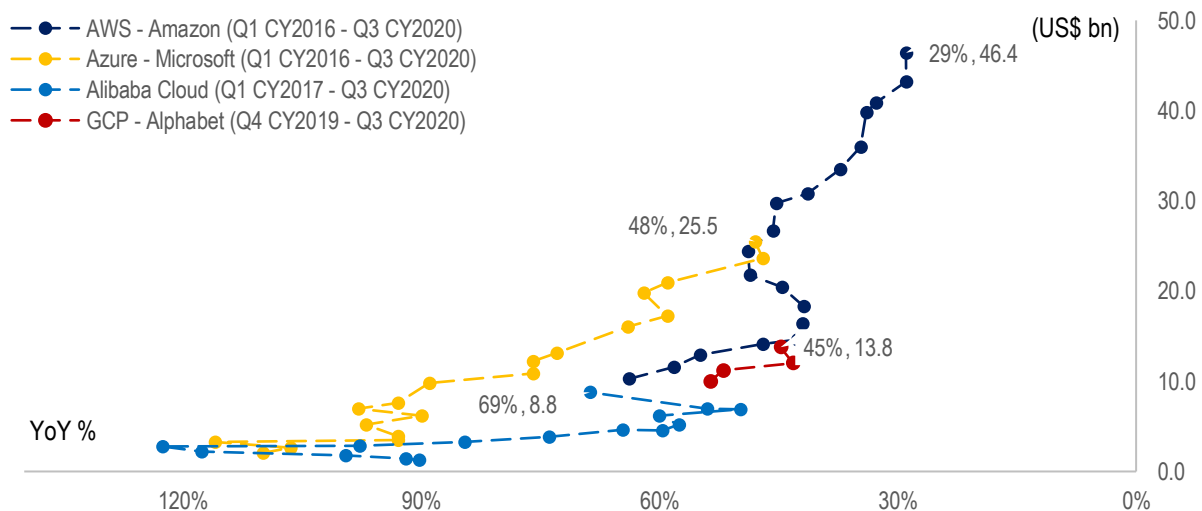




Cloud computing (IaaS) – growth and scale

Figure 1: annual revenue run rate vs growth rate, YoY



Source: company data, AMTD Research estimates

AMTD views: Major IaaS vendors have already released their September quarter results. After a slowdown in Q1 & Q2, their revenue growth rates accelerated in Q3, mainly due to: 1) the pandemic has eased and economic activities have gradually recovered; 2) new demand was rising, such as videoconferencing, online shopping & entertainment, etc. In this quarter, AWS remained strong with its annual run rate reaching US\$46.4bn and growth rate staying at 29% YoY. Azure and GCP’s annual run rate grew by 48% and 45% YoY to US\$25.5bn and US\$13.8bn, respectively. Benefiting from the strong recovery of China economy, Alibaba Cloud recorded the highest growth rate of 69% YoY in the past seven quarters with an annual run rate reaching US\$8.8bn. In the long run, we believe new demand from post-pandemic structural change and digital transformation will continue to drive the sector’s secular growth, although the recent virus cases surge again in some regions.

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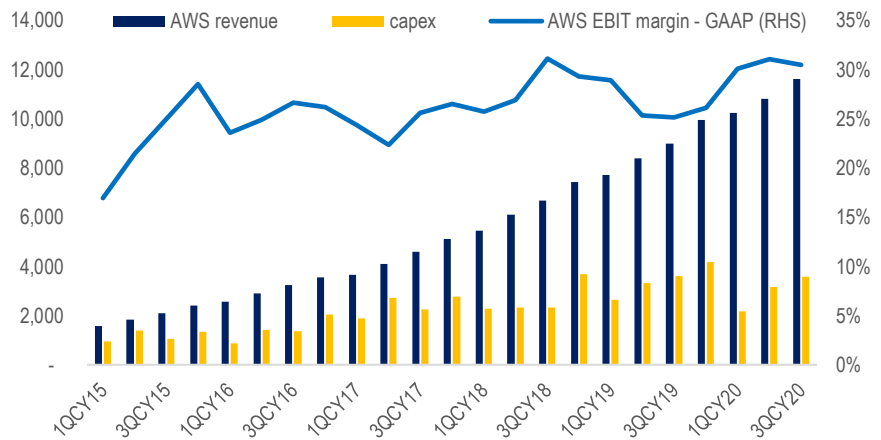
laaS

