**	**18.9%**	**19.7%**
Component				
Sales contribution of Internet of Things for Largan				
Internet of Things (excluding wearable devices and servers)	0.0%	0.0%	2.0%	3.0%
Wearable devices	0.5%	1.0%	2.0%	5.0%
Servers	0.0%	0.0%	0.0%	0.0%
Total sales contribution of Internet of Things for Largan	**0.5%**	**1.0%**	**4.0%**	**8.0%**
Sales contribution of Internet of Things for AAC				
Internet of Things (excluding wearable devices and servers)	0.0%	0.0%	1.0%	1.0%
Wearable devices	0.0%	1.0%	4.0%	8.0%
Servers	0.0%	0.0%	0.0%	0.0%
Total sales contribution of Internet of Things for AAC	**0.0%**	**1.0%**	**5.0%**	**9.0%**
Sales contribution of Internet of Things for Delta				
Servers	20.0%	23.0%	24.0%	25.0%
Total sales contribution of Internet of Things for Delta	**20.0%**	**23.0%**	**24.0%**	**25.0%**
Sales contribution of Internet of Things for Catcher				
Wearable devices	0.0%	0.0%	3.0%	7.0%
Total sales contribution of Internet of Things for Catcher	**0.0%**	**0.0%**	**3.0%**	**7.0%**
Sales contribution of Internet of Things for SEMCO				
Internet of Things (excluding wearable devices and servers)	1.3%	3.0%	7.5%	13.2%
Wearable devices	0.0%	1.4%	1.8%	2.3%
Total sales contribution of Internet of Things for SEMCO	**1.3%**	**4.4%**	**9.3%**	**15.5%**
Sales contribution of Internet of Things for LG Innotek				
Internet of Things (excluding wearable devices and servers)	3.5%	5.1%	5.6%	6.5%
Wearable devices	0.0%	0.0%	0.0%	0.1%
Total sales contribution of Internet of Things for LG Innotek	**3.5%**	**5.1%**	**5.7%**	**6.6%**
Sales contribution of Internet of Things for Samsung SDI				
Wearable devices	0.0%	0.2%	0.2%	0.2%
Total sales contribution of Internet of Things for Samsung SDI	**0.0%**	**0.2%**	**0.2%**	**0.2%**
Sales contribution of Internet of Things for Zhen Ding Tech				
Wearable devices	0.0%	0.4%	1.1%	2.1%
Total sales contribution of Internet of Things for Zhen Ding Tech	**0.0%**	**0.4%**	**1.1%**	**2.1%**
Sales contribution of Internet of Things for Flexium				
Wearable devices	0.0%	0.0%	0.5%	1.2%
Total sales contribution of Internet of Things for Flexium	**0.0%**	**0.0%**	**0.5%**	**1.2%**

Source: Deutsche Bank estimates, Industry data

Figure 83: Sales contribution of IoT, wearable devices, and servers for EMS/ODM/OEM companies under our coverage

	2013	2014E	2015E	2016E
EMS/ODM/OEM				
Sales contribution of Internet of Things for Hon Hai				
Internet of Things (excluding wearable devices and servers)	0.0%	0.5%	1.0%	3.0%
Wearable devices	0.0%	1.0%	2.0%	3.0%
Server, storage and switches	4.0%	5.5%	7.0%	8.0%
Total sales contribution of Internet of Things for Hon Hai	**4.0%**	**7.0%**	**10.0%**	**14.0%**
Sales contribution of Internet of Things for Quanta				
Wearable devices	0.0%	0.0%	2.0%	4.0%
Server, storage and switches	9.0%	11.5%	14.0%	15.5%
Total sales contribution of Internet of Things for Quanta	**9.0%**	**11.5%**	**16.0%**	**19.5%**
Sales contribution of Internet of Things for Lenovo				
Internet of Things (excluding wearable devices and servers)	0.0%	0.0%	0.2%	0.4%
Wearable devices	0.0%	0.0%	0.5%	1.0%
Server, storage and switches	2.0%	2.2%	10.0%	11.0%
Total sales contribution of Internet of Things for Lenovo	**2.0%**	**2.2%**	**10.7%**	**12.4%**
Sales contribution of Internet of Things for LGE				
Internet of Things (excluding wearable devices and servers)	0.0%	0.0%	0.0%	0.0%
Digital Home (mainly smart TVs)	13.0%	19.1%	21.1%	24.0%
Wearable devices	0.0%	0.4%	0.5%	0.6%
Servers	0.0%	0.0%	0.0%	0.0%
Total sales contribution of IoT for LGE	**13.0%**	**19.5%**	**21.6%**	**24.6%**

Source: Deutsche Bank estimates, Industry data

ZigBee definition and application

ZigBee is a technology for remote monitoring, control and sensor network/wireless link applications. The ZigBee standard was created to address the need for a cost-effective, standards-based wireless networking solution that supports low data rates, low power consumption, security, and reliability. The primary target markets are home, building and industrial automation, smart wireless lighting control, medical/patient monitoring, logistics and asset tracking, advanced metering/smart energy, etc.

WiFi definition and application

WiFi is an area wireless technology that allows an electronic device to exchange data or connect to the internet using 2.4 GHz UHF and 5 GHz SHF radio waves. The name is a trademark and the Wi-Fi Alliance defines Wi-Fi as any "wireless local area network (WLAN) products that are based on the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards". A Wi-Fi-enabled device can connect to the internet when within range of a wireless network that is configured to permit this. The coverage of one or more (interconnected) access points—called hotspots—can extend from an area as small as a few rooms to as large as many square kilometers.

Bluetooth definition and application

Bluetooth is a wireless technology for exchanging data over short distances from fixed and mobile devices, and building personal area networks (PANs). Bluetooth operates in the range of 2400–2483.5 MHz. It can connect several devices and overcome problems of synchronization. A master Bluetooth device can communicate with a maximum of seven devices, though not all devices reach this maximum.

NFC definition and application

Near field communication (NFC) is a form of short-range wireless RFID technology. NFC makes use of interacting electromagnetic radio fields instead of the typical direct radio transmissions like Bluetooth. NFC tags (or cards) are passive devices which store data that can be retrieved by active NFC devices. The primary market of NFC is contactless payment systems. It also can be used for authentication, bootstrapping other connections, social networking and gaming etc.

MEMS definition and application

Micro-Electro-Mechanical Systems (MEMS) is the integration of mechanical elements, sensors, actuators, and ICs on a common silicon substrate through microfabrication technology. It usually consists of a microprocessor and several components that interact with the outside such as microsensors. The MEMS market consists of five major sectors: mobile, consumer electronics, automotive, data processing and industrial/process control. Uses of MEMS include the inkjet head of a printer, accelerators that trigger car airbags, gyroscopes for gaming, pressure sensors for blood pressure and car tires, RF MEMS for portable devices, and microphones, etc.

Model updated:16 October 2014

Running the numbers

Asia

Taiwan

Semiconductor & Equipment

TSMC

Reuters: 2330.TW Bloomberg: 2330 TT

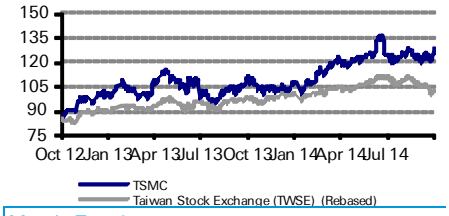
Buy

Price (22 Oct 14)	TWD 129.00
Target Price	TWD 166.00
52 Week range	TWD 100.00 - 136.50
Market Cap (m)	TWDm 3,343,293
	USDm 110,035

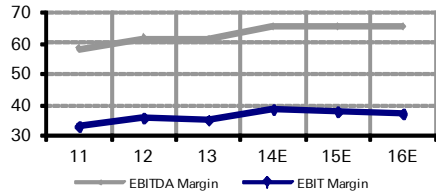
Company Profile

Taiwan Semiconductor Manufacturing Company Ltd (TSMC) is the No.1 foundry globally, with a 64% market share among the top four global foundries in 2008. TSMC manufactures and markets integrated circuits (IC). The company provides the following services: wafer manufacturing, wafer probing, assembly and testing, mask production, and design services. TSMC's ICs are used in the computer, communications, consumer electronics, automotive, and industrial equipment industries.

