

Valuation Analysis Report of Nvidia Corporation (NASDAQ: NVDA)

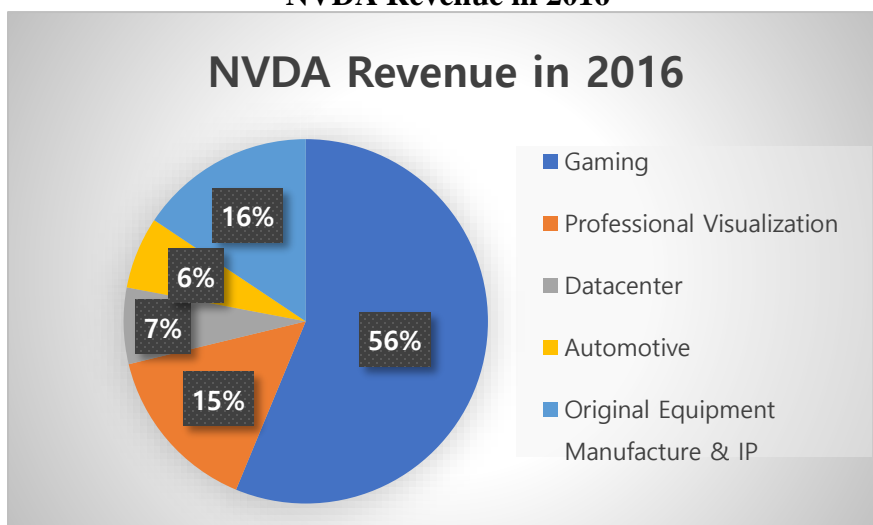
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Company Introduction

Nvidia Corporation designs, develops, and markets three-dimensional (3D) graphics processing units (GPU) and related software. The company's products provide interactive 3D graphics to the mainstream personal computer. They are aiming to extend technology leadership in Artificial Intelligence (AI), revolutionize computing with the GPU's parallel processing capability, extend technology leadership in visual computing, extend visual computing leadership into mobile and cloud-computing platforms, and enable GPU computing platforms in key focus areas.

Nvidia covers several markets, Gaming, Professional Visualization, Data Center, and Automotive, of which has all have great potentials in the future. As technology continues to develop, the future video games will become more and more complex with sophisticated and vivid graphics. As Virtual Reality (VR) and Augmented Reality (AR) become mature, the demand for advanced graphics processing will be much higher in the foreseeable future. Moreover, GPU- powered deep learning is being rapidly adopted by thousands of enterprises to deliver services and features that would have been impossible with traditional coding. In another word, GPUs excel at parallel workloads, speeding applications by 10-75x compared with Central Processing Units (CPUs), making the parallel computation become reality, which is critical for the AI development at this stage. Last but not least, Nvidia is producing the central processing system for autonomous cars. They used to had a exclusive partnership with Tesla, producing the central processing system, until Tesla chose to produce the system themselves. But Nvidia got the first mover advantage since the advanced technology requires a good research team and tons of R&D investment.

NVDA Revenue in 2016



As the pie chart indicates, gaming laid the solid foundation of Nvidia's business, while the Data Center, Professional Visualization, and Automotive have great potential in the future especially with the advent of AI.

Gaming

GPU is one of the most key component in video game. There are three major companies in GPU market, AMD, INTEL and Nvidia. In the latest GPU shipments results for Q3 2017, Nvidia, AMD and Intel's GPU Shipments Increased 30%, 8% and 5% accordingly.

The increase trend can tell intel is going down and Nvidia is moving up. Below table also illustrate it more clearly from market share change perspective. With the total market keep growing, the increased market share means Nvidia has a big potential to grow.