AWS/Azure

AWS – benefiting from economies of scale

AWS remained strong, growing 29% YoY this quarter despite its large scale. The company continued to see customers moving to AWS for cloud performance, business agility, and cost-saving reasons. Economies of scale is one of the important edges of AWS compared with other competitors, in our view: 1) moderate capex can increase revenue several times, which boosts the operating margin. AWS is the only profitable laaS vendor and its EBIT margin has exceeded 30% for three consecutive quarters. 2) continuous technology innovation enhances performance to cost ratio. Amazon EC2 instance families are all powered by the newer AWS design Graviton2 processors, which was launched on re:Invent last year. It can realize up to 40% better price-performance compared with x86-based instances. This year re:Invent will be a free three-week virtual conference running from 30 November through 18 December.

Figure 2: AWS revenue, EBIT margin, and capex (US\$ mn)

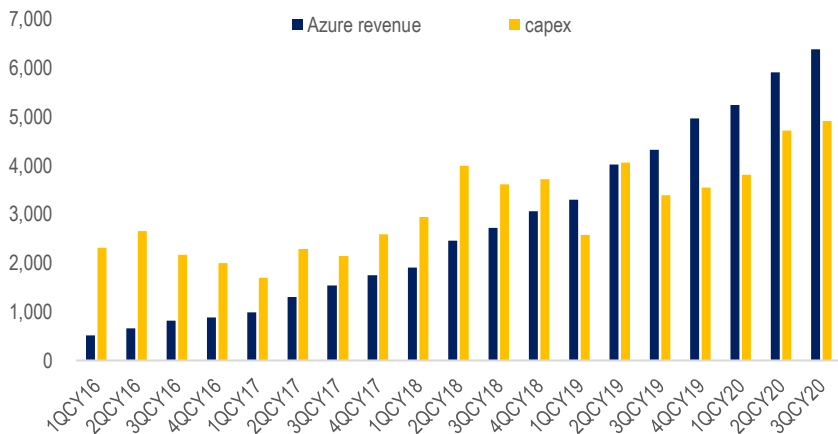


Source: Company data, AMTD Research

Azure – operating leverage on the horizon

In this quarter, Azure revenue grew strongly by 48% YoY, driven by strength in consumption-based business. Different from AWS, which grew up from an e-commerce platform, Azure adopts a differentiated strategy by inheriting customer and software resources from Windows ecosystem. In particular, Azure has the edge in hybrid cloud with the capability of providing multi-cloud solutions to those large/mega-sized customers. Azure is scaling up and improving operating leverage gradually as we saw the scale of revenue surpassed that of capex early last year.

Figure 3: Azure revenue and capex (US\$ mn)



Source: Company data, AMTD Research; Microsoft's Q1FY21 ended 30 Sept 2020

News update

20 Nov 2020

5G

China Mobile

China Mobile has built over 385,000 5G base stations

China has more than 690,000 5G base stations and over 160 million terminal connections. In particular, China Mobile has built the world's largest independent 5G network and more than 385,000 5G base stations. It is estimated that by 2021, more than 40,000 5G base stations will be added. (Source: [CWW](#))

20 Nov 2020

Semiconductor

Samsung

Samsung to invest US\$10 billion to build a fab in US

Samsung Electronics is reported to build a fab in Austin, Texas, and use EUV lithography machines to produce non-memory semiconductors and system LSI products. The investment scale is estimated at US\$10 billion, with a monthly production capacity of about 70,000 pieces. (Source: [EEWorld](#))

19 Nov 2020

Smart Devices

Amazon

Amazon announced upgraded Echo Frames smart glasses, priced at US\$250

Amazon has announced an upgraded model of its Echo Frames smart glasses, adding better sound quality, longer battery life, and new colors. The new Echo Frames are now available for anyone to buy. The second-generation Echo Frames will cost US\$249.99. (Source: [Theverge](#))

