

**Cloud Service Strategies and Competition in the
Chinese Market Among Major Technology**

Companies

By

Sipei Li

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requirements for the Degree of Master of Science in
Management Studies.

ABSTRACT

Regardless of the area of their core business -- marketplace, search engine, game or social network -- many major technology companies find cloud services a new area of growth. Amazon first launched the Amazon Web Services in 2006, followed by Microsoft launching Azure in 2010. On the other side of world, a similar story unfolded in China. Alibaba launched its cloud services in 2008. This thesis first analyzes why these three giant technology companies all chose to enter the cloud service market and how their strategies differ. Based on their capability, different companies have different product focuses on IaaS, PaaS and SaaS in cloud service. And instead of being a single product provider, most of them chose to build up a product platform integrating internal resources and external partnerships. The thesis also discusses how the cloud services impact each company's financial performance.

The Chinese cloud market is projected to grow at a stunning speed, which reveals huge potential. At the same time, the competition has been fierce among the players. In this section, the study is focused on the strategies of the three companies in this competition. The analysis starts with a general market overview and then examines the marketing strategies and competencies in this particular market for each company. The thesis also includes some recommendations to the companies as well as the future outlook of the market.

Thesis Supervisor: Michael A. Cusumano

Title: Professor, Technological Innovation, Entrepreneurship, and Strategic Management

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First and foremost, I would like to express my sincere gratefulness to my thesis advisor Professor Michael A. Cusumano who has been supportive since the beginning. Professor Cusumano has devoted his research on technology strategy and entrepreneurship for many years. From his studies on platform economy, I have gained deeper understanding on how product and service as a platform are applied in the technology field. This thesis has applied some of the frameworks from Professor Cusumano's research on the cloud computing market. Besides academics, I would also like to address my thankfulness to Professor Cusumano for his patience, kindness, generosity and many more. Further, I would like to address my respect to Professor Cusumano for his hardworking and lifelong learning attitude.

I would also like to thank Gilly Parker, Senior Administrative Assistant in the Office of the Dean, for her warmth and help all the time.

Last but not least, I would like to dedicate this thesis as a conclusion of my year at MIT to my family who are always supportive on my further studies. I would also like to thank my friends and classmates who offer countless help and encouragement to me with their full hearts.

-Sipei Li

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Development of the Giants Entering Cloud Service Market

The brief development history of the three target companies Amazon, Microsoft and Alibaba will be summarized in this section. We will focus on how each company landed in the cloud service from different business backgrounds. We will also be describing their go-to-market strategy and key competencies. Lastly, some quantitative analyses are conducted to figure out how the cloud service is affecting the financial performance of the corporations.

Amazon

Development History

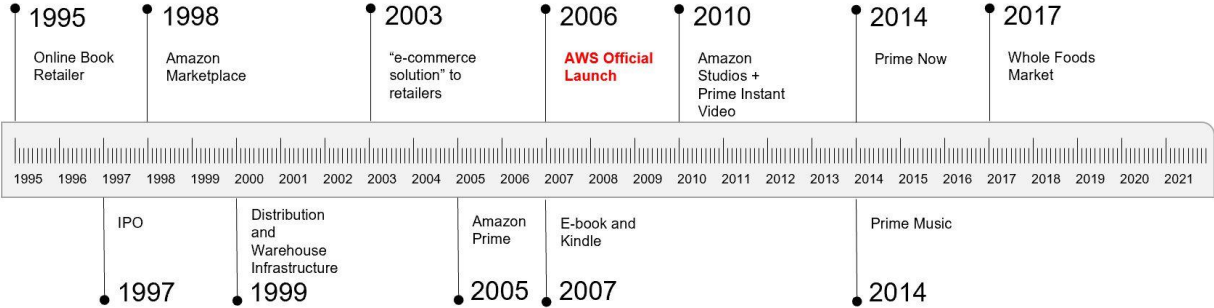


Figure 1 Timeline of Amazon Development History

Amazon started its online business back in 1995 when Jeff Bezos selected books as its beachhead market. When Amazon expanded its online business from a single category to a marketplace by acquisition, partnership and internationalization, it never stopped exploring new business segments. On the one hand, Amazon brought more entertainment or personal life products and services to its ecosystem delivering to the end customers such as music, video and grocery market [1]. On the other hand, Amazon invested heavily on building infrastructures such as distribution center, warehouse, and the Web infrastructures to support its retail business. While growing its e-commerce business, Amazon struggled with the problem of scale in 2000. The tremendous amount of data storage and transaction deals pushed the boundary of the sustainability of Amazon's internal systems.

However, Amazon was never stopped by its past success, the entrepreneurship culture kept it growing out of the marketplace business. Bezos emphasized on the long-term return and the development of new businesses. Amazon started to consider developer services in 2002 under the concept of “inside out” -- expanding the capabilities accumulated from the marketplace business such as data, technology, and fulfillment. The offerings first began from developer support, providing its product data to its third-party affiliates for Amazon advertisement, then followed by selling “e-commerce solutions” to the offline retailers in 2003. The positive feedback from the corporate side encouraged Amazon to plan a broader developer-oriented business.

From the high demand of e-commerce, Amazon built the Web business with full functionality but virtually to a scale that only a few companies worldwide could compete with, which later became the foundation of Amazon Web Services (AWS). Amazon launched AWS in 2006, by 2008 AWS had offered 12 services including 4 main functions: storage (S3), compute (EC2), database (Simple DB) and queue service (SQS) [2].

Go-to-Market Strategy and Core Competencies

AWS initially decided to target the developers from the startups and small business lack of resources to build on-premises infrastructure with minimal storage capacity requirement. This was a huge user base. Therefore, they applied an aggressive pricing strategy – pay-as-you-go model, with no up-front fee or subscription fee. This was a smart move that strengthened AWS’s first mover advantage by quickly growing the user base and building the network externalities. The marginal cost of bandwidth and hardware decreased dramatically with the scale of users. The explosion of developers registered with AWS proved the success. In less than two years, AWS had acquired more than 400,000 developers.

Although the outside world had different voices towards AWS, some considered it a distraction of Amazon’s core business. These two businesses do generate synergies between each other. Amazon marketplace had established a reputation among its broad base of individual customers. And from the marketplace business, Amazon built long-time relationships with both the hardware and software providers and held strong bargaining power and leverage. Internally,

Amazon cultivated an innovative culture and a powerful execution capability in operating, organizing as well as delivering. These played important roles in the fiercely competitive cloud service market. In addition, AWS gradually transferred the competition from the infrastructure capability to service offerings. The diverse services empowered customers by bringing more value and presenting differentiation, for example the flexible payment service (FPS) [2] inherited from the retail business and the recent Machine Learning services SageMaker. Because of the “inside out” strategy, services from AWS were especially attractive to online retail businesses. The service offerings became even more competitive when Amazon opened the application development platform to third-party developers. Many software developers migrated their workforce from hardware-based operating systems to cloud-based services. At the same time, they built tools or enablers as a complementary to this Web environment. The network effects of this innovation platform increased when more tools and services were available which attracted more application developers and vice versa [3].

Financial Performance

AWS did not bring in cashflow in the beginning due to the heavy infrastructure investment and aggressive pricing model, but the network externalities quickly scaled up the business and brought economic returns to Amazon. When analyzing the financial data of Amazon since AWS founded in 2006, there has been tremendous impacts on Amazon’s financial performance which validated the decision of developing the cloud business for the long-run. The annual revenue of AWS from 2013 to 2021 is shown in Figure 2, where the CAGR is as high as 45% across 9 years. Even though the cloud service has been running for 16 years till now, the annual growth rate still remains at 37% with no sign of slowing down.

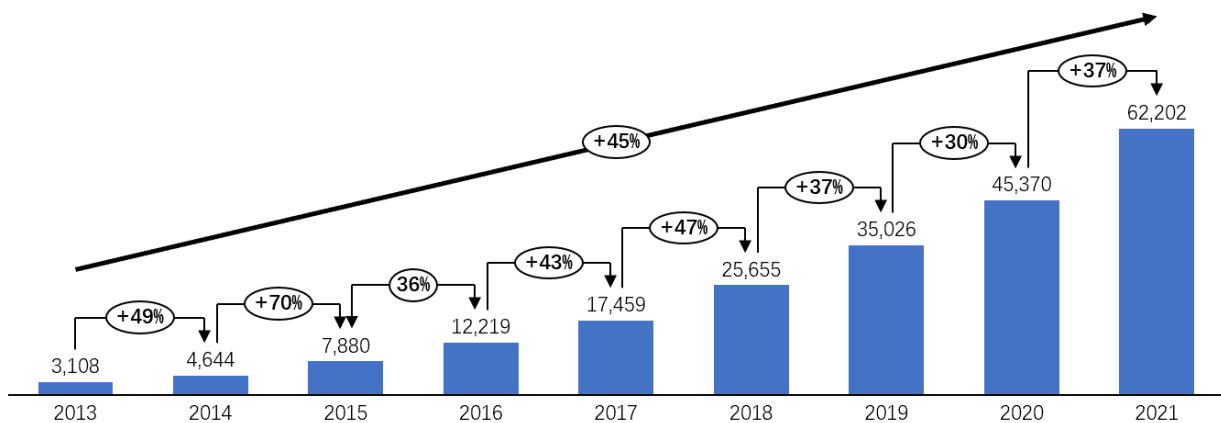


Figure 2 AWS Revenue Growth (in millions USD)

When zooming out to Amazon’s total revenue, as shown in Figure 3, Amazon’s total revenue has increased 6.3 times from 2013 to 2021. AWS is not the key driver in this context, accounting for only 13% in 2021. But AWS revenue accounted for only 4% in 2013. The growth of total revenue has an upward trend since 2019, the 26% CAGR across 9 years has been a satisfactory result although the growth rate is 40% less than that of AWS. Figure 4 shows a clearer picture on how North America marketplace and other prime services remains at the forefront among all segments in terms of revenue growth. Overall, the contribution from AWS to total revenue is not significant but the profit tells a different story.

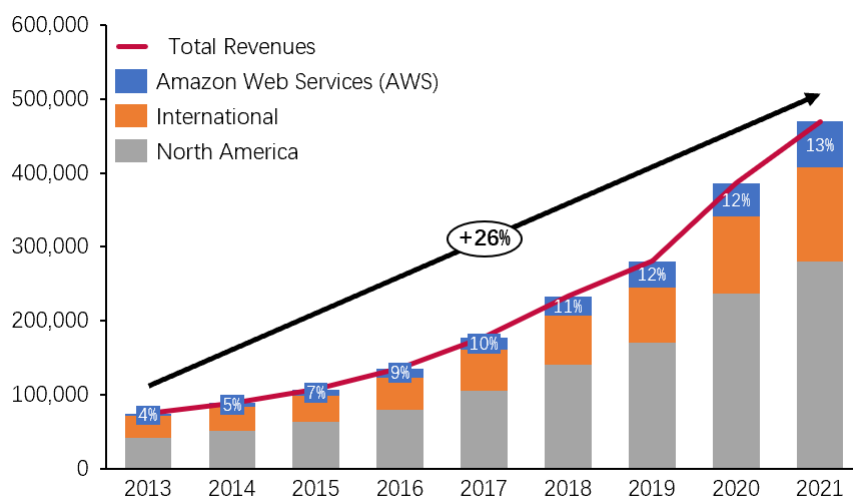


Figure 3 Amazon Revenue Growth by Segment Bar Chart (in millions USD)

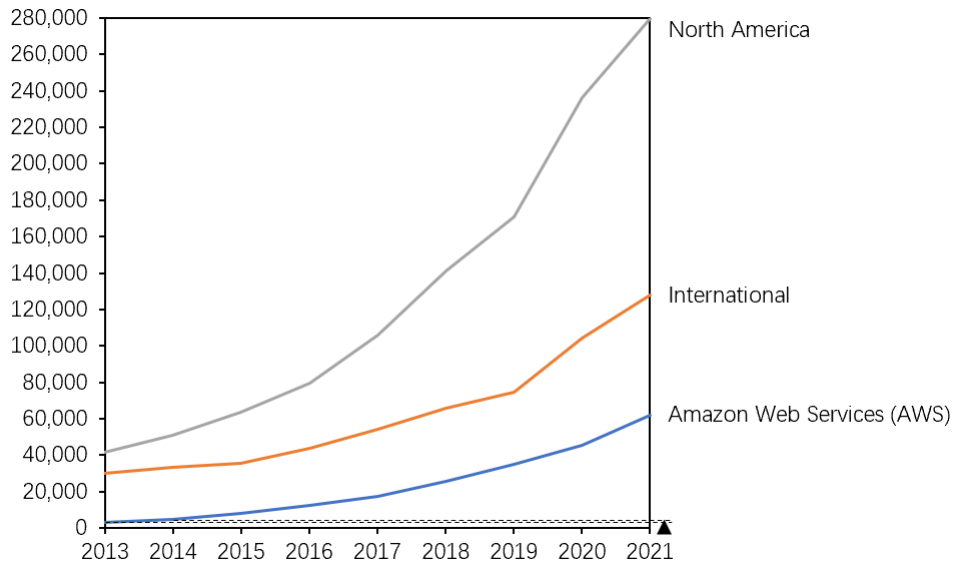


Figure 4 Amazon Revenue Growth by Segment Line Chart (in millions USD)

In Figure 5, the operating profit of Amazon has been increased by 33.4 times from 2013 to 2021 mainly driven by AWS in recent years when the international business is losing money. In 2021, AWS accounts for almost three quarter of total operating profit of Amazon. The 9-year CAGR of total operating profit is 55% compared to that of total revenue at 26%. AWS is undoubtedly the most important reason for profit growth since 2017. The lines in Figure 6 shows how AWS surpasses North America business since 2018 in terms of operating profit and this strong growth is likely to continue for a long term.