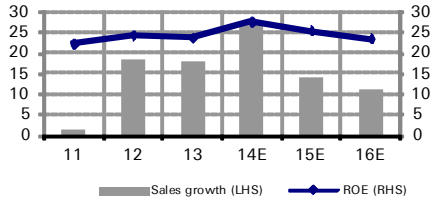
Price Performance



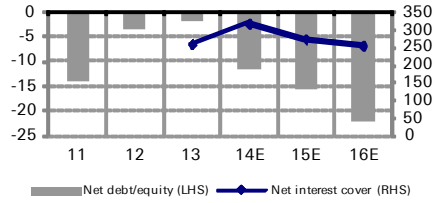
Margin Trends



Growth & Profitability



Solvency



Michael Chou
+886 2 2192 2836 michael.chou@db.com

Fiscal year end 31-Dec	2011	2012	2013	2014E	2015E	2016E
Financial Summary						
DB EPS (TWD)	5.18	6.41	7.26	10.05	11.05	11.99
Reported EPS (TWD)	5.18	6.41	7.26	10.05	11.05	11.99
DPS (TWD)	3.00	3.00	3.00	4.00	4.00	5.00
BVPS (TWD)	24.3	27.9	32.7	39.7	46.8	54.8
Weighted average shares (m)	25,913	25,918	25,926	25,930	25,930	25,930
Average market cap (TWDm)	1,867,842	2,178,638	2,698,686	3,343,293	3,343,293	3,343,293
Enterprise value (TWDm)	1,778,717	2,153,145	2,683,220	3,224,247	3,154,532	3,030,068
Valuation Metrics						
P/E (DB) (x)	13.9	13.1	14.3	12.8	11.7	10.8
P/E (Reported) (x)	13.9	13.1	14.3	12.8	11.7	10.8
P/BV (x)	3.12	3.48	3.23	3.25	2.75	2.36
FCF Yield (%)	1.8	2.0	2.2	5.0	5.2	7.1
Dividend Yield (%)	4.2	3.6	2.9	3.1	3.1	3.9
EV/Sales (x)	4.2	4.3	4.5	4.2	3.6	3.1
EV/EBITDA (x)	7.1	6.9	7.3	6.5	5.6	4.8
EV/EBIT (x)	12.6	11.9	12.8	11.0	9.6	8.4
Income Statement (TWDm)						
Sales revenue	427,081	506,249	597,024	759,312	866,159	965,280
Gross profit	301,751	374,944	437,129	579,206	661,265	736,726
EBITDA	249,239	312,406	365,612	497,034	567,044	630,692
Depreciation	107,682	131,349	156,184	203,522	237,646	270,799
Amortisation	0	0	0	0	0	0
EBIT	141,557	181,057	209,428	293,512	329,398	359,894
Net interest income(expense)	853	624	-810	-921	-1,200	-1,400
Associates/affiliates	0	0	0	0	0	0
Exceptionals/extraordinaries	0	0	0	0	0	0
Other pre-tax income/(expense)	2,737	-128	6,868	6,283	3,200	3,200
Profit before tax	145,148	181,553	215,486	298,874	331,398	361,694
Income tax expense	10,694	15,590	27,468	38,441	44,798	50,800
Minorities	252	-196	-127	-118	40	40
Other post-tax income/(expense)	0	0	0	0	0	0
Net profit	134,201	166,159	188,145	260,550	286,560	310,854
DB adjustments (including dilution)	0	0	0	0	0	0
DB Net profit	134,201	166,159	188,145	260,550	286,560	310,854
Cash Flow (TWDm)						
Cash flow from operations	247,587	289,064	347,384	457,443	493,435	557,984
Net Capex	-213,264	-245,980	-287,421	-289,852	-320,000	-320,000
Free cash flow	34,323	43,084	59,963	167,591	173,435	237,984
Equity raised/(bought back)	0	0	0	0	0	0
Dividends paid	-77,730	-77,749	-77,773	-77,786	-103,720	-103,720
Net inc/(dec) in borrowings	14,496	54,710	137,615	2,446	-5,000	-39,800
Other investing/financing cash flows	24,497	-20,106	-20,521	31,780	0	0
Net cash flow	-4,415	-61	99,284	124,031	64,715	94,464
Change in working capital	*-1,905*	*-3,171*	*55,680*	*-56,950*	*-34,171*	*-22,069*
Balance Sheet (TWDm)						
Cash and other liquid assets	143,472	143,411	242,695	366,726	431,441	525,905
Tangible fixed assets	490,375	617,529	792,666	819,528	901,882	951,083
Goodwill/intangible assets	0	0	0	0	0	0
Associates/investments	41,608	73,293	91,831	88,300	87,800	87,800
Other assets	98,809	120,802	135,863	164,131	202,293	227,776
Total assets	774,265	955,035	1,263,055	1,438,685	1,623,416	1,792,565
Interest bearing debt	54,347	117,918	227,229	247,680	242,680	212,680
Other liabilities	87,874	111,363	188,051	162,169	166,160	159,774
Total liabilities	142,221	229,281	415,280	409,849	408,840	372,454
Shareholders' equity	629,594	723,198	847,508	1,028,718	1,214,418	1,419,952
Minorities	2,450	2,556	267	118	158	158
Total shareholders' equity	632,044	725,754	847,775	1,028,836	1,214,576	1,420,110
Net debt	*-89,125*	*-25,493*	*-15,466*	*-119,046*	*-188,761*	*-313,225*
Key Company Metrics						
Sales growth (%)	1.8	18.5	17.9	27.2	14.1	11.4
DB EPS growth (%)	-17.0	23.8	13.2	38.5	10.0	8.5
EBITDA Margin (%)	58.4	61.7	61.2	65.5	65.5	65.3
EBIT Margin (%)	33.1	35.8	35.1	38.7	38.0	37.3
Payout ratio (%)	57.9	46.8	41.3	39.8	36.2	41.7
ROE (%)	22.3	24.6	24.0	27.8	25.5	23.6
Capex/sales (%)	50.1	48.6	48.2	38.2	36.9	33.2
Capex/depreciation (x)	2.0	1.9	1.8	1.4	1.3	1.2
Net debt/equity (%)	-14.1	-3.5	-1.8	-11.6	-15.5	-22.1
Net interest cover (x)	nm	nm	258.6	318.7	274.5	257.1

Source: Company data, Deutsche Bank estimates

23 October 2014
Technology
Asian Tech Strategy

Model updated:16 October 2014

Running the numbers

Asia

Taiwan

Semiconductor & Equipment
Model updated:28 September 2014

Running the numbers

Asia

South Korea

Semiconductor & Equipment

Samsung Electronics

Reuters: 005930.KS Bloomberg: 005930 KS

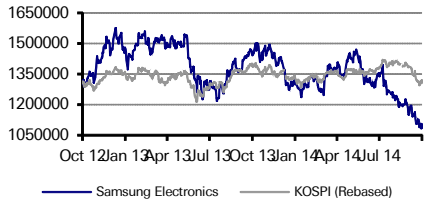
Buy

Price (22 Oct 14)	KRW 1,104,000
Target Price	KRW 1,480,000
52 Week range	KRW 1,083,000 - 1,500,000
Market Cap (bn)	KRWm 162,618
	USDm 154,184

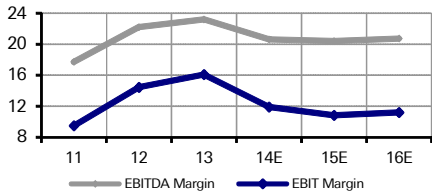
Company Profile

Samsung Electronics Co Ltd (SEC) was founded in 1969 and manufactures a wide range of consumer and industrial electronic equipment and products such as semiconductors, LCD panels, televisions, computer devices and home appliances (including air conditioners, washers and microwave ovens). The company also produces Internet access network systems and telecommunications equipment, including mobile phones.