Total Graphics Chip Market shares

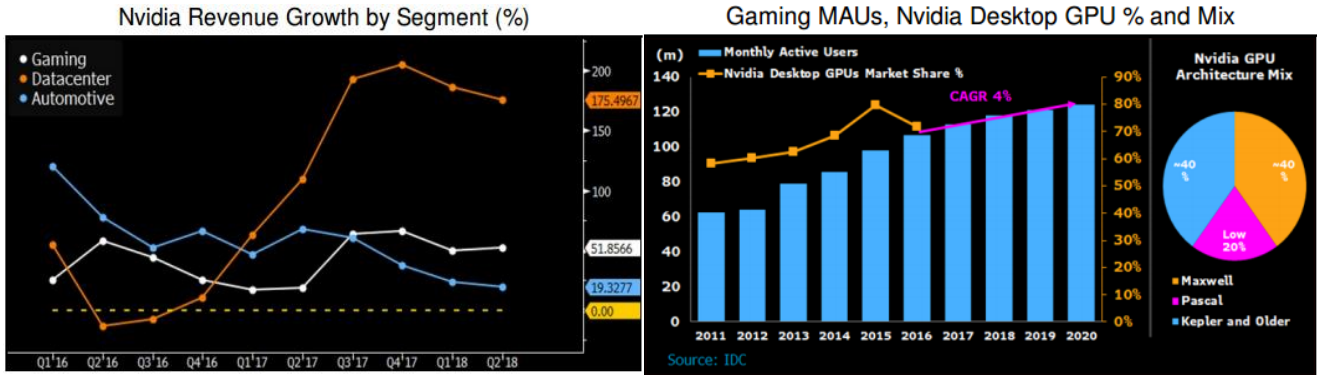
| Supplier | This Qtr Market Share | Last Qtr Share | Qtr-Qtr Market Share change | Last Yr Share Change |
|-----------------|------------------------------|-----------------------|------------------------------------|-----------------------------|
| AMD | 13.0% | 13.2% | -0.2% | 0.0% |
| Intel | 67.8% | 70.6% | -2.8% | -3.2% |
| Nvidia | 19.3% | 16.3% | 3.0% | 3.3% |

Source: <https://wccftech.com/nvidia-amd-intel-gpu-market-share-q3-2017/>

Strength: Nvidia's strengthen is in graphic computing. It is more powerful in the ability of graphic computing than other chip makers. It helps and supports gaming industry and make the complex game run smoothly. The increasing complexity and richer graphics of game gives game players more enjoyment and they are willing to pay for it. The game series like Call of Duty(Activision Blizzard), Battlefield(EA) and Halo(Microsoft) etc requires strong graphic processor so that the game won't be stuck anywhere in the middle. It offers more opportunities to GPU. Nvidia expects its gaming revenue to increase 10-20% annually. Another advantage is that GPU are refreshed every 3.5 years on average and some high-end gamers upgrade every other year to match product releases.

Disadvantage: AMD's GPU price is the cheapest among the three major chip makers. For lower end GPU platform, it may be more compelling against Nvidia. Nvidia's high end GPU price is the most expensive one and for lower-end and free-to-play games, it is not necessary to have Nvidia GPU so users may choose intel or AMD. Nvidia needs to better position them in marketing strategy to sustain their business growth. Since GPU is correlated to game industry, whether the game is attractive becomes a key issue. If a long expected major game release disappointed game players, it will also be a hit to GPU sales. To better estimate and project the GPU sales, the upcoming big game releases has to be taken into consideration.

Future Trend: The game trend impact Nvidia's revenue. 56% of sales are from gaming segments. It is expected the growth in game segment will be faster than ever thanks to steadily growing gaming players. Following charts show Nvidia's revenue growth by segment projection (Left) and monthly active gaming users growth & Nvidia's desktop GPI market share (Right). Based on the these projections, We are confident that Nvidia can take advantage of the gaming industry's up trend and increase its market share along with it.