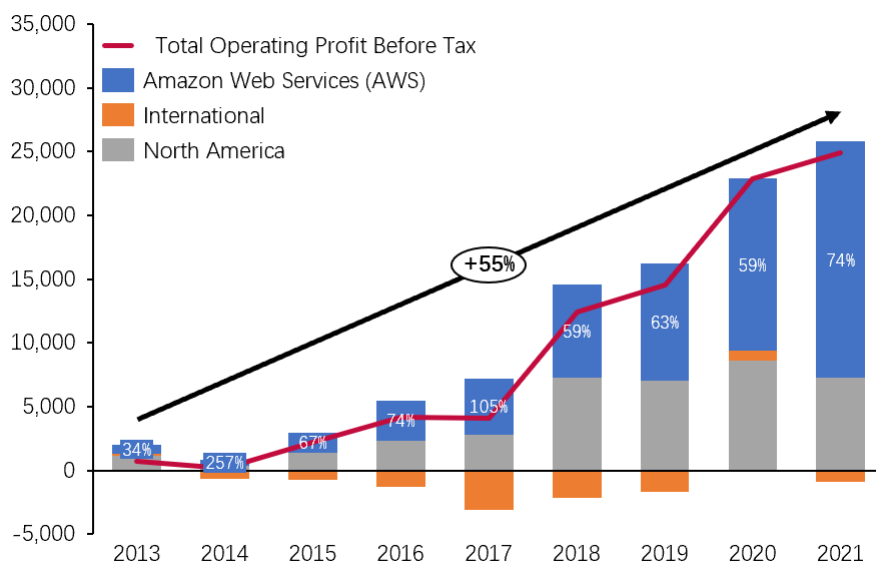


Figure 5 Amazon Operating Profit before Tax Growth by Segment Bar Chart (in millions USD)

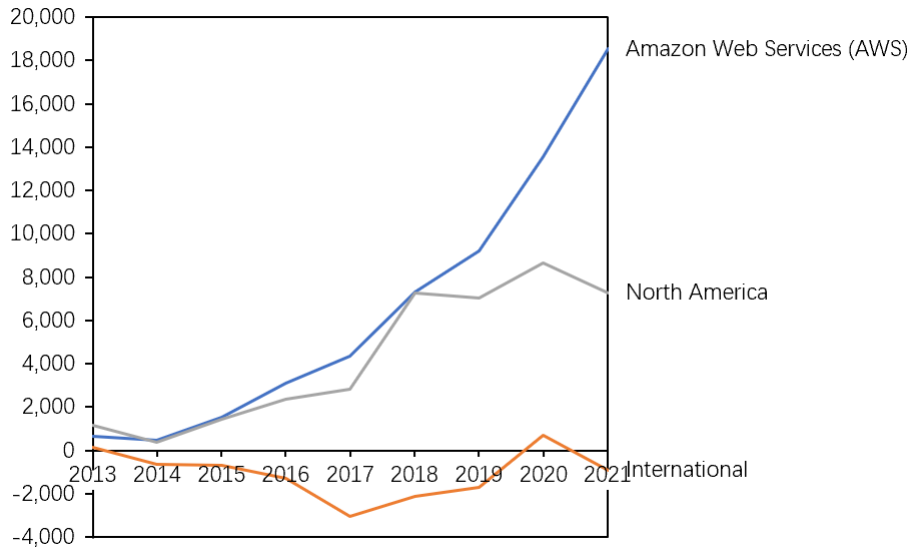


Figure 6 Amazon Operating Profit before Tax Growth by Segment Line Chart (in millions USD)

In Figure 7, the operating margin once again validates that AWS is a business with high profitability. From 2016 to 2021, the operating margin of AWS continued to be in a high range, 25-30%, while the rest of the business segments were under 5% or even negative.

The soaring market capitalization value also reflects the stockholder’s positive attitude towards the AWS business. As Figure 8 shows, the market capitalization of Amazon took a huge turnaround after 2015, soaring all the way up which coincides with the upward trend of the percentage of AWS out of total revenue. Investors gradually recognized and showed strong confidence in AWS business which continued to grow bigger with high return.

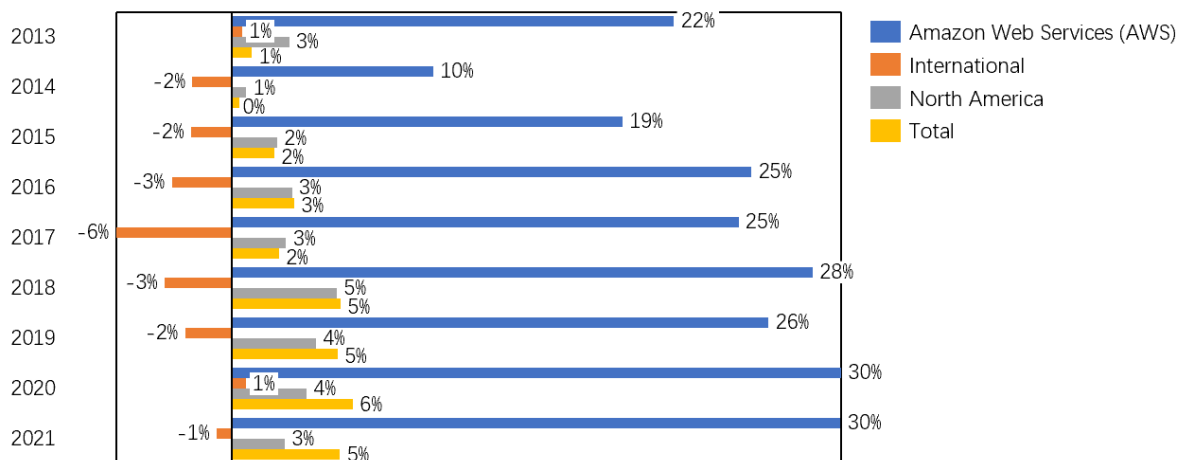


Figure 7 Amazon Operating Margin by Segment

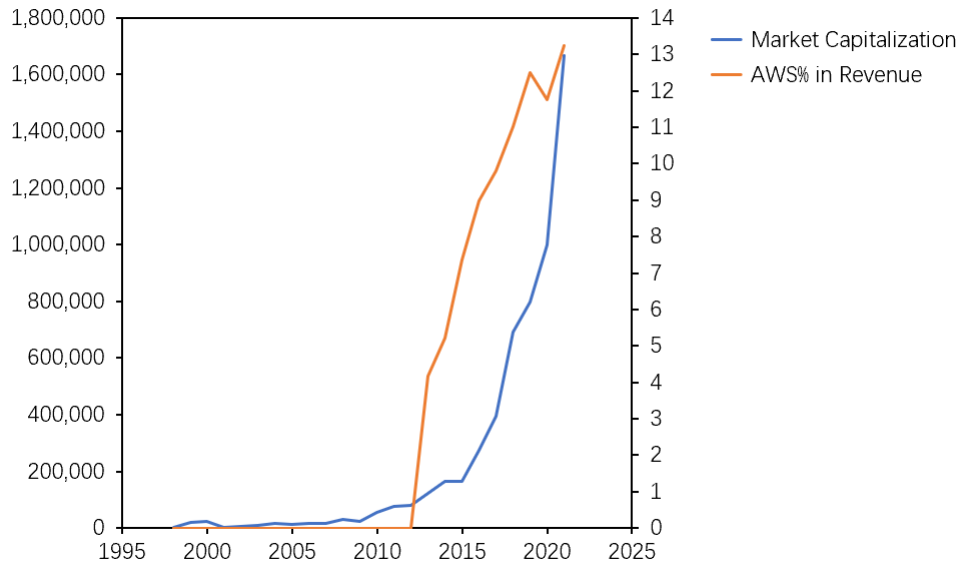


Figure 8 Amazon Market Capitalization Value and AWS% in Revenue (in millions USD)

To further verify the above conclusions, a simple linear regression analysis was conducted with the independent variable as AWS% in revenue and dependent variables as revenue, operating profit before tax, market capitalization value, and operating margin of Amazon. The R² of each pair are 0.77, 0.75, 0.71 and 0.86 respectively. The model with the highest R² is operating margin and the p-value is as low as 0.0003 which shows a strong relevance. The regression function is

$$\text{Amazon Operating Margin} = 0.614 * \text{AWS\% in Revenue} - 0.024$$

The fit plot of this regression model can be found as Figure 9. More regression outputs and fit plots can be found in the appendix 1-4.

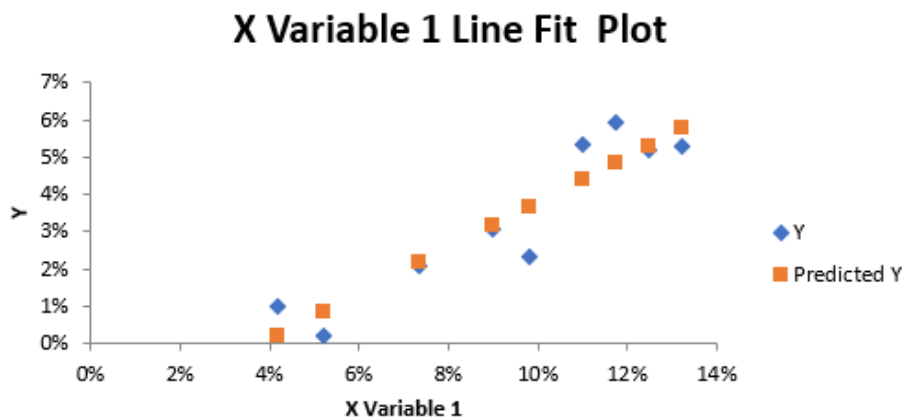


Figure 9 Fit Plot of Regression Model of Amazon Operating Margin and AWS% in Revenue

All data for financial analysis is from public data extracted from respective company's form 10-K

Microsoft

Development History

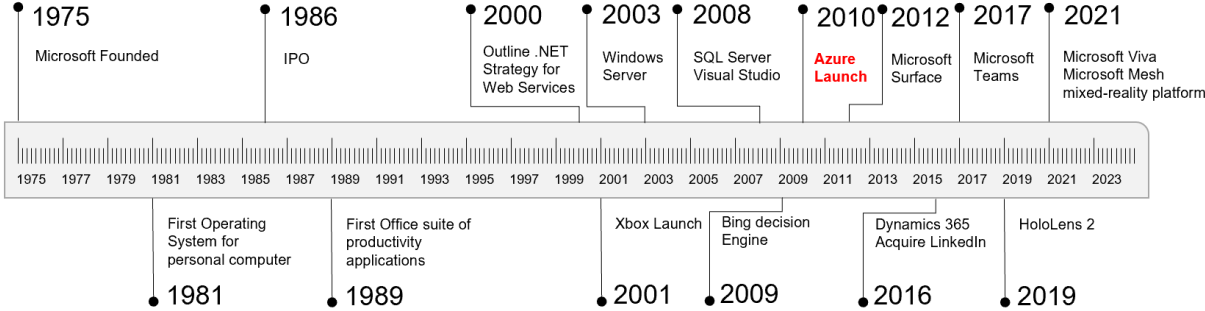


Figure 10 Timeline of Microsoft Development History

Microsoft, founded in 1975, has a long history as a technology company. Figure 10 shows how the company transforms from selling operating system to software, hardware and web services. The wide selection of product matrix has cemented its position as a technology giant. In a long time from 1975 to 2000, Microsoft only concentrated its business on operating system and Office suite. As early as 2000, Bill Gates and Steve Ballmer started to outline the .NET strategy, an open-source development platform [4]. In 2005, Ray Ozzie, the former Chief Software architect of Microsoft, who was also one of the early advocates of SaaS model, articulated the vision of building the Microsoft current offering on the Web as a disruptive platform, which is the foundation of the cloud service today. Steve Ballmer, the CEO of Microsoft at that time, was concerned that the software services platform would cannibalize the existing business. The actions taken by Amazon and Google in 2006 and 2008 eventually pushed Ballmer to make the decision. In 2010, Microsoft officially launched Microsoft Azure. And in 2014, Satya Nadella as the new CEO, had this clear strategy of mobile first and cloud first. Cloud-first is not only about the allocation of internal development resources but also the prioritization when selling to customers [5].

Go-to-Market Strategy and Core Competencies

When Azure first launched, considering the strong presence in developer platform and tools,

Microsoft decided to start as the Platform as a Service (PaaS) despite the fact that Amazon started as an Infrastructure as a Service (IaaS), and the offerings were still like a developer community with tools for Web application development. Only until 2014, Microsoft built the new IaaS infrastructure running Linux OS and closely partnered with many software companies. After 2014, Azure started to differentiate its offering by data service. From data warehouse to SQL and Analytics, Azure offered the end-to-end big data and analytics solution. Azure IoT Central, the Internet of Things (IoT) PaaS and SaaS offering was another differentiator of Azure. In 2018, Azure moved into intelligent Cloud and intelligent Edge, with the product offerings in Machine Learning and edge computing. After 2020, Azure observed two trends from the customers - Kubernetes adoption and multi-cloud, therefore launched new strategy of hybrid cloud called Azure Arc. Azure closely followed the customer needs on flexibility and diversity with the inclusion of on-premises, Azure and other cloud platforms. In 2022, in addition to hybrid cloud, Azure began to focus on industry cloud, security and compliance, and also expanded to small and medium enterprises (SME).

Although Microsoft is not the first mover not even the second mover, the unique advantages allow Microsoft to catch up quickly in this multi-player market. First of all, as a 47-years old company, Microsoft has the strong brand image and presence in the technology field. Everyone in the world who uses electronic devices knows Microsoft and uses their product.

The strategic thinking and vision from the Microsoft leadership also set the direction to success. From Gates and Allen first introduced operating system for personal laptop, they already planted the seed of “platform”. There was fierce competition among manufacturers producing personal computer hardware but they foresee that the future battleground belongs to the software and there could be one ecosystem hosts all the software, an industry-wide platform. Gates agreed to write the operating system to both Apple’s Macintosh and IBM-compatible PC. To him, the most important thing was the wide adoption of personal laptop which gave the network effect for his software future. Later, although Windows gave the office suite the express pass, Gates didn’t stop developers from building any application but gave away the software development kit (SDK) for free [6]. In 2011, Microsoft launched the windows marketplace, later renamed to Microsoft store to include the applications for the web apps. When Azure commercially launched in 2010,

the Azure marketplace was launched only 4 years after to sell the cloud apps from 3rd party developers [7], from where Azure increased its competency and usability by the complementary tools. The platform strategy, openness mindset and great visions made Microsoft what it is today. People all believe that the digital transformation is one of the most important things that any organization should take action nowadays, but as a technology company, the transformation must be faster and more cutting-edge. Despite the fact that Microsoft misses the explosion of Internet and Mobile in early days, Microsoft grabs the chance on cloud before it becomes Nokia. And since Microsoft entered the cloud market, the transformation has been speeding up tremendously. The determination and execution behind the transformation proves that “Who says the elephant can’t dance” applies to Microsoft as well.