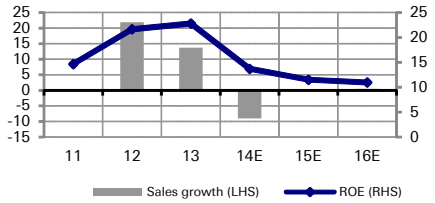
Price Performance



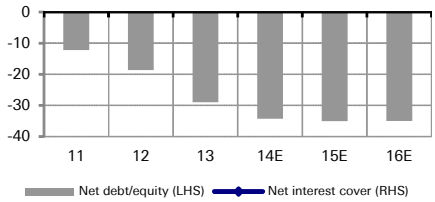
Margin Trends



Growth & Profitability



Solvency



Fiscal year end 31-Dec	2011	2012	2013	2014E	2015E	2016E
Financial Summary						
DB EPS (TWD)	5.18	6.41	7.26	10.05	11.05	11.99
Reported EPS (TWD)	5.18	6.41	7.26	10.05	11.05	11.99
DPS (TWD)	3.00	3.00	3.00	4.00	4.00	5.00
BVPS (TWD)	24.3	27.9	32.7	39.7	46.8	54.8

Fiscal year end 31-Dec	2011	2012	2013	2014E	2015E	2016E
Financial Summary						
DB EPS (KRW)	90,853.64	157,403.51	202,453.65	141,735.71	131,306.87	136,736.44
Reported EPS (KRW)	90,853.64	157,403.51	202,453.65	141,735.71	131,306.87	136,736.44
DPS (KRW)	5,500.00	8,000.00	13,800.00	15,000.00	15,000.00	15,000.00
BVPS (KRW)	659,138.1	794,941.3	980,608.3	1,088,577.4	1,192,617.2	1,300,879.4
Weighted average shares (m)	147	147	147	147	147	147
Average market cap (KRWbn)	na	185,755	210,446	162,618	162,618	162,618
Enterprise value (KRWbn)	na	180,253	187,604	131,118	124,438	118,953
Valuation Metrics						
P/E (DB) (x)	na	8.0	7.1	7.8	8.4	8.1
P/E (Reported) (x)	na	8.0	7.1	7.8	8.4	8.1
P/BV (x)	0.00	1.91	1.40	1.01	0.93	0.85
FCF Yield (%)	na	8.1	11.2	11.5	7.5	6.9
Dividend Yield (%)	na	0.6	1.0	1.4	1.4	1.4
EV/Sales (x)	nm	0.9	0.8	0.6	0.6	0.6
EV/EBITDA (x)	nm	4.0	3.5	3.1	2.9	2.7
EV/EBIT (x)	nm	6.2	5.1	5.3	5.5	5.1
Income Statement (KRWbn)						
Sales revenue	165,002	201,104	228,693	208,053	207,976	208,942
Gross profit	52,857	74,452	90,996	73,758	71,492	72,600
EBITDA	29,236	44,671	53,042	42,903	42,443	43,323
Depreciation	12,934	14,835	15,470	17,351	19,138	19,138
Amortisation	658	787	787	787	787	787
EBIT	15,644	29,049	36,785	24,765	22,517	23,397
Net interest income(expense)	62	246	842	812	1,062	1,222
Associates/affiliates	1,399	987	504	250	250	250
Exceptionals/extraordinaries	0	0	0	0	0	0
Other pre-tax income/(expense)	87	-367	233	1,333	1,333	1,333
Profit before tax	17,192	29,915	38,364	27,161	25,162	26,203
Income tax expense	3,433	6,070	7,890	5,704	5,284	5,503
Minorities	376	660	654	579	537	559
Other post-tax income/(expense)	0	0	0	0	0	0
Net profit	13,383	23,185	29,821	20,878	19,341	20,141
DB adjustments (including dilution)	0	0	0	0	0	0
DB Net profit	13,383	23,185	29,821	20,878	19,341	20,141
Cash Flow (KRWbn)						
Cash flow from operations	22,918	37,973	46,707	42,727	39,152	39,631
Net Capex	-21,966	-22,965	-23,158	-24,000	-27,000	-28,350
Free cash flow	952	15,008	23,550	18,727	12,152	11,281
Equity raised/(bought back)	0	0	0	0	0	0
Dividends paid	-937	-937	-1,362	-2,349	-2,553	-2,553
Net inc/(dec) in borrowings	3,846	270	-3,715	-2,500	-2,500	-1,500
Other investing/financing cash flows	1,039	-10,241	-20,979	-2,978	-2,990	-3,520
Net cash flow	4,900	4,100	-2,507	10,900	4,109	3,708
Change in working capital	*0*	*-5,778*	*-1,313*	*3,132*	*-652*	*-994*
Balance Sheet (KRWbn)						
Cash and other liquid assets	26,878	37,448	54,496	65,423	69,603	73,588
Tangible fixed assets	62,044	68,485	75,496	82,145	90,007	99,218
Goodwill/intangible assets	3,355	3,730	3,981	3,981	3,981	3,981
Associates/investments	12,428	14,015	12,661	13,535	14,471	15,476
Other assets	51,096	57,394	67,441	62,150	62,131	62,368
Total assets	155,800	181,072	214,075	227,234	240,192	254,630
Interest bearing debt	14,524	14,793	11,078	8,578	6,078	4,578
Other liabilities	39,963	44,798	52,981	52,736	52,869	52,861
Total liabilities	54,487	59,591	64,059	61,314	58,947	57,439
Shareholders' equity	97,090	117,094	144,443	160,346	175,671	191,618
Minorities	4,223	4,386	5,573	5,573	5,573	5,573
Total shareholders' equity	101,314	121,480	150,016	165,920	181,245	197,192
Net debt	*-12,354*	*-22,655*	*-43,418*	*-56,845*	*-63,525*	*-69,010*
Key Company Metrics						
Sales growth (%)	nm	21.9	13.7	-9.0	0.0	0.5
DB EPS growth (%)	na	73.2	28.6	-30.0	-7.4	4.1
EBITDA Margin (%)	17.7	22.2	23.2	20.6	20.4	20.7
EBIT Margin (%)	9.5	14.4	16.1	11.9	10.8	11.2
Payout ratio (%)	6.1	5.1	6.8	10.6	11.4	11.0
ROE (%)	14.7	21.6	22.8	13.7	11.5	11.0
Capex/sales (%)	13.3	11.4	10.1	11.5	13.0	13.6
Capex/depreciation (x)	1.6	1.5	1.4	1.3	1.4	1.4
Net debt/equity (%)	-12.2	-18.6	-28.9	-34.3	-35.0	-35.0
Net interest cover (x)	nm	nm	nm	nm	nm	nm

Source: Company data, Deutsche Bank estimates

Seung Hoon Han

Model updated:24 July 2014

Running the numbers

Asia

South Korea

Technology

SK Hynix

Reuters: 000660.KS Bloomberg: 000660 KS

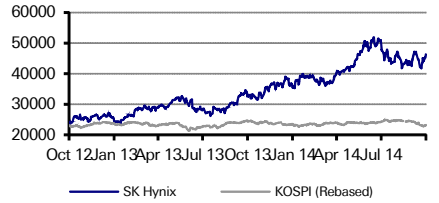
Buy

Price (22 Oct 14)	KRW 46,300
Target Price	KRW 59,400
52 Week range	KRW 31,500 - 51,900
Market Cap (bn)	KRWm 33,809
	USDm 32,056

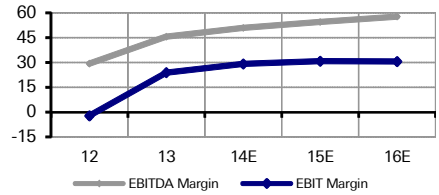
Company Profile

Hynix Semiconductor Inc. (Hynix) was founded in 1949. The company manufactures semiconductors, such as dynamic random access memory (DRAM), NAND flash memory, and non-memory products such as complementary metal oxide semiconductor (CMOS) image sensor, or CIS.