18 Nov 2020

Semiconductor

TSMC/AMD/Google

AMD and Google are TSMC's first customers for its 3D SoIC

TSMC planned to employ its new 3D SoIC stacking technology at a chip packaging plant. Google and AMD are the first major customers. SoIC makes it possible to achieve higher performance and better energy efficiency by stacking and linking several different types of chips in one package. Mass production is expected to start in 2022. (Source: [Nikkei](#))

17 Nov 2020

Semiconductor

MediaTek/Intel

MediaTek acquired Intel's Enpirion Power Solutions business for US\$85mn

MediaTek announced that it would be spending around US\$85 million to acquire Intel Enpirion power management chip product line related assets through its subsidiary Richtek. With this acquisition, MediaTek is now planning to expand its product line to offer integrated high-frequency and high-efficiency power solutions used in FPGA, SoC, CPU, and ASIC for the enterprise-level system applications. (Source: [Gizmochina](#))

17 Nov 2020

Smartphone/AR

Oppo

Oppo released concept AR glasses and rolling phone

Oppo released its concept rolling phone and new AR glasses. The rolling phone, called the Oppo X 2021, is a concept phone featuring a 6.7-inch OLED display, which can be stretched into a tablet-like 7.4-inch panel depending on the content or use case. Oppo AR Glass 2021 is Oppo's latest take on an augmented reality wearable. The Oppo AR Glass 2021 is apparently 75 percent lighter and uses birdbath-type optics with 0.71-inch OLED panels. (Source: [Oppo](#))

16 Nov 2020

Semiconductor/AI

NVIDIA

NVIDIA announced Mellanox InfiniBand for exascale AI super computing

NVIDIA introduced the next generation of NVIDIA® Mellanox® 400G InfiniBand, giving AI developers and scientific researchers the fastest networking performance available. The seventh generation of Mellanox InfiniBand provides ultra-low latency and doubles data throughput with NDR 400Gb/s and adds new NVIDIA In-Network Computing engines to provide additional acceleration. (Source: [NVIDIA](#))

13 Nov 2020

Semiconductor

TSMC/ASML

TSMC has placed big EUV equipment orders for 2021 with ASML

TSMC has already placed EUV lithography equipment orders with ASML for 2021 for at least 13 sets, while TSMC's actual needs for next year might be as high as 16 – 17 EUV scanners. TSMC is expected to have cumulatively installed over 30 sets of EUV machines by the end of 2020, 20 sets of them being at its plant site in southern Taiwan where the foundry has been stepping up its expansion for additional 5nm output and new 3nm node. (Source: [Digitimes](#))

13 Nov 2020

Smartphone

Huawei

Huawei Nova 8 to be launched next month

Huawei is reported to launch the Nova 8 series next month, including Nova 8 and Nova 8 Plus. They come with OLED full screens. Nova 8 Plus will also come with an OLED display with a curved edge with a hole in the screen, which may support high refresh rates. (Source: [EEWorld](#))

12 Nov 2020

Semiconductor

Samsung

Samsung announced first 5nm processor - Exynos 1080

Samsung has officially announced the Exynos 1080 processor in China. The new processor is built on a 5nm process and features an Octa-core CPU, with one Cortex-A78 core clocked at 2.8GHz, three Cortex-A78 cores clocked at 2.6GHz, and four Cortex-A55 cores at 2GHz. It can be hooked to WQHD+ displays of up to 90Hz refresh rate, or Full HD+ panels at up to 144Hz refresh rate. The new chipset seems like a major upgrade for upper mid-range phones. Vivo has confirmed that it will offer the Exynos 1080 in 2021. (Source: [Samsung](#))

12 Nov 2020

Semiconductor/AI

Amazon

Amazon began shifting Alexa's cloud AI to its own silicon

Amazon announced that the Amazon Alexa team had migrated the vast majority of their GPU-based machine learning inference workloads to Amazon Elastic Compute Cloud (EC2) Inf1 instances, powered by AWS Inferentia. This resulted in 25% lower end-to-end latency, and 30% lower cost compared to GPU-based instances for Alexa's text-to-speech workloads. AWS Inferentia is a custom chip, built by AWS, to accelerate machine learning inference workloads and optimize their cost. (Source: [Amazon](#))