Microsoft also never stopped its efforts in M&A and R&D. Microsoft has made 209 acquisition deals in the past 5 years, among which the largest acquisition until today was in 2022, the acquisition of Activision Blizzard for \$68.7B [8]. With acquisition, Microsoft have more and more capabilities complement to its core functions like growing the muscle. The synergies generated from the product matrix gives Microsoft a more complete coverage of competency, connecting the dots to a net. For example, the Activision Blizzard, Xbox and HoloLens 2 are highly likely to be connected somewhere in the cloud gaming. On R&D side, Microsoft is one of the largest research organizations on computer science. In fiscal year 2020, Microsoft allocated 13% of revenue on R&D and was awarded 2,905 patents (Amazon spent 11.1% of revenue and was awarded 2,244 patents) [9]. Microsoft strategically uses the combination of industry and research and travels a virtuous circle within the company. From one direction, the research results are passed to the engineering team to design the product and then to the sales team to sell to the customer - Microsoft brings the most advanced technology to the customers via the products. On the other direction, the sales force collects customer needs and business sense back to the engineering team to translate into technology requirements to the research team. Another important advantage of Microsoft is the well-established relationships. For years of continuous sales to the enterprises, Microsoft has built a stable selling channel to a list of enterprise customers from big to small which can be easily approached when selling Azure. Microsoft uses both direct sale force and partners, includes IT solution providers, consulting

firms, SaaS companies etc. who co-sell Microsoft's products. The gap on sales channel to the large corporations who have greater demand and higher net value is what Amazon needs to be closed in long run. Microsoft takes control and maintains the communication channel with the high-value customers by forming an in-house consulting team, Microsoft Consulting Service (MCS), who aims to help large enterprises align on strategy in a professional and customized presence when adopting and deploying Microsoft products.

Last but not least, Microsoft has a complex product matrix covering both individual customers and corporate customers. The four major product lines are Office 365, Dynamics 365, Power Platform and Azure. The benefits are first all the software products offline can be migrated into the cloud and increases the competency of SaaS on Azure. Those products have high entry-barriers and it needs time to polish such a well-recognized product. Secondly, users are used to the product design of Microsoft Windows and Offices, therefore any new product from Microsoft continuing the product design will take a great advantage since customers are reluctant to change. Lastly, Microsoft has this strategy of selling product bundle to enterprise customers as an end-to-end solution which is also what only Microsoft can offer. Microsoft is good at maintaining long-term relationship with valuable customers and keep bringing new products to customers from time to time. This strategy not only increases sales, and saves the cost of sales for Microsoft but also generates better compatibility within the organization for customers.

Financial Performance

Azure is not only for corporate strategy, when focusing the lens to numbers, it doesn't let the investors down from financial perspectives. The data used in this analysis are from Fiscal year 2014 to Fiscal year 2021 because Microsoft only started to separate the performance of cloud service in its annual report from 2014 and the Intelligent Cloud segment in Microsoft's annual report includes the SaaS. The annual revenue of Azure from 2014 to 2021 is shown in Figure 11, where the CAGR is 16% across 8 years. The annual growth rate had a significant jump from year 2017 to 2018, maintaining the momentum of growth yearly and reaching 24% in 2020. Although this is not a bad performance, when comparing to the 37% growth rate from Amazon in 2021, Azure needs to devote more effort in its cloud business.

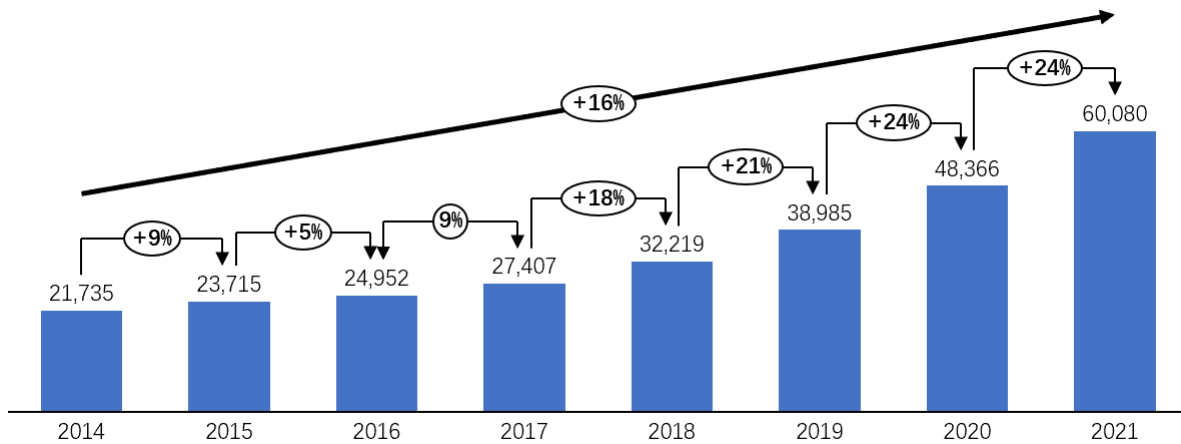


Figure 11 Azure Revenue Growth (in millions USD)

When looking at Microsoft’s total revenue, as shown in Figure 12, Microsoft has a steady increase from 2014 to 2021 with a CAGR of 10% which is 6% lower than the growth rate of Azure. Microsoft is in a different business as Amazon which can have 2.6 times of revenue growth driven by the retail business. The total revenue from 2017 to 2018 of Microsoft has an obvious increase which coincides with the jump of Azure revenue in Figure 11. Another observation is that the three segments of Microsoft: Intelligent Cloud, More Personal Computing and Productivity and Business Processes have almost equal share out of total revenue after the cloud business grows big. In Figure 13, the revenue growths of all three segments are positively upward while Intelligent Cloud is faster than Business Processes and More Personal Computing segments, at a 24% growth rate year on year.

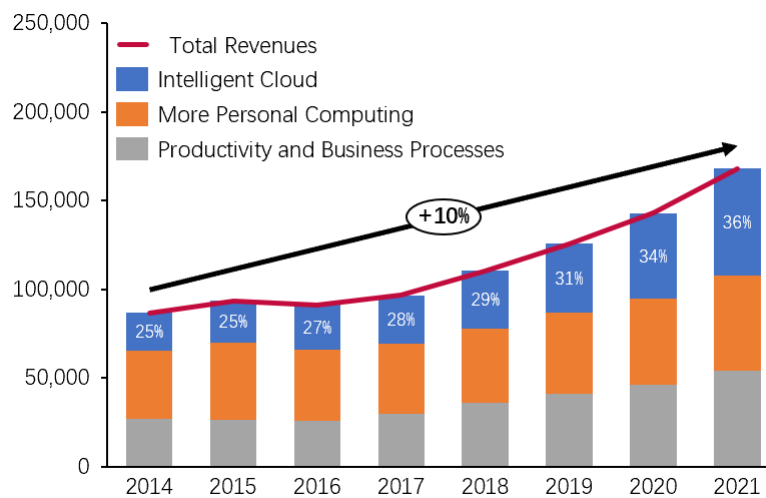


Figure 12 Microsoft Revenue Growth by Segment Bar Chart (in millions USD)

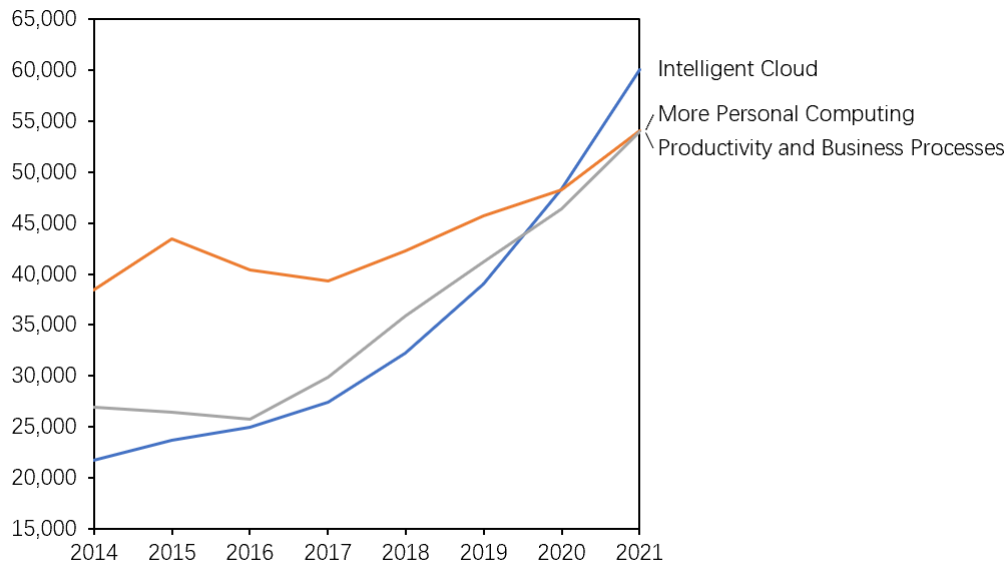


Figure 13 Microsoft Revenue Growth by Segment Line Chart (in millions USD)

Figure 14 shows how the operating profit before tax grows between 2014 to 2021 and how the three segments contributed to the profit. The CAGR of profit across the 8 years is 14% which is 4% higher than the revenue. All three segments are well-performed in profit growth in recent years. The year-on-year growth rate from 2020 to 2021 was at 43% for Intelligent Cloud, 22% for More Personal Computing and 30% for Productivity and Business Processes. While for Amazon only AWS has a strong increase in profit at a 37% year on year growth rate which is still 5% lower than Azure. It can be concluded that although Azure is slower than AWS on revenue growth, it won out on profit figures. Another interesting observation is that same as the revenue, from 2017 to 2018, there is a clear turnaround on the profit performance. And after 2017, all three segments show higher profit growth from year to year. The percentage of profit from Azure is very stable at around 35% and the range is only 7%. In Figure 15, it shows the three segments have very similar increasing trend in the past 8 years, which may tell the story of organizational business well-being and how the three segments are generating synergies among

each other.

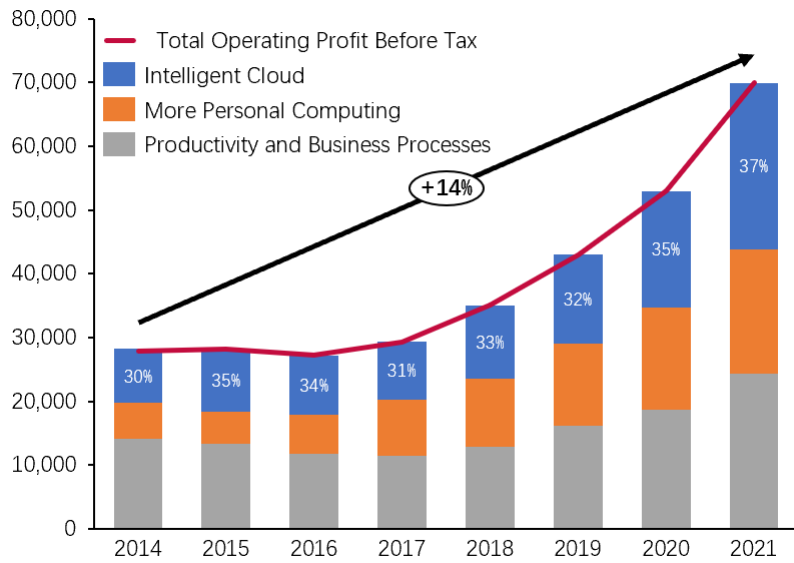


Figure 14 Microsoft Operating Profit before Tax Growth by Segment Bar Chart (in millions USD)

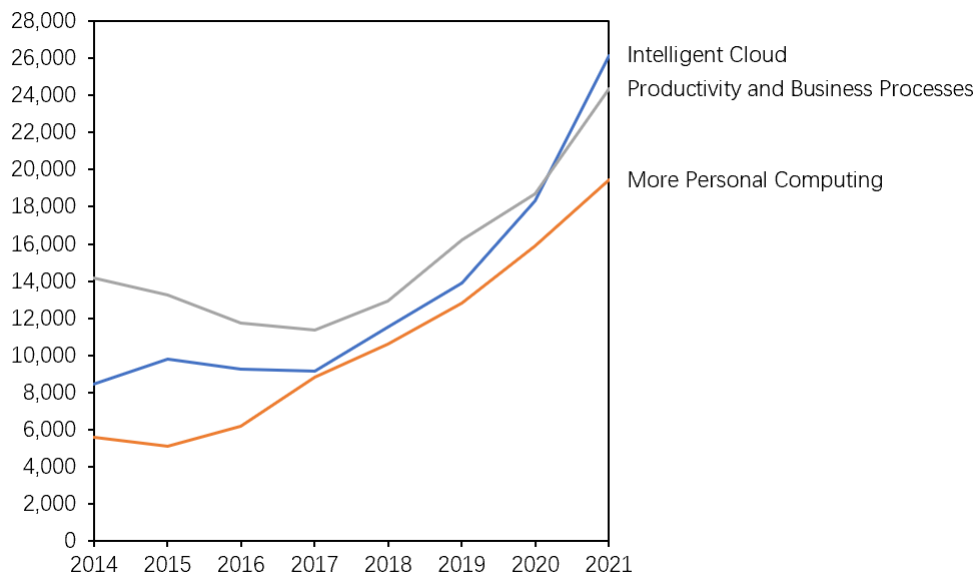


Figure 15 Microsoft Operating Profit before Tax Growth by Segment Line Chart (in millions USD)

The profitability in Figure 16 gives us a clearer picture how the three segments have comparable high profitability especially in year 2021, all three margins exceeded 35%. The profitability of Intelligent Cloud and Productivity and Business Processes are maintained at a high level, but

More Personal Computing has an obvious increasing trend. This pattern looks totally different as how it looks like in Amazon’s case where cloud service is the lonely driver of profitability. This not only tells us that a retail marketplace may not be a good business for profit, but also explains why Amazon is fiercer on the cloud business compared to Microsoft. Microsoft is in this safe ground earning massive of money from existing products, on the other hand, despite the fact that Amazon has the high wall around its marketplace business, it desperately needs the cloud business to give confidence to its shareholders.