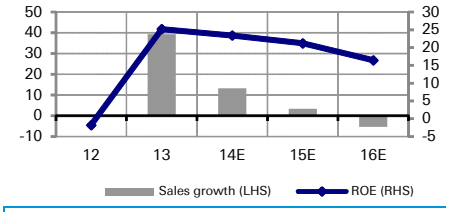
Price Performance



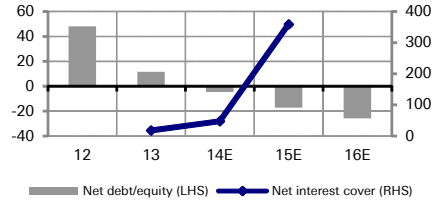
Margin Trends



Growth & Profitability



Solvency



Seung Hoon Han
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Fiscal year end 31-Dec	2012	2013	2014E	2015E	2016E
Financial Summary					
DB EPS (KRW)	-217.59	3,933.70	4,757.86	5,425.83	5,098.38
Reported EPS (KRW)	-217.59	3,933.70	4,757.86	5,425.83	5,098.38
DPS (KRW)	0.00	0.00	0.00	0.00	0.00
BVPS (KRW)	13,338.6	17,894.9	22,769.8	28,387.4	33,674.2
Weighted average shares (m)	730	730	730	730	730
Average market cap (KRWbn)	18,263	21,743	33,809	33,809	33,809
Enterprise value (KRWbn)	22,769	22,963	32,747	29,962	27,175
Valuation Metrics					
P/E (DB) (x)	nm	7.6	9.7	8.5	9.1
P/E (Reported) (x)	nm	7.6	9.7	8.5	9.1
P/BV (x)	1.93	2.06	2.03	1.63	1.37
FCF Yield (%)	nm	14.6	9.0	9.5	10.1
Dividend Yield (%)	0.0	0.0	0.0	0.0	0.0
EV/Sales (x)	2.2	1.6	2.0	1.8	1.7
EV/EBITDA (x)	7.7	3.6	4.0	3.3	3.0
EV/EBIT (x)	nm	6.8	7.0	5.9	5.7
Income Statement (KRWbn)					
Sales revenue	10,162	14,165	16,033	16,573	15,691
Gross profit	1,611	5,301	6,994	7,506	7,076
EBITDA	2,976	6,458	8,162	9,035	9,058
Depreciation	3,058	2,922	3,337	3,777	4,101
Amortisation	146	156	156	156	156
EBIT	-227	3,380	4,669	5,103	4,801
Net interest income(expense)	-238	-190	-98	-14	77
Associates/affiliates	17	19	19	19	19
Exceptionals/extraordinaries	0	0	0	0	0
Other pre-tax income/(expense)	249	-134	-221	-105	-197
Profit before tax	-199	3,075	4,369	5,003	4,701
Income tax expense	-41	202	859	1,001	940
Minorities	0	0	35	40	38
Other post-tax income/(expense)	0	0	0	0	0
Net profit	-159	2,872	3,474	3,962	3,723
DB adjustments (including dilution)	0	0	0	0	0
DB Net profit	-159	2,872	3,474	3,962	3,723
Cash Flow (KRWbn)					
Cash flow from operations	2,212	6,372	7,198	8,200	8,641
Net Capex	-3,773	-3,206	-4,150	-4,980	-5,229
Free cash flow	-1,561	3,166	3,048	3,220	3,412
Equity raised/(bought back)	2,329	432	0	0	0
Dividends paid	0	0	0	0	0
Net inc/(dec) in borrowings	-304	-1,922	-400	-400	-400
Other investing/financing cash flows	-1,048	-1,703	-765	-434	-625
Net cash flow	-585	-27	1,882	2,385	2,387
Change in working capital	*-501*	*-33*	*-254*	*0*	*0*
Balance Sheet (KRWbn)					
Cash and other liquid assets	1,786	3,035	4,917	7,303	9,690
Tangible fixed assets	11,586	12,130	12,943	14,146	15,274
Goodwill/intangible assets	984	1,110	1,110	1,110	1,110
Associates/investments	178	294	294	294	294
Other assets	4,114	4,228	5,099	5,333	5,081
Total assets	18,649	20,797	24,364	28,186	31,450
Interest bearing debt	6,472	4,550	4,150	3,750	3,350
Other liabilities	2,437	3,180	3,587	3,707	3,510
Total liabilities	8,909	7,730	7,737	7,458	6,860
Shareholders' equity	9,740	13,067	16,627	20,729	24,590
Minorities	-1	0	0	0	0
Total shareholders' equity	9,739	13,067	16,627	20,729	24,589
Net debt	*4,686*	*1,515*	*-767*	*-3,552*	*-6,339*
Key Company Metrics					
Sales growth (%)	nm	39.4	13.2	3.4	-5.3
DB EPS growth (%)	na	na	21.0	14.0	-6.0
EBITDA Margin (%)	29.3	45.6	50.9	54.5	57.7
EBIT Margin (%)	-2.2	23.9	29.1	30.8	30.6
Payout ratio (%)	nm	0.0	0.0	0.0	0.0
ROE (%)	-1.8	25.2	23.4	21.2	16.4
Capex/sales (%)	37.1	22.6	25.9	30.0	33.3
Capex/depreciation (x)	1.2	1.0	1.2	1.3	1.2
Net debt/equity (%)	48.1	11.6	-4.6	-17.1	-25.8
Net interest cover (x)	nm	17.8	47.5	359.0	nm

Source: Company data, Deutsche Bank estimates

Model updated:21 October 2014

Running the numbers

Asia

Taiwan

Hardware & Equipment

LARGAN Precision

Reuters: 3008.TW Bloomberg: 3008 TT

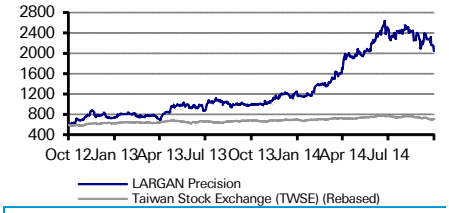
Buy

Price (22 Oct 14)	TWD 2,050.00
Target Price	TWD 2,870.00
52 Week range	TWD 982.00 - 2,635.00
Market Cap (m)	TWDm 274,987
	USDm 9,050

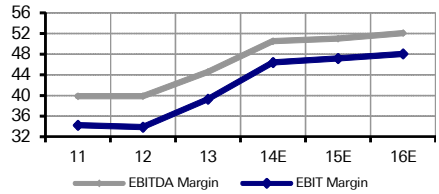
Company Profile

Largan manufactures and markets optical lenses for Digital Still Cameras (DSCs), camera phones, scanners and LCD projectors. With expertise in plastic lens manufacturing, Largan is the leading phone camera lenses producer in Taiwan.