Data Center

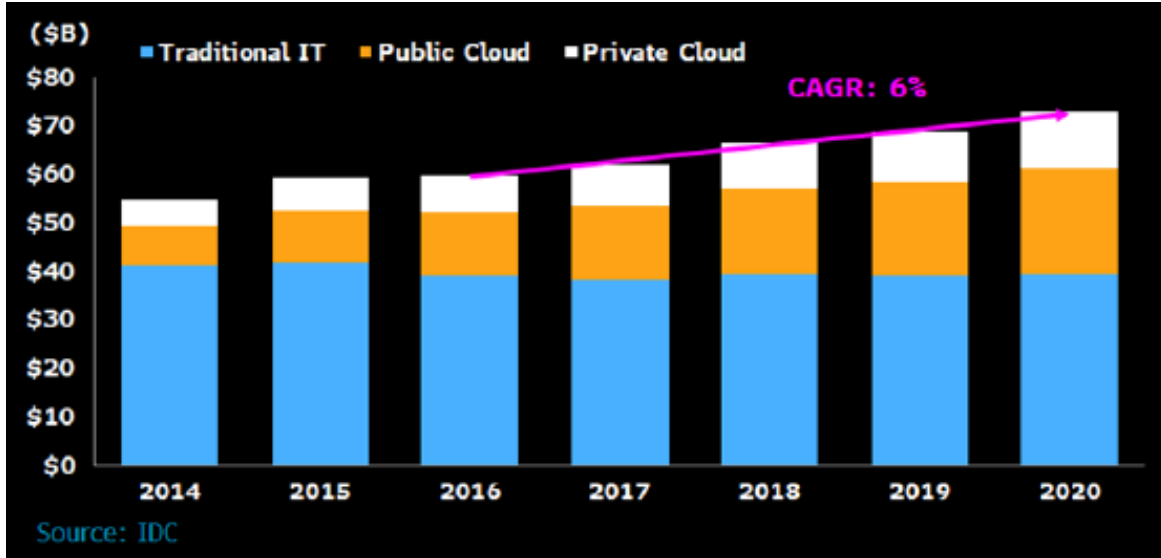
Unlike chips in many data-center segments, Nvidia uses a value-based pricing model for data-center GPUs. In a nascent market, this binds the chipmaker and customer and potentially increases its gross margin. Looking into its rivalries, AMD may use a similar model, yet its GPU chips may be cheaper; while Intel's CPUs carry list-based pricing. Gross margin of its data center GPUs amid their "value-based" price is 75-80%, while the Professional Workstation segment, with its steadier sales, comes in at 70-75%. Data center is 7% of revenue and growing at 175% a year. Hence, Nvidia's margins have room for improvement on the back of data-center sales growth, and Data-center GPUs are a nascent market with room for wider penetration as well.

Nvidia Data-Center Sales and Gross Margin



Nvidia has 15% of data-center sales exposed to traditional IT budgets. It's spared the need to carefully balance cloud-buying with corporate IT budgets, but not intra-cloud-vendor sales volatility. However, sales into data-center systems are likely to be unstable given that large cloud vendors, such as Amazon.com, make up a significant and growing portion of sales while traditional corporate IT buying is declining. Meanwhile, the budgets of Google, Microsoft and Facebook aren't in sync, yet they make up a notable share of sales, leading to inconsistent chip revenue when IT spending plans take a breather. In summary, traditional IT weakness needs to be offset by cloud sales. Cloud-buying is driven by platforms and new initiatives, has extensive scale and tends to be inconsistent.

Server Revenues



As strong as Nvidia's data-center sales growth has been, 60% of the volume has been driven by fewer than eight cloud companies, including Google, Amazon.com, Microsoft, Alibaba and Baidu. Sales visibility here may be limited to 1-3 quarters depending on whether the purchase is for internal or external system chip use. Its 25% sales exposure to the high-performance computing market is likely steadier. The remaining 15% of its data-center sales is for desktop virtualization.