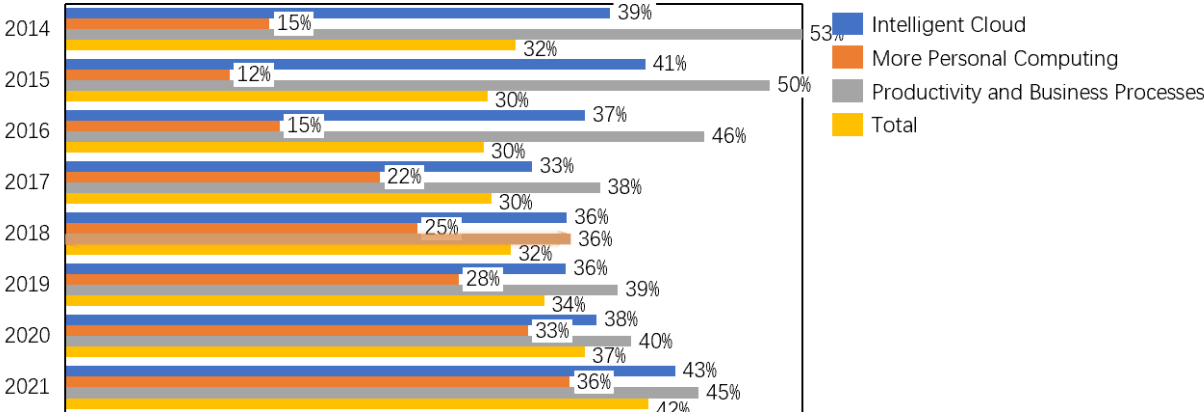


Figure 16 Microsoft Operating Margin by Segment

The market capitalization value of Microsoft shown in Figure 17 has a similar trend with its profit, and it is positively correlated with the percentage of Azure in revenue. The market capitalization value between 2014 to 2021 of Microsoft increased 6.6 times compared to 9.2 times of Amazon.

The market capitalization value of Microsoft shown in Figure 17 has a similar trend with its profit, and it is positively correlated with the percentage of Azure in revenue. The market capitalization value between 2014 to 2021 of Microsoft was increased 6.6 times compared to 9.2

times of Amazon.

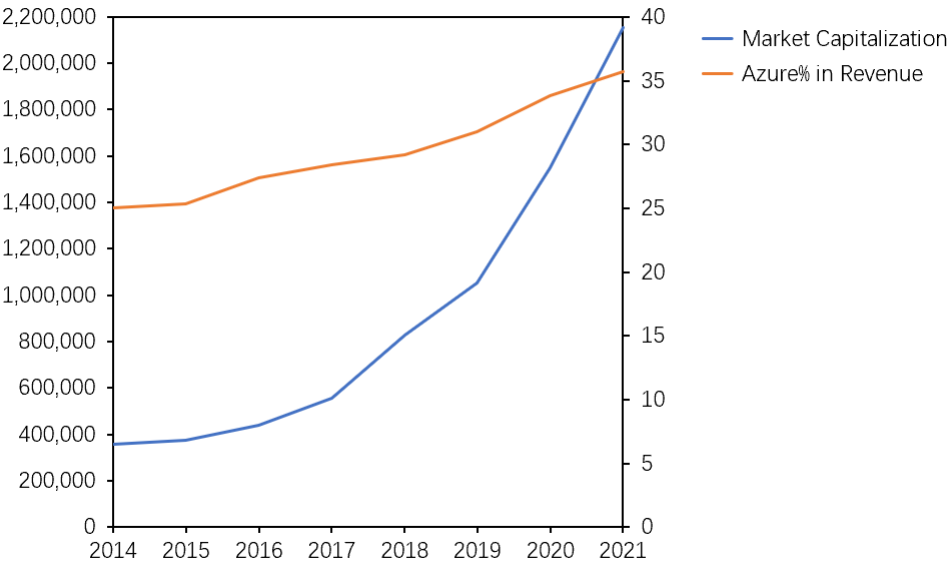


Figure 17 Microsoft market capitalization value and Azure% in Revenue (in millions USD)

To be more accurate about the conclusions and how strong the correlation is, a simple linear regression was conducted. The independent variable is Azure% in revenue and dependent variables as revenue, operating profit, market capitalization value, and operating margin of Microsoft. The R² of each pair are 0.94, 0.90, 0.95 and 0.80 respectively which indicates that cloud business development has a very positive impact on revenue, profit, and market capitalization value, but profitability may be a question mark. The model with the highest R² is market capitalization value surprisingly and the p-value is as low as 0.005%. The regression function is

$$\text{Microsoft market capitalization} = 16,393,923 * \text{Azure\% in Revenue} - 3,919,528$$

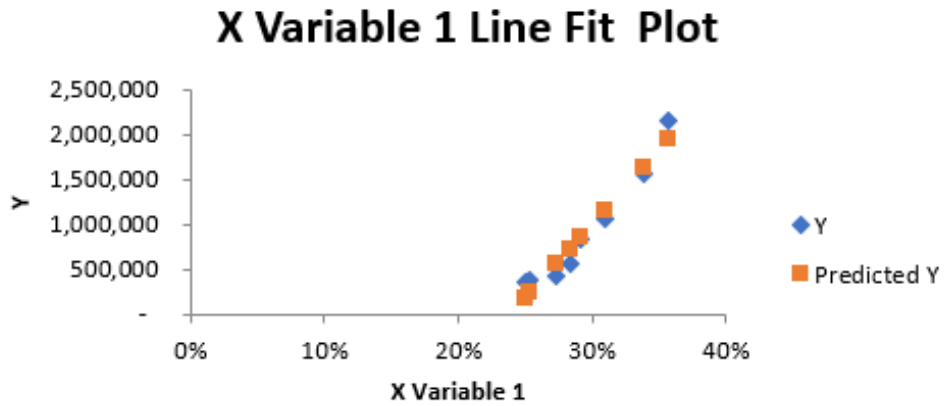


Figure 18 Fit Plot of Regression Model of Microsoft Market Capitalization Value and Azure% in Revenue

The fit plot of this regression model can be found as Figure 18. More regression outputs and fit plots can be found in the appendix 5-8.

All data for financial analysis is from public data extracted from respective company's form 10-K.

Alibaba

Development History

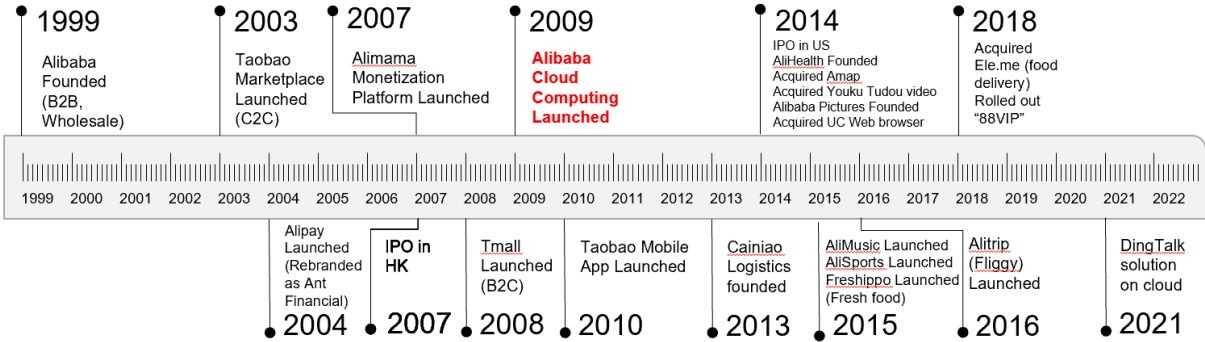


Figure 19 Timeline of Alibaba Development History

Alibaba, the Chinese technology giant, was founded in 1999 as a wholesale e-commerce website [10]. After breakeven from the Business to Business (B2B) market, Alibaba entered the Consumer to Consumer (C2C) market by launching the Taobao marketplace in 2003. For the convenience of the payment flow, Alibaba launched Alipay to hold and escrow payment to sellers, which later rebranded as Ant Financial and was separated from the Alibaba group. In 2008, Alibaba launched Tmall, encouraging merchants to sell to individuals as a Business to Consumer (B2C) model. More and more brands joined the Tmall marketplace which was a complement to the Taobao business. In 2009, Alibaba launched the cloud service which was after Amazon and Google but before Microsoft. In 2013, Alibaba founded the Cainiao Logistics together with five other logistics service providers to improve the logistics experience of Alibaba ecosystem. Between 2014 to 2018, Alibaba ambitiously acquired companies from different businesses including map, music, sports, health, video, film, search engine, and food delivery. It also founded new business sectors like trip services and fresh food e-commerce. Although half of them are still the retail business, the new business segments extended Alibaba’s coverage to local consumer services, entertainment and health. In 2018, Alibaba introduced the premium membership “88VIP” to the Tmall marketplace. In 2020, DingTalk was launched to Alibaba Cloud service for enterprise customers as a solution of work collaboration and an access portal to the data analytics and AI capabilities of Alibaba Cloud. When comparing the business

segments between Alibaba and Amazon, they have a high ratio of overlapping. While, Alibaba has an even larger coverage and the successful step into the digital payment market by Ant Financial. Alibaba aims to become an ecosystem, a super app to compete with the other technology giants in China – Tencent and Baidu.

In 2009, Alibaba launched the Apsara System, a massive-scale cloud computing operating system, which marked the establishment of Alibaba Cloud [11].

Go-to-Market Strategies and Core Competencies

As mentioned above, Alibaba has both B2C and C2C high-density transactions, and behind each transaction, there are countless data intersections. High-frequency transaction data is constantly increasing, bringing massive data storage, data mining, and data analysis needs.

Similar to the Black Friday sales in the U.S., Alibaba has been running a self-created annual promotion since 2009 to boost sales, double 11. On the recent double 11 festival in 2021, Alibaba reached a sale of US\$84.54 billion in gross merchandise volume [12] in one day. On the same day, Alibaba announced that for the first time, 100% of its business was on the public cloud, successfully carrying the world's largest traffic flood [13]. Taobao and Tmall's use of campaigns to promote sales has become a default to both buyers and sellers. They have three huge campaigns every year, and more than 10 small to medium campaigns every month. And the high frequency of transactions in a short period of time is a big challenge for Alibaba's internal computing and storage capabilities, which needs strong scalability and flexibility. At that time, Taobao was still using the IOE system for data storage, i.e., IBM's server, Oracle's database, and EMC's centralized storage. But the IOE system can no longer meet Taobao's business development needs, after the development of software to the extreme, the real limit to its development has become the hardware [13]. Similar to amazon, the strong internal demand forces Alibaba's internal hardware capability to be improved in fast pace and to reach an industry-leading position.

Jack Ma's vision is another reason for entering the cloud computing industry. Jack Ma deeply believes that businesses cannot survive in the long run without developing their own technology. Although there was a lot of internal controversy over the decision, he insisted that Alibaba should

invest 1 billion yuan (150 million) every year in cloud computing projects for 10 years [10]. Of course, Jack Ma's view is not empty words. Growth in the retail industry is highly dependent on macroeconomic growth and people's income levels, at the same time, profit margins are usually at low levels. Although companies from Amazon to Alibaba have set new milestones in the retail industry, as new customer growth slows down, company executives are forced to think about new strategies. Alibaba is constantly looking for new directions to grow its business, but whether it is venturing into new industry sectors or going offshore to open up new business territories, Alibaba's ambitions have not been fully satisfied. And at the same time, Alibaba has seen the rapid growth of U.S. technology companies, which have become the highest valued companies in the world. Jack Ma also wants Alibaba to be one of them, with technology having unlimited imagination for future business.

In addition, within Alibaba, Taobao and Tmall are two separate business units, and internal resources are naturally tilted towards the one with better performance. Therefore, Alibaba sets up the Shared Services Platform in 2009, where shared resources are reused within the organization to avoid duplicated effort. The prerequisite for achieving this is to solve the problem of platform infrastructure, so Alibaba Cloud is used as the foundation of the infrastructure to support the business of other divisions. [14]

After the birth of Alibaba Cloud, the sellers and partners connected to the various businesses in the Alibaba ecosystem are naturally inseparable on board to Alibaba Cloud. Alibaba, who owns the data from various industries, allow enterprises and Alibaba Cloud to be linked and generate stickiness through data.

Alibaba's entry into the cloud market has some unique advantages. First, Alibaba has a high brand awareness and good reputation in China. Especially for government departments or institutions, reliability is very important. Of course, in addition to technical reliability, as a local company, Alibaba has the advantage on data security protection. Second, Alibaba's massive internal data storage and computation needs not only lead to long-term technical accumulation but also simultaneously reduce the marginal cost of enterprise cloud services. In addition to the demand for fast and large data processing, Alibaba also has a high demand for data security, particularly in the financial industry. Alipay and other services that involve money have been the

target of network attacks. Alipay's technology on network security and data security is also one of the most advanced in the Internet industry. Since the first priority of enterprise online services is "security", Alibaba's application of security technology to the enterprise cloud is a significant competitive point. Furthermore, the continuous incubation of small businesses is also a unique advantage of the Alibaba ecosystem. As a result of Taobao's C2C model, Alibaba has developed and is developing a large number of merchants from individuals into small and medium businesses. Alibaba has also transformed its business strategy to accommodate the growth of these merchants. From the establishment of Tmall as a B2C business model to Alibaba Cloud, these small business merchants are critical components in Alibaba's ecosystem. The collection of enterprise merchants or business partners from its B2B e-commerce and different business lines can also be easily converted into Alibaba Cloud customers through data services, CRM, etc. In most cases, these users are small and medium-sized businesses focusing on commercial trade, and their lack of adequate IT infrastructure prompts them to acquire external services. Alibaba's long-standing relationship and familiarity with these enterprises make it a distinct advantage. Alibaba's ecosystem spans a wide range of industries, including retail, finance, local life, supply chain, entertainment, health, travel, and other areas. This starts with having massive data across various industries, which is a very valuable asset as it brings unique advantages to Alibaba's enterprise service offerings in various vertical industries. As Alibaba establishes practices in each industry, it also builds business understanding and talent pools to develop products that meet actual business needs. Finally, Alibaba has invested in the cloud industry without regard to returns in order to scale up in the early stages. It always adopts relatively low prices in the industry, even free of charge for large enterprises migrating to the cloud. A low price reduces the barrier to going to the cloud, which allows small and medium businesses to quickly form network effects.

Financial Performance

According to Amazon and Microsoft, the relationship between the growth of cloud business and financial performance is straightforward, however, the numbers for Alibaba tell a more complex story. Data used here dates from the Fiscal year 2015 to the Fiscal year 2021 because Alibaba

only started separating Cloud Computing in its annual report in 2015. The annual revenue of Alibaba Cloud from 2015 to 2021 is shown in Figure 20, where the CAGR is 90% across 7 years. This is twice the number of AWS in past 9 years and 5.6 times of Azure in past 8 years. The year-on-year growth rate fluctuates heavily but have always been at the level of more than 50%.