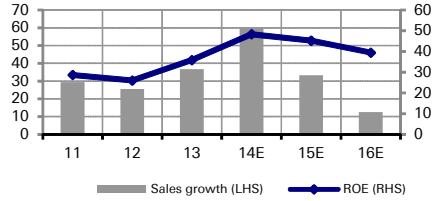
Price Performance



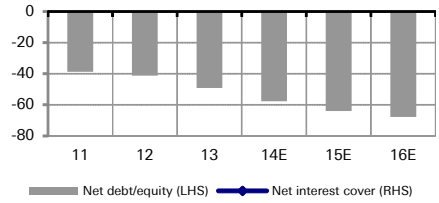
Margin Trends



Growth & Profitability



Solvency



Birdy Lu, CFA
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Fiscal year end 31-Dec	2011	2012	2013	2014E	2015E	2016E
Financial Summary						
DB EPS (TWD)	38.76	41.58	71.64	135.65	179.58	207.34
Reported EPS (TWD)	38.76	41.58	71.64	135.65	179.58	207.34
DPS (TWD)	17.00	17.00	28.50	54.26	75.43	87.08
BVPS (TWD)	147.9	172.2	227.2	334.3	459.7	591.6
Weighted average shares (m)	134	134	134	134	134	134
Average market cap (TWDm)	105,313	83,578	124,966	274,987	274,987	274,987
Enterprise value (TWDm)	94,236	71,704	107,702	246,809	233,192	218,813
Valuation Metrics						
P/E (DB) (x)	20.3	15.0	13.0	15.1	11.4	9.9
P/E (Reported) (x)	20.3	15.0	13.0	15.1	11.4	9.9
P/BV (x)	3.83	4.52	5.35	6.13	4.46	3.47
FCF Yield (%)	4.7	4.0	6.2	5.1	7.6	8.9
Dividend Yield (%)	2.2	2.7	3.1	2.6	3.7	4.2
EV/Sales (x)	5.9	3.6	3.9	5.6	4.0	3.3
EV/EBITDA (x)	14.8	9.0	8.8	11.1	7.8	6.4
EV/EBIT (x)	17.2	10.5	10.0	12.1	8.4	6.9
Income Statement (TWDm)						
Sales revenue	15,984	20,072	27,433	43,885	58,497	65,863
Gross profit	7,840	9,569	14,409	25,463	33,939	38,785
EBITDA	6,372	8,005	12,229	22,172	29,844	34,306
Depreciation	887	1,191	1,434	1,796	2,227	2,637
Amortisation	13	17	13	13	13	13
EBIT	5,472	6,798	10,781	20,363	27,604	31,656
Net interest income(expense)	50	84	122	165	273	408
Associates/affiliates	-18	2	-51	5	43	51
Exceptionals/extraordinaries	0	0	0	0	0	0
Other pre-tax income/(expense)	332	-73	649	875	255	225
Profit before tax	5,837	6,811	11,501	21,408	28,175	32,340
Income tax expense	638	1,234	1,891	3,211	4,085	4,528
Minorities	0	0	0	0	0	0
Other post-tax income/(expense)	0	0	0	0	0	0
Net profit	5,199	5,578	9,610	18,197	24,089	27,812
DB adjustments (including dilution)	0	0	0	0	0	0
DB Net profit	5,199	5,578	9,610	18,197	24,089	27,812
Cash Flow (TWDm)						
Cash flow from operations	7,318	6,000	10,746	18,956	25,358	29,949
Net Capex	-2,368	-2,654	-3,056	-5,000	-4,500	-5,500
Free cash flow	4,951	3,347	7,690	13,956	20,858	24,449
Equity raised/(bought back)	5	3	0	0	0	0
Dividends paid	-2,280	-2,280	-3,823	-7,279	-10,118	-11,681
Net inc/(dec) in borrowings	332	-351	-11	62	10	10
Other investing/financing cash flows	61	762	1,584	4,220	2,823	1,549
Net cash flow	3,068	1,480	5,440	10,960	13,574	14,326
Change in working capital	*1,202*	*-783*	*-363*	*-1,044*	*-928*	*-463*
Balance Sheet (TWDm)						
Cash and other liquid assets	8,124	9,604	15,045	26,004	39,578	53,904
Tangible fixed assets	8,057	9,731	9,800	13,004	15,278	18,141
Goodwill/intangible assets	0	0	0	0	0	0
Associates/investments	3,376	2,335	2,274	2,290	2,343	2,404
Other assets	5,353	9,519	11,495	16,026	21,015	23,458
Total assets	24,909	31,188	38,614	57,324	78,213	97,908
Interest bearing debt	444	93	83	145	155	165
Other liabilities	4,653	8,030	8,086	12,361	16,429	18,418
Total liabilities	5,097	8,123	8,168	12,506	16,584	18,583
Shareholders' equity	19,834	23,093	30,474	44,848	61,659	79,355
Minorities	-21	-28	-29	-29	-30	-30
Total shareholders' equity	19,813	23,065	30,445	44,819	61,630	79,324
Net debt	*-7,680*	*-9,511*	*-14,962*	*-25,859*	*-39,423*	*-53,739*
Key Company Metrics						
Sales growth (%)	29.4	25.6	36.7	60.0	33.3	12.6
DB EPS growth (%)	28.5	7.3	72.3	89.4	32.4	15.5
EBITDA Margin (%)	39.9	39.9	44.6	50.5	51.0	52.1
EBIT Margin (%)	34.2	33.9	39.3	46.4	47.2	48.1
Payout ratio (%)	43.9	40.9	39.8	40.0	42.0	42.0
ROE (%)	28.7	26.0	35.9	48.3	45.2	39.4
Capex/sales (%)	14.8	13.2	11.1	11.4	7.7	8.4
Capex/depreciation (x)	2.6	2.2	2.1	2.8	2.0	2.1
Net debt/equity (%)	-38.8	-41.2	-49.1	-57.7	-64.0	-67.7
Net interest cover (x)	nm	nm	nm	nm	nm	nm

Source: Company data, Deutsche Bank estimates

Model updated:21 October 2014

Running the numbers

Asia

Taiwan

Hardware & Equipment

Catcher Technology

Reuters: 2474.TW Bloomberg: 2474 TT

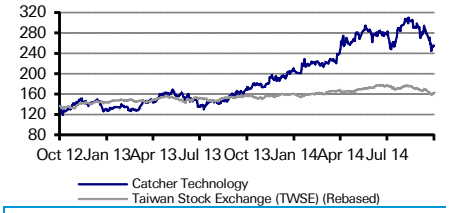
Buy

Price (22 Oct 14)	TWD 255.00
Target Price	TWD 350.00
52 Week range	TWD 168.50 - 310.00
Market Cap (m)	TWDm 191,429
	USDm 6,300

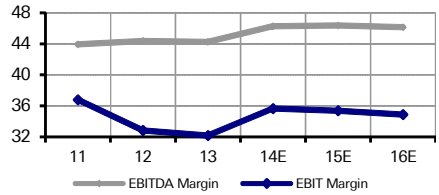
Company Profile

Catcher Technology Co Ltd manufactures aluminium and magnesium die-casting products, which are used in notebook computers, cellular phones and MP3 players. Its major customers are Apple, Dell, HTC and RIM.

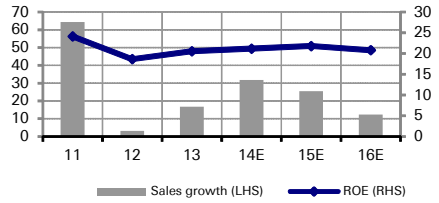
Price Performance



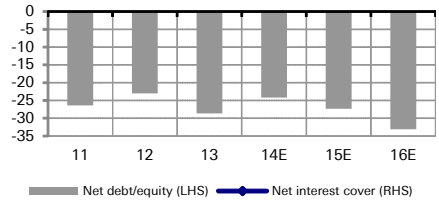
Margin Trends



Growth & Profitability



Solvency



Birdy Lu, CFA
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Fiscal year end 31-Dec	2011	2012	2013	2014E	2015E	2016E
Financial Summary						
DB EPS (TWD)	14.98	14.51	18.38	22.55	27.10	29.68
Reported EPS (TWD)	14.98	14.51	18.38	22.55	27.10	29.68
DPS (TWD)	5.27	6.00	5.00	9.02	10.84	11.87
BVPS (TWD)	74.3	81.3	97.7	115.2	133.3	152.1
Weighted average shares (m)	713	751	751	751	751	751
Average market cap (TWDm)	121,258	127,351	115,164	191,429	191,429	191,429
Enterprise value (TWDm)	103,785	110,789	91,373	167,599	161,018	150,442
Valuation Metrics						
P/E (DB) (x)	11.4	11.7	8.3	11.3	9.4	8.6
P/E (Reported) (x)	11.4	11.7	8.3	11.3	9.4	8.6
P/BV (x)	1.89	1.77	1.98	2.21	1.91	1.68
FCF Yield (%)	6.2	2.6	8.3	2.1	7.1	10.1
Dividend Yield (%)	3.1	3.5	3.3	3.5	4.3	4.7
EV/Sales (x)	2.9	3.0	2.1	2.9	2.3	1.9
EV/EBITDA (x)	6.6	6.7	4.8	6.4	4.9	4.1
EV/EBIT (x)	7.9	9.1	6.6	8.2	6.4	5.4
Income Statement (TWDm)						
Sales revenue	35,914	37,029	43,246	56,990	71,539	80,379
Gross profit	19,455	20,314	23,546	31,959	39,754	44,325
EBITDA	15,778	16,433	19,141	26,374	33,173	37,090
Depreciation	2,466	4,152	5,179	6,006	7,819	9,009
Amortisation	98	123	47	45	44	43
EBIT	13,213	12,158	13,916	20,323	25,310	28,039
Net interest income(expense)	126	338	367	390	393	505
Associates/affiliates	122	114	56	119	127	135
Exceptionals/extraordinaries	0	0	0	0	0	0
Other pre-tax income/(expense)	243	1,341	3,190	895	275	285
Profit before tax	13,705	13,951	17,528	21,727	26,105	28,964
Income tax expense	3,040	3,042	3,711	4,780	5,743	6,662
Minorities	-12	19	16	18	19	21
Other post-tax income/(expense)	0	0	0	0	0	0
Net profit	10,677	10,890	13,801	16,930	20,343	22,281
DB adjustments (including dilution)	0	0	0	0	0	0
DB Net profit	10,677	10,890	13,801	16,930	20,343	22,281
Cash Flow (TWDm)						
Cash flow from operations	15,543	11,663	19,189	19,054	24,123	28,803
Net Capex	-8,031	-8,369	-9,603	-15,015	-10,500	-9,500
Free cash flow	7,512	3,294	9,586	4,039	13,623	19,303
Equity raised/(bought back)	11,994	8	0	0	0	0
Dividends paid	-3,753	-4,504	-3,754	-6,772	-8,137	-8,913
Net inc/(dec) in borrowings	5,826	6,224	-10,982	1,652	1,784	-24,084
Other investing/financing cash flows	1,372	506	1,129	2,646	962	44
Net cash flow	22,951	5,528	-4,020	1,565	8,232	-13,650
Change in working capital	*2,401*	*-3,417*	*218*	*-3,807*	*-3,956*	*-2,394*
Balance Sheet (TWDm)						
Cash and other liquid assets	40,198	45,726	41,706	43,270	51,503	37,853
Tangible fixed assets	28,408	30,998	34,903	43,913	46,593	47,085
Goodwill/intangible assets	0	0	0	0	0	0
Associates/investments	2,886	2,656	2,928	3,057	3,195	3,340
Other assets	17,787	21,546	25,842	33,101	41,116	46,198
Total assets	89,278	100,926	105,379	123,341	142,407	134,475
Interest bearing debt	25,406	31,630	20,648	22,300	24,084	0
Other liabilities	7,867	8,086	11,221	14,355	18,066	20,074
Total liabilities	33,273	39,716	31,870	36,655	42,150	20,074
Shareholders' equity	55,801	61,020	73,316	86,488	100,055	114,195
Minorities	204	190	194	198	201	206
Total shareholders' equity	56,005	61,210	73,509	86,686	100,257	114,401
Net debt	*-14,792*	*-14,096*	*-21,057*	*-20,970*	*-27,419*	*-37,853*
Key Company Metrics						
Sales growth (%)	64.4	3.1	16.8	31.8	25.5	12.4
DB EPS growth (%)	124.8	-3.1	26.7	22.7	20.2	9.5
EBITDA Margin (%)	43.9	44.4	44.3	46.3	46.4	46.1
EBIT Margin (%)	36.8	32.8	32.2	35.7	35.4	34.9
Payout ratio (%)	35.2	41.4	27.2	40.0	40.0	40.0
ROE (%)	24.1	18.6	20.5	21.2	21.8	20.8
Capex/sales (%)	22.4	22.6	22.2	26.3	14.7	11.8
Capex/depreciation (x)	3.1	2.0	1.8	2.5	1.3	1.0
Net debt/equity (%)	-26.4	-23.0	-28.6	-24.2	-27.3	-33.1
Net interest cover (x)	nm	nm	nm	nm	nm	nm