11 Nov 2020

Semiconductor

MediaTek

MediaTek unveiled Dimensity 700 7nm chipset with 5G modem

MediaTek unveiled Dimensity 700, a 7nm SoC chipset for premium to mid-range and mass market devices. It comes integrated with two Arm Cortex-A76 big cores in its octa-core CPU and operates at up to 2.2GHz. The 5G chipset can support 90Hz refresh rate displays with Full HD+ resolution. It can also support 48MP or 64MP main camera sensors with AI-bokeh, AI-color and AI-beauty features. (Source: [MediaTek](#))

11 Nov 2020

Display

BOE

BOE unveiled a 55-inch new 4K display AMQLED

BOE launched a 55-inch 4K active-matrix Quantum Dot light-emitting diode (AMQLED) display. It has a resolution of 3,840×2,160 pixels, a colour gamut of up to 119% NTSC, and a contrast ratio of 1,000,000:1. AMQLED displays do not need a backlight, and the quantum dots can emit light by injecting current. It has the advantages of self-luminescence, wide colour gamut, and long life, which has become the development direction of quantum dot displays. (Source: [BOE](#))

11 Nov 2020

Semiconductor

Intel

Intel debuted its first discrete GPU for the data center - Intel® Server GPU

Intel debuted its first discrete graphics processing unit (GPU) for the data center, Intel® Server GPU, based on the Xe-LP microarchitecture, Intel's most energy-efficient graphics architecture. The combination of Intel® Xeon® Scalable processors, open-sourced and licensed software ingredients and the new Intel Server GPU offers a high-density, low-latency solution at lower total cost of ownership (TCO) for Android cloud gaming and high-density media transcode and encode for real-time over-the-top video streaming. (Source: [Intel](#))

10 Nov 2020

Semiconductor

AMD

AMD announced AMD Ryzen Embedded V2000 Processors, up to 8 Zen2 cores

AMD unveiled an updated family with AMD Ryzen Embedded V2000 SoC's with the 7nm process. It comes with 8 Zen2 cores, 16 threads, 4MB L2 cache, 8MB L3 cache, DDR4/LPDDR4X memory support, and a TDP range between 10W to 54W depending on the model. (Source: [AMD](#))

10 Nov 2020

Smartphone

Apple

Apple may release a foldable iPhone in 2022, starting at US\$1,499

Apple is reportedly testing out foldable screens, which the company may have procured from Samsung, most likely to test out the quality first. A foldable iPhone may not arrive until November 2022 since the display technology switching to micro-LED might take around three to four years. The pricing details have been shared at US\$1,499. Apple filed a patent previously described as a foldable screen that features self-healing properties. (Source: [Wccftech](#))

10 Nov 2020

Semiconductor

Xilinx/Samsung

Xilinx and Samsung launched SmartSSD computational storage drive

Xilinx and Samsung announced the SmartSSD CSD flash drive, a computer-on-storage device that uses a Xilinx FPGA to offload a host server's CPU. It also provides the performance, customization, and scalability required by data-intensive applications. Xilinx will sell the drive. The SmartSSD CSDs are available for pre-order and will begin shipping with general availability in January 2021. (Source: [Xilinx](#))

10 Nov 2020

Semiconductor

TSMC

TSMC's October 2020 revenue reached NT\$119.30 billion (US\$4.17 billion)

TSMC announced its net revenues: On a consolidated basis, revenues for October 2020 were approximately NT\$119.30 billion (US\$4.17 billion), a decrease of 6.5% QoQ and an increase of 12.5% YoY. Revenues for January through October totaled NT\$1,097.02 billion (US\$38.35 billion), an increase of 27.7% YoY. (Source: [TSMC](#))

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We, Brian Li, Halsey Wu and Alyssa Han, hereby certify that (i) all of the views expressed in this research report reflect accurately our personal views about the subject companies and their securities; and (ii) no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed by us in this research report, nor is it tied to any specific investment banking transactions performed by AMTD Global Markets Limited.

As of the date the report is published, Brian Li holds financial interest in the securities of Amazon mentioned in the report.

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