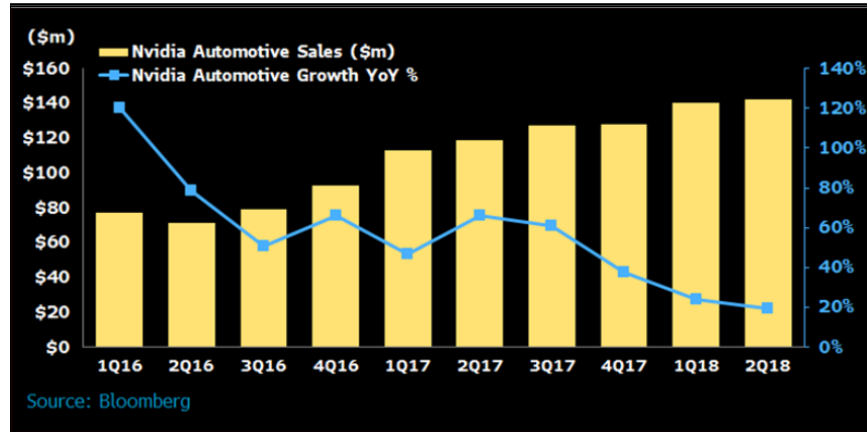
Nvidia believes that deep learning, including system training, inference and high-performance computing (HPC), may become a \$30 billion market by 2020. Its share in HPC, where Intel's Xeon Phi is the only other large chipmaker, is 70-75%. Nvidia's dominance may continue in the training segment, having built chips explicitly for that function. The inferencing segment remains fragmented and traditional Intel CPUs currently dominate, even as GPUs from AMD and FPGA (Field-programmable gate array) chips from Xilinx potentially expand sales. Nvidia is expanding the market natively and plans to increase its Deep Learning Institute program, teaching 100,000 programmers to use its AI tools this year, up from 10,000.

Autonomous Cars

Comparing to its peers, Nvidia is providing autonomous-driving chips with higher prices. Nvidia suggests its advanced chip content alone may be in a wide \$133-\$2,000 per vehicle range with an average of \$600-\$1,000, while today's cars average expense in chips is \$450. It leaves a huge gap for lower-end cars considering the manufacturing costs.

Our anticipation is that Nvidia will not lower the cost in the near future due to its higher quality comparing to other products. On the other hand, due to technical bottleneck, the volume of the autonomous cars is still low, let alone the fully autonomous one. Therefore, it may have little impact in its sales as all and carry less of the margin compare to that of data center. In another word, while autonomous-driving chips contributes to revenue, the proportion remains small until advanced cars ship in high volume.

Nvidia Automotive Sales



Competitive Environment in Semiconductor Industry

There are several big players in the industry, of whom seldom specialized in producing GPUs, except for AMD, a direct competitor with Nvidia in this area. As mentioned above, GPUs are critical dealing with complex graphics and AI algorithm (at least at this stage). There are two major threats from two big players in the market that may completely change the whole picture, Google and Intel.

Google has been using Tensor Processing Units (TPUs) for its data farm and claim it a better processor for complex algorithms such as Deep Learning and Neuro Network. But there is no evidence that Google will commercialize it externally, due to less advantages for them in producing hardwares. Another threat came from Intel with their advanced processor for AI algorithm, FPGA. After the earning season, we learnt that there would be no materialized impact on the market until the end of 2018, when Intel probably can commercial FPGA with large volume. It is also worth mentioning that FPGA requires systematic programming. In another word, it can be only used for dealing with parallel computation. If companies want to expand it to more purposes, it requires reprogram it, which is a niche program language in the market and seldom people know how to do it. With such high maintenance cost, even if FPGA can be carried out in a short future, it cannot take much market share from Nvidia.