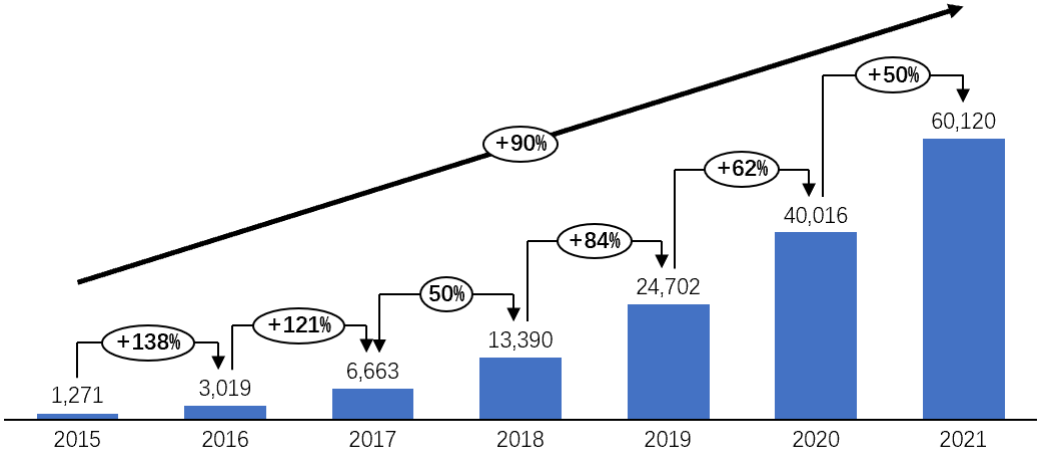


Figure 20 Alibaba Cloud Revenue Growth (in millions RMB)

When looking at the Alibaba group’s total revenue and the revenue of each segment in Figure 21, the Cloud Computing revenue is still a small piece. Alibaba’s business is divided into four segments: Commerce, Cloud Computing, Digital Media and Entertainment, and innovation initiatives and others, where the innovation initiative includes Amap, DingTalk and Tmall Genie smart speaker. There is no doubt that the Commerce segment is the main source of revenue contributing more than 85% of revenue while Cloud Computing is only 8%. However, one hidden fact is that the growth rate of the Commerce segment is not as high as the Cloud Computing, which is only 44% on average. The rapid growth rate and decomposition of Alibaba’s revenue is very similar to Amazon although Alibaba has a much more complex product offering. In Figure 22, Commerce's lead is even more pronounced. All other businesses are not in the same scale as Commerce. The total revenue of Alibaba increased almost 10 times in the

past 7 years where Commerce itself increased 9 times.

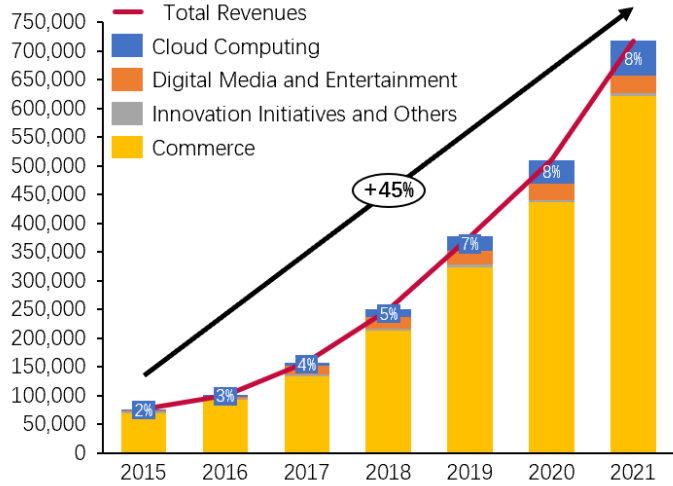


Figure 21 Alibaba Revenue Growth by Segment Bar Chart (in millions RMB)

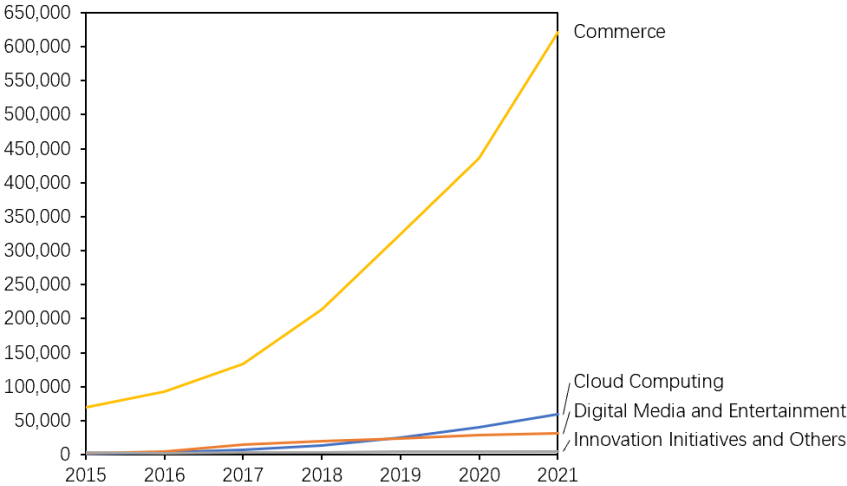


Figure 22 Alibaba Revenue Growth by Segment Line Chart (in millions RMB)

In terms of the operating profit before tax of Alibaba, Figure 23 shows the changes between 2015 to 2021 in each segment. The CAGR of total profit of Alibaba across the 7 years is 39%, unfortunately, only the Commerce business has a positive profit every year. The loss before tax of Cloud Computing is slowly decreasing, from -1,923 million USD in 2015 to -166 million USD in 2021. According to Alibaba’s Annual report in 2021, the decrease in the loss of Cloud Computing is primarily due to the economies of scale. The increase of profit from the Commerce segment is strong over the past 7 years at an average of 30%. However, in the past two years, the profit growth was declined because of the slowdown of macroeconomics as well as the increase of operating cost. The profit decomposition is totally opposite from Amazon, whose

main profit contributor is Cloud Computing. But similar to Amazon, although Alibaba remained a high profit growth from Commerce, the profit growth of which is not as high as the revenue growth. In Figure 24, among all segments that lost money, no trend of loss reduction is observed except for the Cloud Computing.

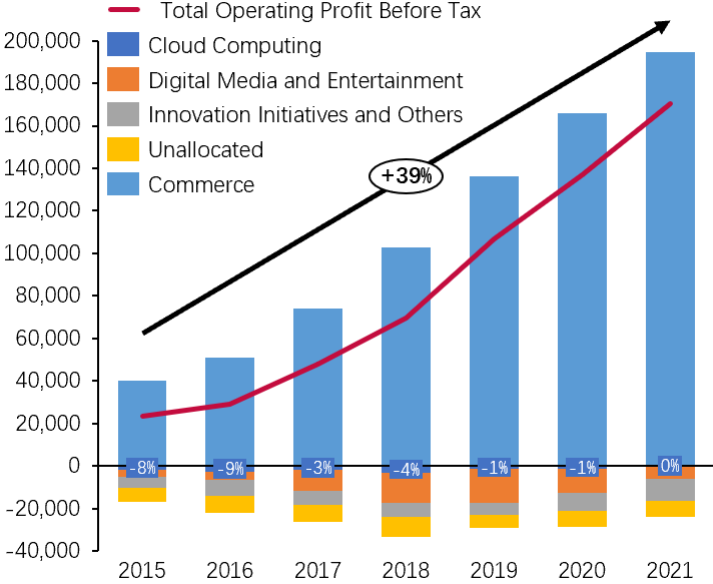


Figure 23 Alibaba Operating Profit before Tax Growth by Segment Bar Chart (in millions RMB)

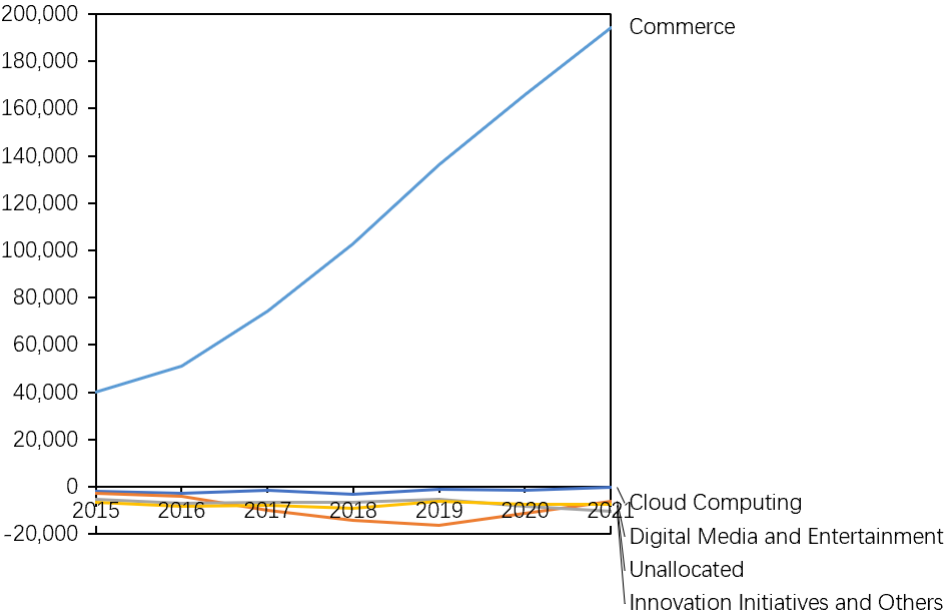


Figure 24 Alibaba Operating Profit before Tax Growth by Segment Line Chart (in millions RMB)

The profitability shown in Figure 25 is even less promising. The innovation initiatives and others segment are extremely loss-making while it could be understandable as innovation products may not be profitability driven or it needs longer turnover time. The Digital media and entertainment segment although still has a negative operating margin, the loss seems to have declined obviously, same as the Cloud Computing. The operating margin of Commerce is lowering dramatically, from 58% in 2015 to 31% in 2021, which is not a good sign as well.

With the declining of the profitability of Commerce segment, Cloud Computing has a more important role to play in the business development of Alibaba in the future. The investors are not optimistic about the current situation of Alibaba as well.

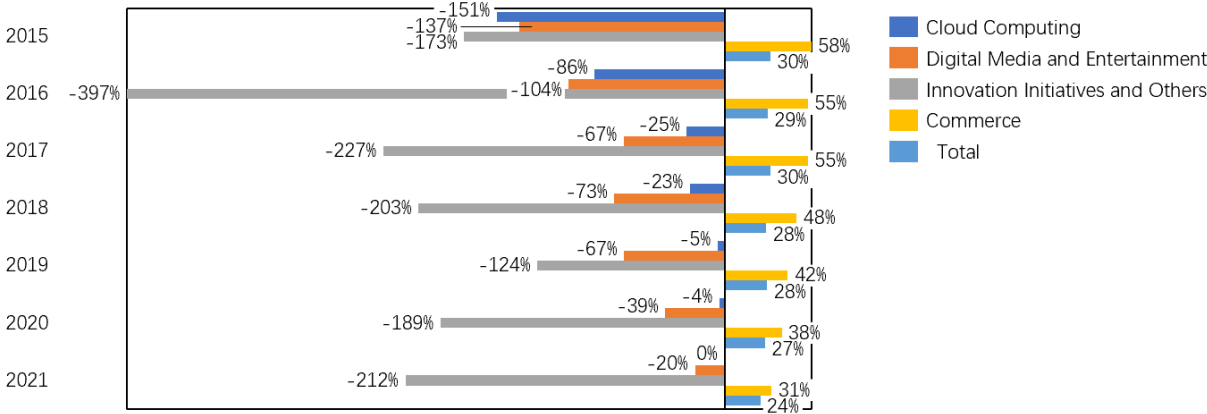


Figure 25 Alibaba Operating Margin by Segment

In figure 26, the market capitalization value of Alibaba encountered the largest decline in 2021 in the past 7 years. There are several reasons for the decline in stock price. First, China's regulators began to crack down on technology giants like Alibaba since 2021 for anti-trust purpose. Second, there were five Chinese companies named by the Securities and Exchange Committee (SEC) who do not provide details to back up their financial statements could be delisted from U.S. exchanges [15]. While all the stocks from Chinese companies are affected under the panic of further action targeted to a wider range of Chinese companies. Lastly, the financial statements of Alibaba show the difficulty of profit growth especially when the growth of Commerce segments is slowing down but the cloud business has not yet started making profits to fill the gap. Therefore, it seems the development of Cloud Computing of Alibaba has not yet

provided sufficient confidence to the investors.

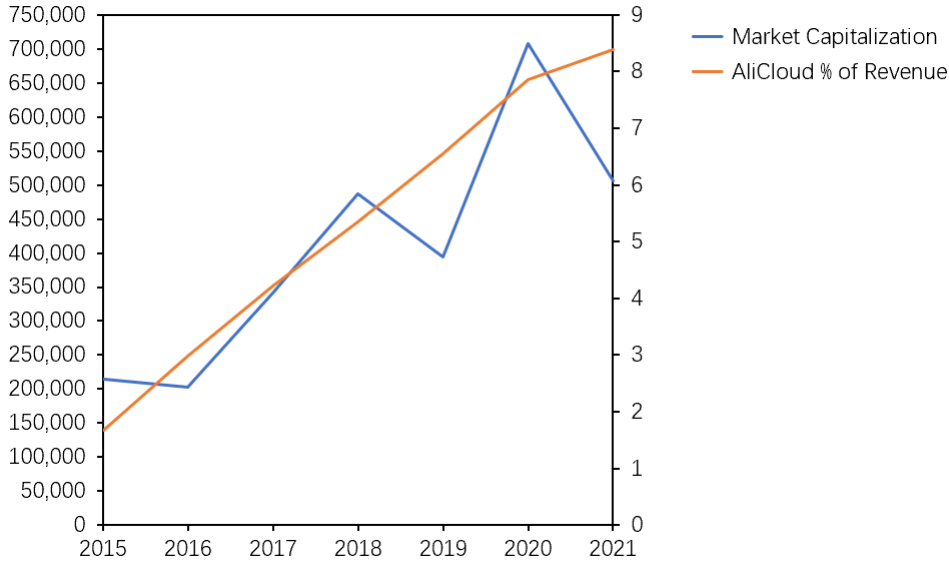


Figure 26 Alibaba market capitalization value and Alibaba Cloud% in Revenue (in millions USD)

To further prove the conclusions, a simple liner regression was conducted with the independent variable being Alibaba Cloud% in revenue and dependent variables being revenue, operating profit, market capitalization value, and operating margin of Alibaba. The R^2 of each pair are 0.89, 0.94, 0.75 and 0.69 respectively. This conclusion first overlaps with the finding that the growth of the Cloud Computing business is not yet enough to drive the growth of the company's valuation. The high R^2 in the regression of revenue and profit, indicates that the growth of Cloud Computing coincides with the growth of Alibaba's revenue and profit, but given the observation discussed above and the low R^2 of profit margin, the causality conclusion is hard to be made.