Source: Company data, Deutsche Bank estimates

Model updated:29 September 2014

Running the numbers

Asia

Taiwan

Hardware & Equipment

Delta Electronics

Reuters: 2308.TW Bloomberg: 2308 TT

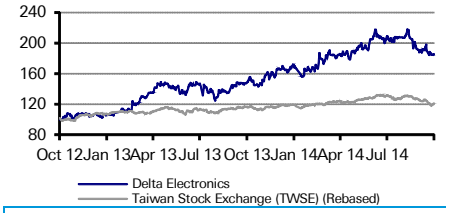
Buy

Price (22 Oct 14)	TWD 185.50
Target Price	TWD 220.00
52 Week range	TWD 143.00 - 218.00
Market Cap (m)	TWDm 452,164
	USDm 14,882

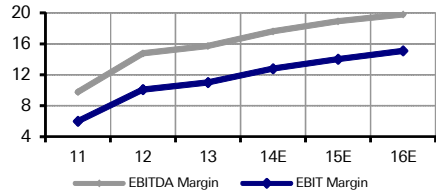
Company Profile

Delta Electronics Inc. manufactures power supplies and video display products. The Company's products include switching power supplies, telecom power systems, uninterrupted power supply (UPS), variable speed alternating current (AC) monitor drives, high resolution color monitors, and projectors. Delta also manufactures magnetics and networking components.

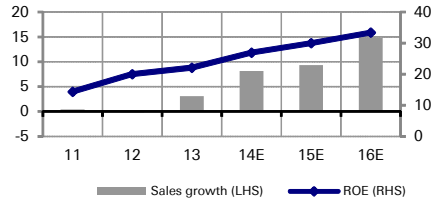
Price Performance



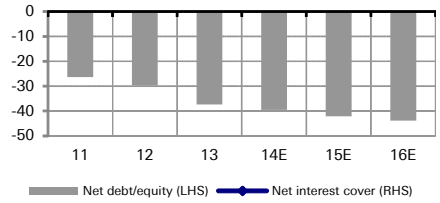
Margin Trends



Growth & Profitability



Solvency



Fiscal year end 31-Dec	2011	2012	2013	2014E	2015E	2016E
Financial Summary						
DB EPS (TWD)	4.57	6.65	7.29	8.96	10.97	13.62
Reported EPS (TWD)	4.57	6.65	7.29	8.96	10.97	13.62
DPS (TWD)	3.50	5.30	5.78	7.16	8.78	10.90
BVPS (TWD)	32.3	34.5	31.7	34.8	38.4	43.1
Weighted average shares (m)	2,403	2,421	2,438	2,438	2,438	2,438
Average market cap (TWDm)	241,382	228,665	332,997	452,164	452,164	452,164
Enterprise value (TWDm)	219,077	203,012	296,078	409,737	402,648	394,891
Valuation Metrics						
P/E (DB) (x)	22.0	14.2	18.7	20.7	16.9	13.6
P/E (Reported) (x)	22.0	14.2	18.7	20.7	16.9	13.6
P/BV (x)	2.23	3.09	5.36	5.34	4.83	4.30
FCF Yield (%)	nm	3.7	6.2	4.5	5.5	6.5
Dividend Yield (%)	3.5	5.6	4.2	3.9	4.7	5.9
EV/Sales (x)	1.3	1.2	1.7	2.1	1.9	1.6
EV/EBITDA (x)	13.0	8.0	10.6	12.2	10.2	8.3
EV/EBIT (x)	21.2	11.7	15.2	16.7	13.7	10.9
Income Statement (TWDm)						
Sales revenue	172,056	171,760	177,053	191,463	209,305	240,269
Gross profit	39,294	50,189	53,362	61,672	69,813	82,042
EBITDA	16,829	25,381	27,850	33,718	39,568	47,563
Depreciation	5,451	6,547	7,227	8,072	9,030	10,066
Amortisation	1,060	1,482	1,115	1,148	1,182	1,218
EBIT	10,318	17,352	19,508	24,498	29,355	36,280
Net interest income(expense)	508	538	548	564	631	716
Associates/affiliates	583	773	1,021	844	1,056	1,111
Exceptionals/extraordinaries	0	0	0	0	0	0
Other pre-tax income/(expense)	3,175	3,843	1,419	1,915	2,512	3,123
Profit before tax	14,585	22,506	22,497	27,821	33,554	41,230
Income tax expense	2,826	3,349	3,582	4,396	5,201	6,391
Minorities	768	3,048	1,139	1,594	1,610	1,642
Other post-tax income/(expense)	0	0	0	0	0	0
Net profit	10,991	16,110	17,776	21,831	26,743	33,197
DB adjustments (including dilution)	0	0	0	0	0	0
DB Net profit	10,991	16,110	17,776	21,831	26,743	33,197
Cash Flow (TWDm)						
Cash flow from operations	9,817	19,119	29,101	28,954	34,301	40,763
Net Capex	-13,290	-10,705	-8,380	-8,715	-9,412	-11,295
Free cash flow	-3,473	8,414	20,721	20,239	24,888	29,469
Equity raised/(bought back)	311	71	0	0	0	0
Dividends paid	-8,411	-12,843	-14,100	-17,465	-21,394	-26,558
Net inc/(dec) in borrowings	23,791	-21,718	1,868	235	237	239
Other investing/financing cash flows	-4,982	9,475	-1,153	2,350	3,007	4,213
Net cash flow	7,236	-16,600	7,337	5,358	6,738	7,364
Change in working capital	*-7,701*	*-4,547*	*3,864*	*-1,396*	*-1,745*	*-2,755*
Balance Sheet (TWDm)						
Cash and other liquid assets	67,696	51,096	58,433	63,791	70,529	77,893
Tangible fixed assets	36,918	34,908	37,195	37,958	38,340	39,569
Goodwill/intangible assets	12,097	11,733	10,858	11,401	11,971	12,569
Associates/investments	12,857	12,139	18,256	18,968	19,887	20,860
Other assets	63,626	72,012	72,587	77,460	83,198	93,605
Total assets	193,194	181,889	197,329	209,577	223,925	244,495
Interest bearing debt	43,320	21,602	23,470	23,704	23,942	24,181
Other liabilities	57,389	60,883	80,211	84,494	89,326	97,854
Total liabilities	100,708	82,485	103,681	108,198	113,268	122,035
Shareholders' equity	77,557	83,423	77,347	84,753	93,698	105,162
Minorities	14,929	15,981	16,301	16,627	16,959	17,298
Total shareholders' equity	92,486	99,404	93,648	101,379	110,657	122,460
Net debt	*-24,376*	*-29,494*	*-34,963*	*-40,087*	*-46,588*	*-53,712*
Key Company Metrics						
Sales growth (%)	0.4	-0.2	3.1	8.1	9.3	14.8
DB EPS growth (%)	-30.5	45.5	9.6	22.8	22.5	24.1
EBITDA Margin (%)	9.8	14.8	15.7	17.6	18.9	19.8
EBIT Margin (%)	6.0	10.1	11.0	12.8	14.0	15.1
Payout ratio (%)	76.5	79.7	79.3	80.0	80.0	80.0
ROE (%)	14.4	20.0	22.1	26.9	30.0	33.4
Capex/sales (%)	7.7	6.2	4.7	4.6	4.5	4.7
Capex/depreciation (x)	2.0	1.3	1.0	0.9	0.9	1.0
Net debt/equity (%)	-26.4	-29.7	-37.3	-39.5	-42.1	-43.9
Net interest cover (x)	nm	nm	nm	nm	nm	nm