Relative Valuation

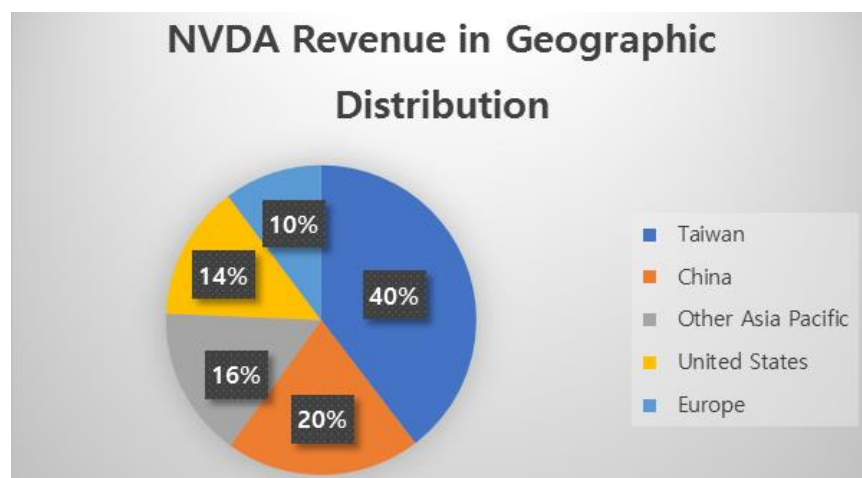
| | Nvidia | AMD | Intel | Broadcom | Microchip | Industry Avg.* |
|------------------|--------|--------|---------|----------|-----------|----------------|
| P/E | 55.3 | n.a | 15.26 | n.a | 42.83 | 39.88 |
| P/B | 19.5 | 25.49 | 2.56 | 3.57 | 5.17 | 7.23 |
| Dividend Yield | 3% | n.a | 2.87% | 1.15% | 1.95% | 1.8% |
| Revn Grth | 35.9% | 7.04% | 7.28% | 92.5% | 56.8% | 34.83% |
| NI Grth | 79% | 24.7% | -9.67 | n.a | -49.21% | 29.15% |
| Operating Margin | 28% | -0.98% | 25.02% | 7.4% | 17.8% | 15.82% |
| Debt / Equity | 0.35 | 3.4 | 0.38 | 0.62 | 0.90 | 0.7 |
| Market Cap | 116.7B | 13.5B | 186.41B | 101.1 B | 21.4 B | 50.5B |
| Revenue TTM | 8344 | 4619 | 61711 | 16928 | 3581 | 12060 |
| Net Income TTM | 2288 | -128 | 16010 | 1760 | 514 | 2560 |
| FCF TTM | 1943 | -229 | 11790 | 4915 | 1102 | 2280 |

Resource: Bloomberg. AMD and Broadcom operate at loss. AMD does not pay dividend at this time.

Compare to its peers in the industry, Nvidia has a higher P/E ratio, but a pretty healthy financial conditions. With high growth in its business, we believe Nvidia will soon fill the gap of its P/E ratio with its peers if they can keep the current pace. Also, Nvidia did not take advantage of the low interest environment and leverage their business. All revenues came from organic growth in its business. Hence, Nvidia does not need to worry about the anticipating interest raising in the foreseeable future. Also, although they just started paying dividend in 2013, they provide a higher dividend yield comparing to its peers, which may also be a good reason to invest in the company.

Potential Risk in the Future

The technology develops so fast in the tech industry. We cannot predict how it goes in the future. But unless there will be a fundamental change in AI algorithm or completely revolution in computer hardware, the business of Nvidia will remain solid and found in the future.



Since most NVDA's revenues come from Asia Pacific area, the deteriorating global trade environment may play a critical impact for its business. The business depends vitally on the trading relationship between the U.S. and Asia Pacific Area, especially with Taiwan and Mainland China.

Also, Nvidia has been consistently surpassing the earning forecasts for the past quarters, which propped up the stock prices for the past years. If Nvidia miss the earning estimation in the future, the stock price will be easily adjusted. Fortunately, they beat the estimate again with in the third quarter revenue, and the stock price went up more than 4% reacting to the announcement of the earnings.

Financial Analysis

All details please refer to the Excel (Valuation of NVDA).

Valuation Conclusion

We are still at the primary stage learning how to build the model and use DCF to value the company. Based on the result given in the model, we think the stock may be overvalued since it requires a long term growth rate of 5% to support the current price level.

But for the semi conduct producer, we do not know if the advent and the broad application of AI is sitting somewhere on the hypercycle or it will be the third industrial revolution for the entire human race. If the latter happen, the global GDP and productivity will move up beyond the existing boundary and create more value. Nvidia, the one producing the future brain will benefit the most from the revolution.

References

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