All data for financial analysis is from public data extracted from respective company's form 10-K.

Summary

After detailed analysis of the three companies Amazon, Microsoft, and Alibaba, there are certain similarities among them but also differences. One of the biggest commonalities is that they are all using cloud technology to seek greater growth, both in terms of revenue and profit. Despite their rapid growth rates, not every company's cloud business has beautiful financials, depending on the market they are in and their different strategies. Let's conclude with a comprehensive side-by-side comparison of the financial numbers. Figure 27 shows a comparison in cloud services revenue metrics. In the annual reports, SaaS revenues are included which differs from the definition of cloud market share in industry research, including only IaaS, PaaS, and private cloud services normally. Azure at early days have plenty revenues from transforming its software to SaaS but the sales of IaaS and PaaS were all the time behind AWS. Although Alibaba has a very rapid growth rate, his revenue is not yet an order of magnitude compared to his US competitors. And it is important to note that while AWS and Alibaba Cloud are still growing fast, the growth rate is slowing down, while at the same time Azure, who is steadily gaining ground, is maintaining an upward growth rate. However, this is a business with a first-mover advantage and moderately high network effects, so being first-to-market is still an important strategy. Azure and Alibaba should maintain its current acceleration momentum and close the gap of market share with AWS early.

| | | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|-------------------|---------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|
| Revenue | AWS | 3,108 | 4,644 | 7,880 | 12,219 | 17,459 | 25,655 | 35,026 | 45,370 | 62,202 |
| | Azure | | 21,735 | 23,715 | 24,952 | 27,407 | 32,219 | 38,985 | 48,366 | 60,080 |
| | Alibaba Cloud | | | 192 | 457 | 1,008 | 2,026 | 3,738 | 6,056 | 9,098 |
| Growth Rate | AWS | | 49% | 70% | 55% | 43% | 47% | 37% | 30% | 37% |
| | Azure | | | 9% | 5% | 10% | 18% | 21% | 24% | 24% |
| | Alibaba Cloud | | | | 138% | 121% | 101% | 84% | 62% | 50% |
| Cloud% of Revenue | AWS | 4% | 5% | 7% | 9% | 10% | 11% | 12% | 12% | 13% |
| | Azure | | 25% | 25% | 27% | 28% | 29% | 31% | 34% | 36% |
| | Alibaba Cloud | | | 2% | 3% | 4% | 5% | 7% | 8% | 8% |

Figure 27 Comparison of the Three Companies from Cloud Revenue Perspective (in millions USD)

Figure 28 shows the profit relevant metrics of the cloud business of the three companies. The profits of AWS and Azure are both high in net value and margin ratio, while Azure is even higher with the SaaS included. The profit of Alibaba is not comparable given the rivals have reached a

more than 30% margin, Alibaba is just about to breakeven. One assumption is that both Alibaba and Amazon are from the Internet industry facing individual consumers, they are used to applying high subsidies in the early stage to cultivate user behaviors and seize the market aggressively ahead of competitors. On the other hand, Microsoft always owns a continuous profitable business at all time because its products are so popular with minimal competition. Another reason for Alibaba’s low profitability is that not like Amazon, Alibaba have a stable high income from the Commerce segment, the cloud services is still at the stage of investing for the returns in the long run. Of course, locations of the major markets also explain the gap. Chinese companies are still far behind in IT investment compared to the U.S. and market education needs time. At the same time, the Chinese market had a fierce price war where every player either subsidized or went out of the game.

| | | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|----------------------------------|-----------|-------|-------|------|-------|-------|-------|--------|-------|------|
| Capitalization Value Growth Rate | Amazon | ● | 33% ● | 0% ● | 68% ● | 43% ● | 75% ● | 15% ● | 25% ● | 67% |
| | Microsoft | | ● | 5% ● | 17% ● | 27% ● | 49% ● | 27% ● | 47% ● | 39% |
| | Alibaba | | | ● | -5% ● | 69% ● | 42% ● | -19% ● | 79% ● | -29% |
| PE Ratio | Amazon | 166.4 | 925.5 | 73.7 | 66.0 | 96.1 | 55.7 | 54.9 | 43.7 | 67.0 |
| | Microsoft | | 12.8 | 13.3 | 16.1 | 19.0 | 23.6 | 24.5 | 29.3 | 30.8 |
| | Alibaba | | | 61.2 | 46.0 | 47.0 | 46.4 | 24.4 | 34.1 | 19.6 |

Figure 28 Comparison of the Three Companies from Cloud Profit Perspective (in millions USD)

Lastly, Figure 29 shows the capitalization evaluation of the three companies in the past years. All three companies have had very strong growth in capitalization value, with amazon's growth being the highest and most consistent. Even though the value of all three companies fluctuates widely, only Alibaba's growth has ever been negative. Based on the PE ratio, we can see that investors' expectation for amazon's future growth is the highest, and its stock is the most expensive. Microsoft's PE ratio is more reasonable as a technology company even though it has been more and more expensive gradually. In contrast, Alibaba's PE ratio is declining, especially it dropped to under 20 in 2021. It is considered undervalued compared to other technology companies as the external environmental factors have a great impact on Alibaba's stock.

| | | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|----------------------|-----------|-------|-------|------|------|------|------|------|------|------|
| Capitalization Value | Amazon | | 33% | 0% | 68% | 43% | 75% | 15% | 25% | 67% |
| | Microsoft | | | 5% | 17% | 27% | 49% | 27% | 47% | 39% |
| | Alibaba | | | | -5% | 69% | 42% | -19% | 79% | -29% |
| PE Ratio | Amazon | 166.4 | 925.5 | 73.7 | 66.0 | 96.1 | 55.7 | 54.9 | 43.7 | 67.0 |
| | Microsoft | | 12.8 | 13.3 | 16.1 | 19.0 | 23.6 | 24.5 | 29.3 | 30.8 |
| | Alibaba | | | 61.2 | 46.0 | 47.0 | 46.4 | 24.4 | 34.1 | 19.6 |

Figure 29 Comparison of the Three Companies from Capitalization Perspective (in millions USD)

In the current global cloud market competition, including only IaaS, PaaS and private cloud, AWS is leading the market with 33% market share as of Q4 2021, followed by Azure with 21% market share. Alibaba is in fourth place, with only 6% market share. In addition to these three, google also has a pretty good market share of 10%. But among the top five companies in terms of market share, only Alibaba is a non-U.S. company. In the past 5 years, the global market share of Amazon is stable at around 33%, while the market share of Microsoft has soared from 13% to 22%. Even though Alibaba is growing fast, the market share only increased from 4% to 6% in five years. In the next chapter, the focus will be on the Chinese market competition and how each player analyzed in this chapter has performed in the Chinese market [16].

Competition in the Chinese Market

In this section, the analysis will first focus on the Chinese cloud market as a whole followed by the three companies. For each company, the discussion will include the competitiveness, the market strategies in the Chinese market specifically as well as recommendations in this competition. Finally, the section will end with a future outlook of Chinese cloud market.

Chinese Cloud Market Analysis

China's public cloud market started in 2007 and has been developing for nearly 15 years. After the nascent stage, the start-up stage, the adjustment stage, the rapid development stage, it has now entered a phase of inclusive stage.

The nascent stage (2007-2010) was the time that Alibaba, Huawei and Tencent launched the cloud service business which remarked the public cloud was beginning to take shape in China. The concept of public cloud was formed and vigorously promoted during this period. However, public cloud solutions and business models were only starting to be experimented, and users' awareness of public cloud is low.

At start-up stage (2011-2014), there was explosive growth in China cloud computing market, which was also the time that the foreign rivals including Amazon and Microsoft entered Chinese market. This was credited to the iterative advancement of technology as well as the low-cost service to small and medium enterprises.

At the adjustment stage (2015-2017), the number of players in the public cloud market was increasing, the market competition was getting fierce, and the problem of homogenization of public cloud services became obvious. In order to seize market opportunities, public cloud service providers engaged in price wars, and the profitability of the public cloud market was under pressure. In order to solve the profitability problem, most public cloud service providers seek service differentiation or capturing of niche markets. The transformation of traditional enterprises into "Internet+" had become another driving factor in the cloud computing market, and domestic public cloud vendors had been expanding their market share and cultivating competitive advantages by penetrating into various industries [17].

In the rapid development stage (2018-2019), the overall layout of the market was still in the process of change, more and more enterprises are migrating their applications and systems to the cloud environment, the public cloud market further expanded.

Finally, the inclusive stage (2020-now) is driven by the Covid-19 pandemic, promoting digital transformation for enterprises in thousands of industries. The public cloud is being used as an inclusive and flexible infrastructure resource.

The size of China's cloud infrastructure market had reached US\$27.5 billion in 2021 with an annual growth rate of 45% [18], which is twice that of the U.S. market. Although China had been at second place in the world after the U.S., the cloud spends from China only accounted for about 15% of the global market [19]. There are still undiscovered potentials in the Chinese market in the near future. According to Canalys, China's cloud infrastructure market is expected to reach US\$85 billion by 2026, representing a 25% annual growth rate over the next five years [18]. Among the multiple players in the IaaS and PaaS market, Alibaba Cloud remain at the leading position with a market share of 38.2%, while Tencent Cloud is at 10.9% and Huawei Cloud at 10.7%, in 2021 Q3. At the same time, the market share of Amazon and Microsoft were 7.2% and 2.6% respectively [20].

All players mentioned above are cloud as a service platforms. Based on the winner-take-all-or-most framework from Professor Michael A. Cusumano, the cloud platform has moderately high network effect because enterprises are cautious about IT infrastructures and hence, they need a trustworthy supplier. However, the multi-homing is easy because there is no set-up cost for a new vendor and most of the enterprises would not risk storing all the data at one place. Therefore, the multi-cloud business is popular nowadays when enterprises moved from adapting the technology to planning for the long-run. The differentiation is medium because there are opportunities to differentiate the product by technology and service offerings. The deep dive into certain industry needs could also create niche market unicorns. Last but not least the entry barriers are medium to high because it requests heavy investment on hardware and technology to enter this market, which is nearly impossible for small business. As a result, the cloud market is considered a winner-take-most market. While the Chinese market could have even higher entry barrier because of the competitive price war and strict regulation [6]. In fact, China's cloud market has

formed an oligopolistic competition as the U.S. market with Alibaba in the leading position as what Amazon is in the U.S. What has made Alibaba what it is today? Are there still opportunities for the U.S. rivals to survive in the fierce competition in the Chinese market?

To better understand the macro environment of China cloud market, a PEST analysis is conducted.

Political

There are a number of supportive policies for the cloud market from both central and regional governments in China over the past decade. In 2021, president Xi emphasized that "promoting the deep integration of digital technology and the real economy, empowering the transformation and upgrading of traditional industries, and creating new industries and new business models" [21].

Central Government

- Cloud computing was listed as one of the strategic initiatives in China's Digital Economy Development Planning as part of the 14th 5-year Plan published in Dec 2021 [22].
- Ministry of Industry and Information Technology (MIIT) announced the "Three-Year Plan for New Data Centre Development" to encourage the development of cloud computing [23]
- National Development and Reform Commission (NDRC) published the "Plan of Digital Enable Intelligence through Cloud Computing Initiative" to support the development of new economic initiatives through cloud and enterprise digitalization [24]
- The laws and regulations related to the security of the internet and data have been introduced one after another, which "draws a red line" for the safe and compliant operation of enterprises. The important position of data security in the national security system has been further clarified which encourages the security embedded in the cloud platform, delivering more secure cloud services [17].

Regional Government

- Shandong’s provincial government provides electronic vouchers to companies for the purchase of cloud computing products and services [25]
- Guangdong’s provincial government published a detailed plan to encourage the development of Internet + Advanced Manufacturing with specific targets of cloud computing coverage for local businesses [26]

Economic

China is facing an economic slowdown due to the trade war with the US, and Covid restrictions. Corporations are feeling the need to cut IT costs to stay afloat. While this could be a limiting factor in certain cases, cloud computing, in general, improves efficiency and reduces IT costs while also providing flexibility. The current economic situation could be a boost for more adoption of cloud computing.

As part of the effort to find new growth engines for the economy, China is aspiring to “upgrade” its manufacturing industry from the labor-intensive sectors to more technology-intensive sectors. Cloud computing is one of the critical infrastructures supporting the “upgrade” plan.

The number of investment events in China's cloud market has been rising year by year since the concept of cloud computing was introduced. Till 2016, the investment events rose rapidly to 283. Subsequently, the market returned to be more rational, and the number of financing events gradually declined. However, cloud computing companies with mature development and high-quality products received more attention, and the average funding amount of cloud computing investment and financing events trended upward and reached 286 million RMB each in 2019. In 2020, investors were more cautious in funding, and the average funding amount fell back, but was still higher than the average level in 2018, showing the industry is still a bullish market [27].

Social

Enterprise level

Covid-19 pandemic has accelerated the adoption of remote working as part of the norm which drives demand for cloud-based IT infrastructure and SaaS applications for collaborative work.

Personal level

people's reliance on digital channels for goods, services, entertainment, and communication has been increasing and Covid-19 pandemic accelerated that trend. This forces providers to upgrade their infrastructure with cloud computing to provide more capacity and capabilities [28].

Technological

Cloud computing has been in development for years and has matured over the process. The technology is ready for wide adoption. The development of new infrastructure such as 5G and new technologies such as edge computing, AI, IoT are driving the demand for more cloud computing capabilities. The integration of the above technologies can optimize computing services, provide a more extensive computing infrastructure, lower the cost and increase the efficiency for various applications in the 5G era, and promote the application of public cloud services in more complex scenarios. The rapid development of AI and IoT applications drives the increasing penetration of public cloud.