Source: Company data, Deutsche Bank estimates

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Model updated:21 October 2014

Running the numbers

Asia

Taiwan

Hardware & Equipment

Hon Hai Precision

Reuters: 2317.TW Bloomberg: 2317 TT

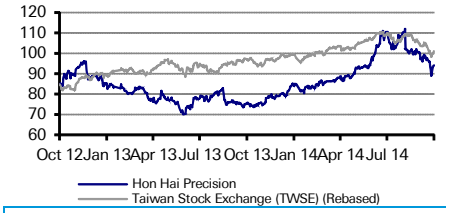
Buy

Price (22 Oct 14)	TWD 94.00
Target Price	TWD 116.00
52 Week range	TWD 73.60 - 112.00
Market Cap (m)	TWDm 1,409,887
	USDm 46,402

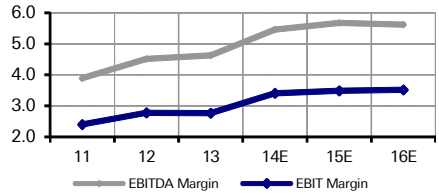
Company Profile

Hon Hai Precision Industry Co., Ltd. manufactures and markets personal computer (PC) connectors, and cable assemblies used in desktop PCs and PC servers.

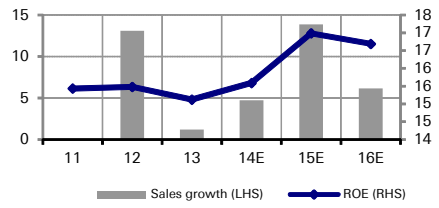
Price Performance



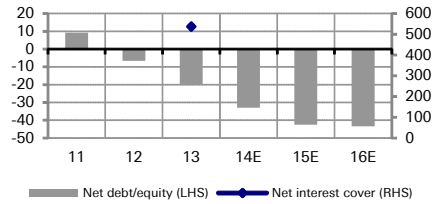
Margin Trends



Growth & Profitability



Solvency



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Fiscal year end 31-Dec	2011	2012	2013	2014E	2015E	2016E
Financial Summary						
DB EPS (TWD)	7.49	7.86	8.00	8.17	9.63	10.02
Reported EPS (TWD)	7.49	7.86	8.00	8.17	9.63	10.02
DPS (TWD)	1.50	1.50	1.80	1.84	2.17	2.26
BVPS (TWD)	53.0	53.6	57.3	53.8	59.6	60.6
Weighted average shares (m)	10,907	12,054	13,334	14,999	14,999	14,999
Average market cap (TWDm)	1,013,223	1,109,415	1,046,142	1,409,887	1,409,887	1,409,887
Enterprise value (TWDm)	905,819	896,248	681,272	966,196	842,714	823,518
Valuation Metrics						
P/E (DB) (x)	12.4	11.7	9.8	11.5	9.8	9.4
P/E (Reported) (x)	12.4	11.7	9.8	11.5	9.8	9.4
P/BV (x)	1.56	1.66	1.40	1.75	1.58	1.55
FCF Yield (%)	0.9	9.9	12.3	10.2	10.4	3.4
Dividend Yield (%)	1.6	1.6	2.3	2.0	2.3	2.4
EV/Sales (x)	0.3	0.2	0.2	0.2	0.2	0.2
EV/EBITDA (x)	6.7	5.1	3.7	4.3	3.2	2.9
EV/EBIT (x)	10.9	8.3	6.2	6.8	5.1	4.7
Income Statement (TWDm)						
Sales revenue	3,452,682	3,905,395	3,952,318	4,138,850	4,713,377	5,003,941
Gross profit	317,839	397,512	328,309	375,159	432,446	463,095
EBITDA	134,301	176,334	182,929	226,092	267,507	281,296
Depreciation	45,661	58,162	72,687	79,162	97,363	99,310
Amortisation	5,794	9,722	926	5,860	5,802	5,981
EBIT	82,846	108,451	109,316	141,069	164,343	176,005
Net interest income(expense)	2,721	3,752	-203	4,656	2,737	3,014
Associates/affiliates	3,319	2,937	5,668	1,131	3,042	3,031
Exceptionals/extraordinaries	0	0	0	0	0	0
Other pre-tax income/(expense)	13,650	3,239	21,516	14,784	15,030	12,347
Profit before tax	102,536	118,379	136,296	161,640	185,152	194,397
Income tax expense	20,602	26,591	28,951	37,628	38,578	41,843
Minorities	259	-2,975	647	1,450	2,107	2,199
Other post-tax income/(expense)	0	0	0	0	0	0
Net profit	81,676	94,764	106,698	122,562	144,466	150,355
DB adjustments (including dilution)	0	0	0	0	0	0
DB Net profit	81,676	94,764	106,698	122,562	144,466	150,355
Cash Flow (TWDm)						
Cash flow from operations	101,208	179,805	172,752	192,208	199,060	105,114
Net Capex	-91,666	-70,144	-44,395	-48,835	-52,741	-56,961
Free cash flow	9,542	109,661	128,356	143,374	146,319	48,153
Equity raised/(bought back)	0	0	0	0	0	0
Dividends paid	-9,661	-16,034	-17,754	-21,340	-24,512	-28,893
Net inc/(dec) in borrowings	69,557	32,455	77,613	31,001	32,415	32,416
Other investing/financing cash flows	18,751	1,682	28,448	5,465	4,670	3,638
Net cash flow	88,188	127,764	216,664	158,500	158,892	55,314
Change in working capital	*-66,028*	*-36,483*	*-3,230*	*-18,947*	*-50,786*	*-26,628*
Balance Sheet (TWDm)						
Cash and other liquid assets	330,538	506,445	696,312	854,814	1,013,708	1,069,024
Tangible fixed assets	355,373	390,298	379,562	329,728	285,107	242,757
Goodwill/intangible assets	0	0	0	0	0	0
Associates/investments	49,122	63,432	71,286	71,357	71,429	71,500
Other assets	995,277	1,084,229	1,165,301	1,207,554	1,356,425	1,429,476
Total assets	1,730,311	2,044,404	2,312,461	2,463,454	2,726,669	2,812,758
Interest bearing debt	387,491	461,479	535,645	575,508	616,924	658,430
Other liabilities	727,801	901,193	970,892	1,040,427	1,177,368	1,207,217
Total liabilities	1,115,292	1,362,672	1,506,537	1,615,936	1,794,292	1,865,646
Shareholders' equity	577,832	646,532	764,670	807,630	893,424	908,376
Minorities	37,188	35,199	41,255	39,888	38,953	38,736
Total shareholders' equity	615,019	681,731	805,925	847,518	932,377	947,112
Net debt	*56,953*	*-44,966*	*-160,667*	*-279,306*	*-396,785*	*-410,595*
Key Company Metrics						
Sales growth (%)	nm	13.1	1.2	4.7	13.9	6.2
DB EPS growth (%)	na	5.0	1.8	2.1	17.9	4.1
EBITDA Margin (%)	3.9	4.5	4.6	5.5	5.7	5.6
EBIT Margin (%)	2.4	2.8	2.8	3.4	3.5	3.5
Payout ratio (%)	20.0	19.1	22.5	22.5	22.5	22.5
ROE (%)	15.4	15.5	15.1	15.6	17.0	16.7
Capex/sales (%)	2.7	1.8	1.1	1.2	1.1	1.1
Capex/depreciation (x)	1.8	1.0	0.6	0.6	0.5	0.5
Net debt/equity (%)	9.3	-6.6	-19.9	-33.0	-42.6	-43.4
Net interest cover (x)	nm	nm	537.6	nm	nm	nm