Strategy analysis of the Giants in Chinese Market

Alibaba

Alibaba started its offerings to the public in 2011 from IaaS but later launched PaaS and SaaS. Since the launch, it never stopped innovating on the product offerings. The services are not only comparable to the U.S. rivals in technology, but also deeply customized to the needs of China customers. The abundant industry data owned by Alibaba enables it to offer distinctive and diverse solutions to customers from different industries. The smooth integration with the products in Alibaba ecosystem used by billions of Chinese end users such as Alipay is another huge advantage. The other offline resources and channels in the Alibaba ecosystem make the solutions more unbeatable, such as the Cainiao logistics network. The research firm Gartner announced the results of the 2018 Global Database Magic Quadrant, and Alibaba Cloud was selected for the first time and entered the Visionaries quadrant. Gartner believed that in addition to public cloud, Alibaba Cloud also provided proprietary cloud platform Apsara Stack and hybrid cloud sharing

solution, which was an important advantage lacked by AWS and Google. In addition, Alibaba Cloud's open source AliSQL had a solid user base, especially the management and security improvements had been widely recognized; Alibaba Cloud's relational database POLARDB in high-performance, high-capacity use scenarios were also of great interest. On the other hand, Alibaba focused on building ecosystem and platform, empowering the service providers and developers. Alibaba Cloud was only responsible for the core infrastructure and value-added layer of industry solutions, and all specific solutions were provided by the third parties. For developers, Alibaba Cloud community provides open-source projects, development resources application services, SDKAPI, platform API, error center, DevOps solutions, Explorer open platform, cloud-native application center, and Alibaba Cloud University [10]. Alibaba Cloud's open strategy has accelerated its booming growth.

On the distribution channel, as mentioned above, the Alibaba ecosystem has exclusive relationships with the customers and partners from its retail and other business units. Apart from that, Alibaba Cloud has been actively building a partner ecosystem, dividing partners into distribution partners, solution partners, and service partners. As of May 2021, the number of Alibaba Cloud partners exceeded 10,000. This strategy is the same as Microsoft's long-standing partner strategy. Further, the sales team of Alibaba have the reputation of being an Iron Army, with amazing fighting power and execution, and have established a complete sales system and distribution channels in the country [29].

Alibaba Cloud started its business from the small to medium enterprises in its ecosystem, and then attracted more small to medium enterprises who found the value proposition of cloud product. With the good reputation, Alibaba Cloud started to approach the large enterprises and government departments and won a lot of high value cases, raising the competitive barrier for Alibaba Cloud. Alibaba Cloud has over 2.3 million customer cases, most of whom are located in first-tier cities [29]. Undertake the resources brought by the e-commerce industry, the beachhead market for Alibaba industry solutions were retail, manufacturing, and supply chain.

Besides the partner ecosystem, another strategy from Alibaba Cloud is promoting the cloud by adapting the DingTalk SaaS. DingTalk is a free intelligent platform for enterprise collaboration and communication. It was founded in 2014, and used by 500 million of users [29]. Among all

three, SaaS has the lowest entry barrier with the highest trialability and observability. The freemium strategy onboarded enterprises into the Alibaba Cloud ecosystem, educated the concept of cloud and gradually transferred them into the IaaS and PaaS customer pool. The Covid-19 pandemic accelerated the adoption of Dingtalk and the transformation to the cloud services when all enterprises had to seek online collaboration tools during the lockdown.

Most of the advantages of Alibaba Cloud have been covered in the first section. When looking at the Chinese market standalone, Alibaba with no doubt obtained the first-mover advantages and enjoyed the economies of scale. Although there were aggressive price wars and competition, the strong cashflow of Alibaba Group and steady income stream from the commerce business supported it to repel the small to medium competitors. The close relationship between Alibaba and the government also made it hassle-free in the development of cloud business.

In the competition in the Chinese market, Alibaba Cloud has moved much further ahead in the leading direction, especially in IaaS and PaaS. Alibaba should take full advantage of the current leading position by making the Alibaba Cloud the default ecosystem and infrastructure in most industries to utilize the network effect and stop the differentiation from competitors. To achieve that, Alibaba should deepen its cooperation with the industry leaders, at the same time transform the customized services for the large enterprises into a more standardize industry specific tools and services. The development effort of Alibaba Cloud is not enough for the strategy to flourish, the development center should also play an important role. Giving incentive to the developers who contributed on the platform can be another strategy. Additionally, learning from the success of DingTalk, Alibaba should introduce more SaaS products to the ecosystem and form a SaaS product matrix as what Microsoft is doing by self-development as well as acquisition and partnership. The transformation from SaaS to IaaS and PaaS or selling in a bundle could be a strong driver to the revenue. Increasing the diversity of product offerings could also make Alibaba Cloud a one-stop solution which will weaken the multi-homing from customers. The curated improvement on technology is also not neglectable as an industry leader since it will increase the entry barriers continuously. Last but not least, Alibaba Cloud is not earning profit but expanding the business by a low-price strategy, compared to the U.S. rivals, and this should not be a long-term strategy. The investors are losing confidence especially when the growth of

the Commerce segments is slower. Alibaba Cloud should start to take actions on monetizing its services apart from the usage revenue, such as aftersales services. Learning from AWS could be a good starting point.

AWS

AWS has remained low-key in the Chinese cloud market, with a 7.2% market share. Although Amazon entered the Chinese market as early as 2013, only two years after Alibaba Cloud commercialized its services, the domestic policies have led to foreign cloud computing vendors facing higher barriers to entry into China and put AWS in a less competitive position. Foreign companies can only carry out technical cooperation with domestic licensed enterprises, ensuring the security of data autonomy and control. Amazon, Microsoft and other cloud computing companies as foreign investors can only provide technical support without participating in the physical operation, getting in touch with the customers, and controlling the data [30]. It took Amazon 4 years to finally fully operated in the Chinese market in 2017, and as a result it lost the first-mover advantages.

On the 2021 Amazon Cloud Technology China Summit, Amazon announced its new strategy of “rooting” its business locally in China while leveraging the “global advantages”. And Amazon believed their five advantages are the wide range of products of over 200 categories, the extensive infrastructure worldwide covering 245 countries, the leading practices of security and regulation, the successful practices that have served millions of customers worldwide for the past 15 years, as well as the solutions from over 100,000 partners worldwide. Apart from products, AWS also is outstanding in its service for customers, addressing the challenges of skills gaps and talent shortages [31].

In order to comply with the regulations, Amazon cooperate with its two local operators in China, Beijing Sinnet Technology and Ningxia Western Cloud Data Technology. AWS Asia Pacific (Hong Kong) region officially opened on April, 2019 after the existing two regions in China.

On the Summit, Amazon also shared the three types of targeting clients were local companies, domestic firms with overseas business and multinational corporations in China [32]. For the domestic firms with overseas business, AWS would utilize its advantages in the global cloud

market compared to the Chinese competitors such as the global infrastructures and local partners. For multinational corporations, the familiarity of AWS services in the home countries would ease the cooperation and save the operating cost of IT integration.

To promote its services, at the summit, AWS committed to strengthen its partnership with Deloitte China. Together, the two companies would provide one-stop consultancy services to multinationals entering China as well analytics services and data security services [32].

In this competition, although AWS has missed the leading position, even a small piece of this high potential market is still a good business. AWS has clear strategy about how to position in this market, and what are its unique advantages compared to local players. To AWS, since the product development control is in the U.S., to increase the localization of its products, AWS should increase its impact on the local developers, expanding the local partnership network who would bring more localized product capability to the AWS platform. At the same time, since AWS does not have advantages on the price, the possibility of attracting small to medium enterprises is low. It should actively analyze the customer demand and look for the unmet needs by offering niche product or services. Copying the successful application from the global market should be another focus. Although China has been leading the internet and mobile economy, its enterprise IT development is far behind the U.S. Good practice in the U.S. could be a great selling point, especially for the traditional industries that have low digitalization level. For the multinational corporations originated overseas or China, AWS should offer services with more synergies and barriers within the corporation to motivate them to use AWS across countries. The lack of a local sales channel and promotion channel is another weakness of AWS, it should fill the gap with more local partnership who have the dedicated power especially for Amazon to be in touch with large enterprises. Last but not least, AWS could look for opportunities in private cloud and multi-cloud business since most of the large enterprises would gradually move from public cloud to private cloud such as Tik Tok, and even though they use the public cloud, it is less likely for them to rely on one service provider for risk concern.

Microsoft

Microsoft has very similar situation as Amazon, as a foreign cloud computing provider, it takes Azure extra efforts to enter the China cloud market. Microsoft Azure cloud computing services are operated by 21Vianet, same operator as the other Microsoft products, in compliance with Chinese regulations, and used datacenters located within China. To provide unrestricted access to Chinese customers, Azure had set up the fifth region within China market in Mar 2022 [33]. Same as the U.S. market, Azure started with migrating its office software to the web in China. Given Microsoft already had more than 20 years presence in China back to 1992 when introducing the cloud services, compared to Amazon, a 2.6% market share indicates that Azure has a lot of room for improvement.

As mentioned previously, Microsoft has strong SaaS capabilities and a complete product matrix by development and acquisition. The bundle sale from Microsoft is easy to use and creates lots of synergies. This applies to the Chinese market as well -- Microsoft has an extremely high adoption rate for the Windows OS and Office suite in China. All the sales channels selling Microsoft products could be used for Azure as well. The tricky part is the capability of implementing cloud services could be different from the traditional software when choosing the sales partners, but by proper training from Microsoft, the channels should work well. Same as Amazon, Microsoft misses the first-mover advantages in Chinese market, but it is also looking for the opportunities that it can fit in well with its unique advantages. The target customers from Azure have high overlap with Amazon, the strategy of “Go China, Go Global” emphasizes the focus on multinational companies entering the Chinese market and the Chinese companies expanding business overseas. However, in this “Go China” competition, Azure only has 10% market share when both AWS and Alibaba have 25% market shares. At the same time, Microsoft is also focusing on the hybrid cloud, multi-cloud and the expansion to the small and medium enterprises in the Chinese market.

The biggest problem of Microsoft in China may be the slow speed of reaction when all the other competitors are fighting fiercely. On one hand, when Microsoft uses the sales channels of the software, it should give more incentives to use Azure and sell the products as a bundle, and hasten the transformation from SaaS to IaaS and PaaS. On the other hand, Microsoft should look for

new fast-spreading channels. The SaaS products of Microsoft are a perfect entry point that Amazon does not have. Take DingTalk as an example, Microsoft should give free access and promote aggressively on its SaaS such as Teams to build up the awareness of Azure. At the same time, another weakness of Azure is that the product localization and product update is not comparable to local vendors. The solution to this could be either building a local product development team or properly open the platform to allow third party developers to develop local applications. Same as the global market, the advantage of Microsoft is its relationship with large enterprises which both Alibaba and Amazon lack. When Alibaba is chasing rapidly, Microsoft should grab the corporations as fast as possible by providing highly customized, high quality, and high technology product offerings. The experience accumulated in the high-end market should gradually embedded into the Azure platform and penetrates to the small and medium enterprises. Also, same as Amazon, Microsoft should look for the sweet spot between its capability and the unmet needs in the market. For example, Microsoft should avoid the highly competitive industries among local players such as retail. Rather, it should focus on the industries such as manufacturing and healthcare which required higher technology advancement like IoT. Microsoft should also quickly translate its research on new technologies into a new platform to build the high barrier for competition and create differentiation to the Azure ecosystem, such as Metaverse and Quantum computing. The synergies from other business such as gaming could be another battle field with local competitors such as Tencent. The high entry barrier of the gaming industry and the possible transformation to the Metaverse is where Microsoft should position itself.

Future Outlook

Cloud Computing is still a booming sector in China with new trends bringing about growth opportunities frequently. We are seeing the companies taking advantage of these opportunities and reshaping the competitive landscape.

One of the opportunities driving change in the cloud computing field in recent years is the development of the Industrial Internet of Things (IIoT). As a critical component of IIoT infrastructure, cloud computing is expected to experience significant growth. Many cloud suppliers have laid out strategies and developed solutions specifically targeting the IIoT sector. While most of the cloud suppliers in China adopted similar strategies and development paths as the overseas giants, localized user requirements are becoming more prominent and prompting some of the suppliers to adapt and cash on this trend. One such example is the Zero Trust security services. Cloud computing has a natural advantage in adopting the Zero Trust security strategy and local companies like Tencent, Huawei and Alibaba have responded to the trend and developed localized products integrating this security feature to meet the demand by Chinese customers [17].

Integration of cloud and edge computing is another trend that is expected to bring significant growth opportunities. Many industries adopting cloud computing need low-latency, high-availability applications that can only be possible with edge computing. At the same time, data storage and big data analytics capabilities are done in the cloud. A survey done in 2020 suggested that while only 4.9% of companies responded have already deployed edged computing, 53.8% of them are planning to do so in the near future. Integration of edged computing and cloud is driving new technology advancements and more growth [17].

Lastly, after-sales service has become a more important factor distinguishing winners and losers in this competition. The fast adoption of cloud computing in China led to new problems. One survey by Flexera suggested that companies adopting cloud are wasting an average of 30% of their cloud's capacity. It was also found that nearly 50% of the survey respondents reported a reduction in application performances after moving to the cloud. These are on top of the integration and change management issues that they have to work on after the migration. These

problems are driving demand for a higher standard of after-sales service so that the customers can better utilize the technology to achieve their goals. At the same time, after-sales service can become a new growth opportunity for cloud suppliers to provide service offerings and monetize.