Source: Company data, Deutsche Bank estimates

Model updated:14 August 2014

Running the numbers

Asia

China

Hardware & Equipment

Lenovo Group Ltd

Reuters: 0992.HK Bloomberg: 992 HK

Buy

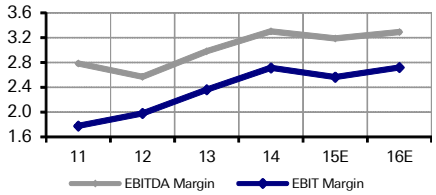
Price (22 Oct 14)	HKD 11.30
Target Price	HKD 13.20
52 Week range	HKD 7.72 - 12.62
Market Cap (m)	HKDm 121,020
	USDm 15,600

Company Profile

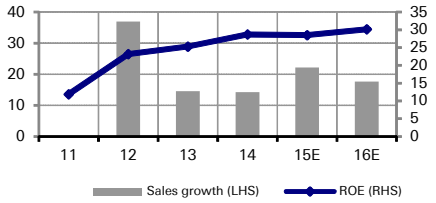
Lenovo Group Limited, through its subsidiaries, manufactures and sells Lenovo brand personal computers and handheld devices. The company also provides internet and IT services and is engaged in contract manufacturing.

Price Performance

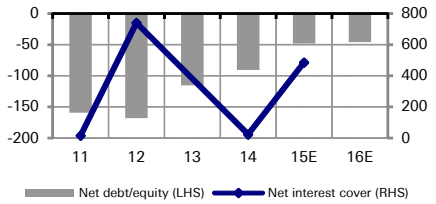
Margin Trends



Growth & Profitability



Solvency



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Fiscal year end 31-Mar	2011	2012	2013	2014	2015E	2016E
Financial Summary						
DB EPS (USD)	0.02	0.05	0.06	0.08	0.09	0.11
Reported EPS (USD)	0.02	0.05	0.06	0.08	0.09	0.11
DPS (USD)	0.01	0.01	0.02	0.03	0.03	0.04
BVPS (USD)	0.2	0.2	0.3	0.3	0.3	0.4
Weighted average shares (m)	9,609	10,115	10,304	10,310	10,710	11,109
Average market cap (USDm)	6,082	6,875	9,306	10,740	15,600	15,600
Enterprise value (USDm)	3,156	2,850	6,223	8,001	13,880	13,631
Valuation Metrics						
P/E (DB) (x)	31.9	14.5	14.9	13.3	16.8	13.8
P/E (Reported) (x)	31.9	14.5	14.9	13.3	16.8	13.8
P/BV (x)	2.98	3.85	3.84	3.76	4.50	3.76
FCF Yield (%)	15.2	26.8	nm	11.7	nm	1.2
Dividend Yield (%)	1.3	1.9	2.6	3.0	2.3	2.8
EV/Sales (x)	0.1	0.1	0.2	0.2	0.3	0.2
EV/EBITDA (x)	5.3	3.8	6.2	6.3	9.2	7.4
EV/EBIT (x)	8.2	4.9	7.8	7.6	11.4	9.0
Income Statement (USDm)						
Sales revenue	21,594	29,574	33,874	38,707	47,300	55,651
Gross profit	2,582	3,623	4,283	5,291	6,599	8,443
EBITDA	601	760	1,010	1,278	1,508	1,831
Depreciation	82	78	92	101	132	145
Amortisation	136	97	118	128	163	173
EBIT	384	585	800	1,050	1,213	1,513
Net interest income(expense)	-25	-1	2	-47	-3	21
Associates/affiliates	0	0	0	-5	-2	0
Exceptionals/extraordinaries	0	0	0	0	0	0
Other pre-tax income/(expense)	-69	8	-1	15	0	0
Profit before tax	289	592	801	1,013	1,208	1,534
Income tax expense	85	107	170	196	268	344
Minorities	0	-1	-4	0	-3	0
Other post-tax income/(expense)	0	0	0	0	0	0
Net profit	204	486	636	817	943	1,191
DB adjustments (including dilution)	0	0	0	0	0	0
DB Net profit	204	486	636	817	943	1,191
Cash Flow (USDm)						
Cash flow from operations	966	1,940	20	1,365	-533	494
Net Capex	-40	-95	-104	-105	-305	-295
Free cash flow	925	1,845	-85	1,260	-838	199
Equity raised/(bought back)	-87	0	0	0	0	0
Dividends paid	-88	-115	-195	-239	-322	-359
Net inc/(dec) in borrowings	-223	-212	229	-522	315	0
Other investing/financing cash flows	189	-741	-244	0	0	0
Net cash flow	717	778	-294	499	-845	-160
Change in working capital	*598*	*1,230*	*-1,041*	*354*	*-1,706*	*-944*
Balance Sheet (USDm)						
Cash and other liquid assets	2,997	4,171	3,573	3,972	3,220	3,540
Tangible fixed assets	209	392	480	667	840	990
Goodwill/intangible assets	2,134	3,091	3,326	3,340	3,653	3,689
Associates/investments	1	3	3	4	6	5
Other assets	5,365	8,202	9,500	10,374	12,471	13,825
Total assets	10,706	15,861	16,882	18,357	20,190	22,050
Interest bearing debt	72	63	479	1,237	1,484	1,545
Other liabilities	8,800	13,350	13,722	14,095	15,054	16,163
Total liabilities	8,871	13,413	14,201	15,332	16,538	17,708
Shareholders' equity	1,835	2,361	2,667	3,025	3,592	4,306
Minorities	0	87	14	0	22	31
Total shareholders' equity	1,835	2,448	2,681	3,025	3,614	4,337
Net debt	*-2,925*	*-4,108*	*-3,094*	*-2,735*	*-1,736*	*-1,995*
Key Company Metrics						
Sales growth (%)	nm	37.0	14.5	14.3	22.2	17.7
DB EPS growth (%)	na	136.1	29.1	29.1	11.2	21.7
EBITDA Margin (%)	2.8	2.6	3.0	3.3	3.2	3.3
EBIT Margin (%)	1.8	2.0	2.4	2.7	2.6	2.7
Payout ratio (%)	37.5	26.8	38.7	38.8	37.5	37.4
ROE (%)	11.9	23.2	25.3	28.7	28.5	30.2
Capex/sales (%)	0.2	0.3	0.3	0.3	0.6	0.5
Capex/depreciation (x)	0.2	0.6	0.5	0.5	1.0	0.9
Net debt/equity (%)	-159.4	-167.8	-115.4	-90.4	-48.0	-46.0
Net interest cover (x)	15.1	739.8	nm	22.3	485.1	nm

Source: Company data, Deutsche Bank estimates

Appendix 1

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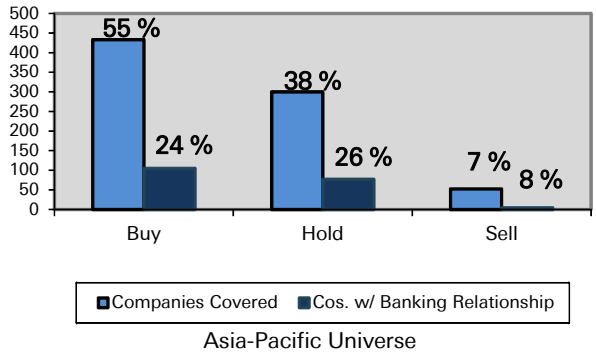

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