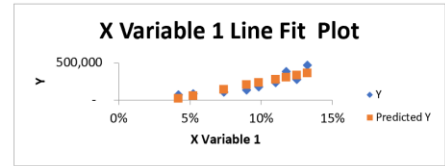
APPENDIX

SUMMARY OUTPUT

| Regression Statistics | |
|-----------------------|----------|
| Multiple R | 0.878325 |
| R Square | 0.771454 |
| Adjusted R Square | 0.738805 |
| Standard Error | 70836.85 |
| Observations | 9 |

| ANOVA | | | | | |
|------------|----|----------|----------|----------|----------------|
| | df | SS | MS | F | Significance F |
| Regression | 1 | 1.19E+11 | 1.19E+11 | 23.62845 | 0.001833 |
| Residual | 7 | 3.51E+10 | 5.02E+09 | | |
| Total | 8 | 1.54E+11 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|--------------|--------------|----------------|----------|----------|-----------|-----------|-------------|-------------|
| Intercept | -138806 | 76924.5 | -1.80444 | 0.11414 | -320703 | 43091.79 | -320703 | 43091.79 |
| X Variable 1 | 3810553 | 783917.6 | 4.860911 | 0.001833 | 1956883 | 5664224 | 1956883 | 5664224 |



RESIDUAL OUTPUT

| Observation | Predicted Y | Residuals |
|-------------|-------------|-----------|
| 1 | 20265.85 | 54186.15 |
| 2 | 60054.87 | 28933.13 |
| 3 | 141806.2 | -34800.2 |
| 4 | 203588.4 | -67601.4 |
| 5 | 235231.2 | -57365.2 |
| 6 | 280967.5 | -48080.5 |
| 7 | 336980.2 | -56458.2 |
| 8 | 309008.1 | 77055.92 |
| 9 | 365691.8 | 104130.2 |

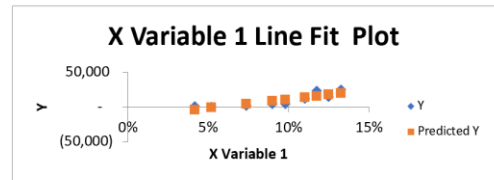
Appendix 1 Regression Output of Amazon Revenue with AWS% of Revenue

SUMMARY OUTPUT

| Regression Statistics | |
|-----------------------|----------|
| Multiple R | 0.865409 |
| R Square | 0.748933 |
| Adjusted R | 0.713066 |
| Standard E | 5094.534 |
| Observatio | 9 |

| ANOVA | | | | | |
|------------|----|----------|----------|----------|----------------|
| | df | SS | MS | F | Significance F |
| Regression | 1 | 5.42E+08 | 5.42E+08 | 20.88099 | 0.002575 |
| Residual | 7 | 1.82E+08 | 25954281 | | |
| Total | 8 | 7.24E+08 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|------------|--------------|----------------|----------|----------|-----------|-----------|-------------|-------------|
| Intercept | -14483.6 | 5532.354 | -2.61798 | 0.03451 | -27565.6 | -1401.68 | -27565.6 | -1401.68 |
| X Variable | 257626.9 | 56378.78 | 4.569572 | 0.002575 | 124312.3 | 390941.5 | 124312.3 | 390941.5 |



RESIDUAL OUTPUT

| Observation | Predicted Y | Residuals |
|-------------|-------------|-----------|
| 1 | -3728.98 | 4473.975 |
| 2 | -1038.89 | 1216.888 |
| 3 | 4488.218 | -2255.22 |
| 4 | 8665.238 | -4479.24 |
| 5 | 10804.57 | -6698.57 |
| 6 | 13896.75 | -1475.75 |
| 7 | 17683.7 | -3142.7 |
| 8 | 15792.54 | 7106.463 |
| 9 | 19624.85 | 5254.148 |

Appendix 2 Regression Output of Amazon Operating Profit with AWS% of Revenue

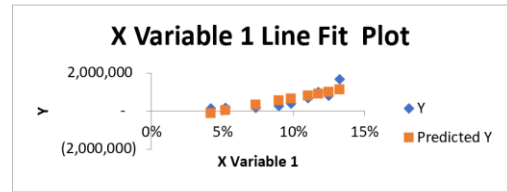
SUMMARY OUTPUT

| Regression Statistics | |
|-----------------------|----------|
| Multiple R | 0.843106 |
| R Square | 0.710828 |
| Adjusted R | 0.669518 |
| Standard E | 294518.1 |
| Observations | 9 |

ANOVA

| | df | SS | MS | F | Significance F |
|------------|----|----------|----------|----------|----------------|
| Regression | 1 | 1.49E+12 | 1.49E+12 | 17.20703 | 0.004305 |
| Residual | 7 | 6.07E+11 | 8.67E+10 | | |
| Total | 8 | 2.1E+12 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|--------------|--------------|----------------|----------|----------|-----------|-----------|-------------|-------------|
| Intercept | -675587 | 319828.7 | -2.11234 | 0.072537 | -1431862 | 80687.72 | -1431862 | 80687.72 |
| X Variable 1 | 13519985 | 3259291 | 4.148136 | 0.004305 | 5812985 | 21226984 | 5812985 | 21226984 |



RESIDUAL OUTPUT

| Observation | Predicted Y | Residuals |
|-------------|-------------|-----------|
| 1 | -111195 | 235180.3 |
| 2 | 29977.82 | 134755.8 |
| 3 | 320034.5 | -155396 |
| 4 | 539240 | -262856 |
| 5 | 651509.8 | -256811 |
| 6 | 813784.2 | -121535 |
| 7 | 1012519 | -213710 |
| 8 | 913273.1 | 86688.71 |
| 9 | 1114389 | 553684.4 |

Appendix 3 Regression Output of Amazon Capitalization Value with AWS% of Revenue

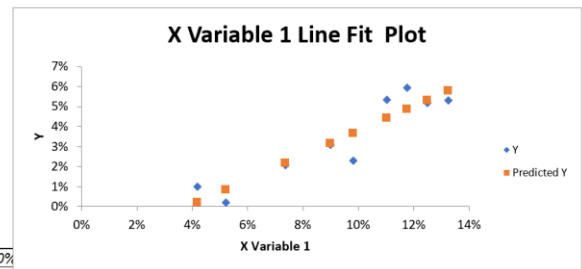
SUMMARY OUTPUT

| Regression Statistics | |
|-----------------------|----------|
| Multiple R | 0.925287 |
| R Square | 0.856156 |
| Adjusted R | 0.835607 |
| Standard E | 0.008593 |
| Observations | 9 |

ANOVA

| | df | SS | MS | F | Significance F |
|------------|----|----------|----------|---------|----------------|
| Regression | 1 | 0.003076 | 0.003076 | 41.6638 | 0.000349 |
| Residual | 7 | 0.000517 | 7.38E-05 | | |
| Total | 8 | 0.003593 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|--------------|--------------|----------------|-----------|----------|-----------|-----------|-------------|-------------|
| Intercept | -0.023526 | 0.009331 | -2.521193 | 0.039741 | -0.045591 | -0.001461 | -0.045591 | -0.001461 |
| X Variable 1 | 0.613806 | 0.095094 | 6.45475 | 0.000349 | 0.388945 | 0.838667 | 0.388945 | 0.838667 |



RESIDUAL OUTPUT

| Observation | Predicted Y | Residuals |
|-------------|-------------|-----------|
| 1 | 0.002097 | 0.007909 |
| 2 | 0.008506 | -0.006506 |
| 3 | 0.021675 | -0.000807 |
| 4 | 0.031627 | -0.000844 |
| 5 | 0.036724 | -0.013639 |
| 6 | 0.044091 | 0.009244 |
| 7 | 0.053114 | -0.001278 |
| 8 | 0.048608 | 0.010706 |
| 9 | 0.057739 | -0.004784 |

Appendix 4 Regression Output of Amazon Operating Margin with AWS% of Revenue

SUMMARY OUTPUT

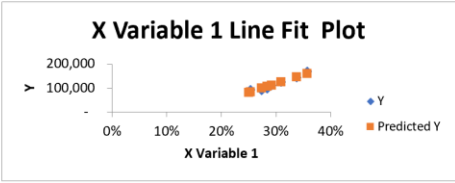
Regression Statistics
 Multiple R 0.970157
 R Square **0.941204**
 Adjusted R 0.931405
 Standard E 7603.754
 Observatio 8

| ANOVA | | | | | |
|-----------|----|----------|----------|----------|---------------|
| | df | SS | MS | F | ignificance F |
| Regressor | 1 | 5.55E+09 | 5.55E+09 | 96.04837 | 6.5E-05 |
| Residual | 6 | 3.47E+08 | 57817070 | | |
| Total | 7 | 5.9E+09 | | | |

| | Coefficients | andard Err | t Stat | P-value | Lower 95% | Upper 95% | ower 95.0% | pper 95.0% |
|------------|--------------|------------|----------|----------|-----------|-----------|------------|------------|
| Intercept | -102107 | 22257.64 | -4.5875 | 0.003741 | -156569 | -47644.4 | -156569 | -47644.4 |
| X Variable | 734454.7 | 74941.1 | 9.800427 | 6.5E-05 | 551080.5 | 917829 | 551080.5 | 917829 |

RESIDUAL OUTPUT

| Observator | Predicted Y | Residuals |
|------------|-------------|-----------|
| 1 | 81733.07 | 5099.933 |
| 2 | 84018.3 | 9561.699 |
| 3 | 98938.77 | -7784.77 |
| 4 | 106332.5 | -9761.52 |
| 5 | 112313.2 | -1953.18 |
| 6 | 125420.4 | 422.5768 |
| 7 | 146277.1 | -3262.12 |
| 8 | 160410.6 | 7677.382 |



Appendix 5 Regression Output of Microsoft Revenue with Azure% of Revenue

SUMMARY OUTPUT

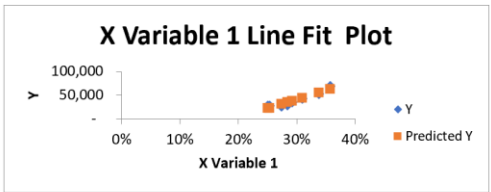
Regression Statistics
 Multiple R 0.947218
 R Square **0.897223**
 Adjusted R 0.880093
 Standard E 5325.016
 Observatio 8

| ANOVA | | | | | |
|-----------|----|----------|----------|----------|---------------|
| | df | SS | MS | F | ignificance F |
| Regressor | 1 | 1.49E+09 | 1.49E+09 | 52.37874 | 0.000353 |
| Residual | 6 | 1.7E+08 | 28355795 | | |
| Total | 7 | 1.66E+09 | | | |

| | Coefficients | andard Err | t Stat | P-value | Lower 95% | Upper 95% | ower 95.0% | pper 95.0% |
|------------|--------------|------------|----------|----------|-----------|-----------|------------|------------|
| Intercept | -72801 | 15587.34 | -4.67052 | 0.00343 | -110942 | -34660.1 | -110942 | -34660.1 |
| X Variable | 379831 | 52482.31 | 7.237316 | 0.000353 | 251411.4 | 508250.6 | 251411.4 | 508250.6 |

RESIDUAL OUTPUT

| Observator | Predicted Y | Residuals |
|------------|-------------|-----------|
| 1 | 22273.8 | 5612.198 |
| 2 | 23455.64 | 4716.365 |
| 3 | 31171.91 | -3983.91 |
| 4 | 34995.67 | -5664.67 |
| 5 | 38088.63 | -3030.63 |
| 6 | 44867.18 | -1908.18 |
| 7 | 55653.44 | -2694.44 |
| 8 | 62962.73 | 6953.272 |



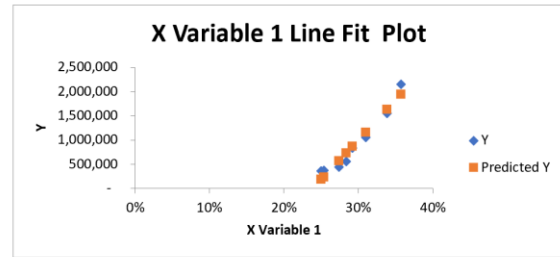
Appendix 6 Regression Output of Microsoft Operating Profit with Azure% of Revenue

SUMMARY OUTPUT

| Regression Statistics | |
|-----------------------|----------|
| Multiple R | 0.972307 |
| R Square | 0.94538 |
| Adjusted R | 0.936277 |
| Standard E | 163225.4 |
| Observatio | 8 |

| ANOVA | | | | | |
|-----------|----|----------|----------|----------|---------------|
| | df | SS | MS | F | ignificance F |
| Regressor | 1 | 2.77E+12 | 2.77E+12 | 103.8499 | 5.2E-05 |
| Residual | 6 | 1.6E+11 | 2.66E+10 | | |
| Total | 7 | 2.93E+12 | | | |

| | Coefficients | andard Err | t Stat | P-value | Lower 95% | Upper 95% | ower 95.0% | pper 95.0% |
|------------|--------------|------------|----------|----------|-----------|-----------|------------|------------|
| Intercept | -3919528 | 477792 | -8.20342 | 0.000177 | -5088643 | -2750413 | -5088643 | -2750413 |
| X Variable | 16393923 | 1608718 | 10.19068 | 5.2E-05 | 12457533 | 20330314 | 12457533 | 20330314 |



RESIDUAL OUTPUT

| Observatio | Predicted Y | Residuals |
|------------|-------------|-----------|
| 1 | 184003.3 | 171628.5 |
| 2 | 235012.6 | 138493.1 |
| 3 | 568055.5 | -130038 |
| 4 | 733093.1 | -176529 |
| 5 | 866588.6 | -38114.4 |
| 6 | 1159158 | -105014 |
| 7 | 1624705 | -73260.7 |
| 8 | 1940182 | 212834.3 |

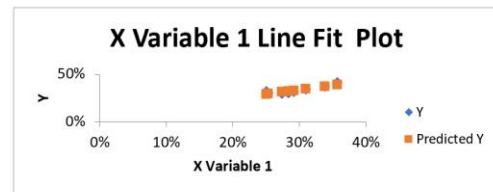
Appendix 7 Regression Output of Microsoft Market Capitalization Value with Azure% of Revenue

SUMMARY OUTPUT

| Regression Statistics | |
|-----------------------|----------|
| Multiple R | 0.897035 |
| R Square | 0.804672 |
| Adjusted R | 0.772117 |
| Standard E | 0.019598 |
| Observatio | 8 |

| ANOVA | | | | | |
|-----------|----|----------|----------|----------|---------------|
| | df | SS | MS | F | ignificance F |
| Regressor | 1 | 0.009494 | 0.009494 | 24.71757 | 0.002523 |
| Residual | 6 | 0.002305 | 0.000384 | | |
| Total | 7 | 0.011799 | | | |

| | Coefficients | andard Err | t Stat | P-value | Lower 95% | Upper 95% | ower 95.0% | pper 95.0% |
|------------|--------------|------------|----------|----------|-----------|-----------|------------|------------|
| Intercept | 0.050556 | 0.057368 | 0.881254 | 0.412087 | -0.08982 | 0.190931 | -0.08982 | 0.190931 |
| X Variable | 0.960319 | 0.193158 | 4.971677 | 0.002523 | 0.487678 | 1.432959 | 0.487678 | 1.432959 |



RESIDUAL OUTPUT

| Observatio | Predicted Y | Residuals |
|------------|-------------|-----------|
| 1 | 0.290931 | 0.030214 |
| 2 | 0.293919 | 0.007128 |
| 3 | 0.313428 | -0.01516 |
| 4 | 0.323096 | -0.01937 |
| 5 | 0.330916 | -0.01325 |
| 6 | 0.348054 | -0.00668 |
| 7 | 0.375324 | -0.00502 |
| 8 | 0.393804 | 0.022144 |

Appendix 8 Regression Output of Microsoft Operating Margin with Azure% of Revenue

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