BEHIND THE NUMBERS
Quality of Earnings Analysis

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NVIDIA Corporation (NVDA)
Earnings Quality Review

NVIDIA (NVDA) has become one of the symbols of the promise of AI-based technology over the last year. We are NOT going to comment on the market for AI-based technology or try to predict the sales growth that could come from data centers adding more NVDA technology. Instead, we will examine the business model and the accounting to understand what drives EPS growth at NVDA as well as what has derailed it in the past. This is important because while NVDA is not going to disappear, several times in the past it has seen up to 90% of its market value vanish in a very short time after years of huge returns gave way to reality. And in most cases, the new period of reality lasted for several years.

Also, for some managers, this may be a stock they cannot afford to be out of completely, but there are times to consider lightening the position or using some options to hedge some of the exposure.

In this report, we will assess the quality of the company's accounting as well as examine some of the risks associated with its operational business model. We will explore some of the company's past blowups to see how these risks accelerated the downturn as well as identify some signs in the numbers that were giving investors an early warning of the coming profit declines.

Points we will cover in this report include:

- The nature of NVDA's products results in the propensity of unexpected buildups in inventory in the channel that has led to price discounting, massive inventory writedowns, and plummeting margins in the past.

- An examination of past blowups may offer a road map to follow in the future to predict when dangerous levels are being breached. A rapid increase in Finished Goods DSI has signaled several past NVDA blowups before the event.

- The company's fabless operating model also adds special risks that investors must be familiar with.

- The business model also results in massive working capital needs that can build up quickly during a slowdown.

- While we view the company's overall earnings quality as acceptable, we do note that its current warranty reserve looks too low considering past warranty experiences. The last time a warranty situation arose, it cut margins by 5% for several years.

- We also take issue with the company adding back stock compensation to non-GAAP results especially given how much it spends every year on buybacks to limit dilution.

Watch Inventory for Signs of the Next Blowup

NVDA produces many different GPUs (graphics processing units) and related hardware and software. It is no secret that the product development cycle for this technology has been getting shorter for some time. NVDA's latest products often get premium pricing compared to the previous generation as competition may not have heated up yet for the latest chips. NVDA also supplies many customers directly as well as relying on third-party distributors to buy its product in bulk and deliver it to end users. These factors lead to three of the biggest risks for NVDA:

- Short-lived products

- Pricing pressure can develop quickly

- Three channels being filled with inventory – NVDA's books, distributors, and end customers.

In the past, these factors have resulted in rapid buildups in inventory, falling prices, and massive writedowns that have caught investors off guard and collapsed the stock price.

Investors have seen NVDA report periods of enormous sales growth like it saw in fiscal 2024. In such periods of hot demand, NVDA can sell all its inventory:

	F2024	F2023	F2022	F2021	F2020	F2019	F2018
Revenue	$60,922	$26,974	$26,914	$16,675	$10,918	$11,716	$9,714
Growth Rate y/y	125.9%	0.2%	61.4%	52.7%	-6.8%	20.6%	40.6%

However, when sales growth stalls like in fiscal 2023 – the inventory backs up on it very quickly. The following tables show inventory and DSIs for the last twelve quarters:

	1/28/2024	10/29/2023	7/30/2023	4/30/2023
Inventory	$5,282	$4,779	$4,319	$4,611
Adjusted COGS	$5,144	$4,537	$3,893	$2,390
DSI	93.4	95.9	101.0	175.6
Finished Goods DSI	36.4	35.5	38.4	72.0

	1/29/2023	10/30/2022	7/31/2022	5/01/2022
Inventory	$5,159	$4,454	$3,889	$3,163
Adjusted COGS	$2,052	$2,602	$3,630	$2,725
DSI	228.8	155.8	97.5	105.6
Finished Goods DSI	100.7	60.8	40.0	45.4

	1/30/2022	10/31/2021	8/01/2021	5/02/2021
Inventory	$2,605	$2,233	$2,114	$1,992
Adjusted COGS	$2,518	$2,342	$2,170	$1,915
DSI	94.1	86.8	88.7	94.7
Finished Goods DSI	40.5	36.5	31.1	36.0

A quick look shows that in 2023, inventory levels doubled y/y while sales growth was virtually flat. On the earnings calls, NVDA addressed channel inventory:

- In 1Q23 NVDA said channel inventory had normalized and was expected to remain flat in 2Q23.

- In 2Q23 that changed to the channel needed to cut prices and the channel was reducing inventory levels to match lower demand forecasts.

- 3Q23 showed the channel in full inventory correction with demand expectations falling further.

Based on past experience, it appears that investors should be leery when total DSI's top 100 days and Finished Goods DSIs top 50 days and grow for a couple of quarters. NVDA is under those levels now. However, as quarters during calendar 2022 and 2023 show – this can change quickly and it is easy to monitor. Below we show that this situation has happened multiple times in the past.

Inventory Backing Up Crushes Margins

When inventory rises, the risk of the company having to write it down increases also. Inventory write-downs deflating gross margins is a common occurrence at NVDA at which point the company goes from a phase of hyper-growth to one of flat-to-negative sales growth and falling margins. (To NVDA's credit – it does not add these charges back to adjusted EPS.)

Typically, these charges reflect NVDA slashing prices to move the inventory. It doesn't throw it away, it just gives customers a bargain to buy chips that may be only one generation behind. It is important to remember that with NVDA's product development cycle getting shorter, it is often trying to sell the latest generation and the prior generation products at the same time. We'll discuss this more below, but because NVDA contracts out much of its manufacturing, it must reserve space in other fabs. When it is writing down inventory, it may also be writing off prepayments toward the fab space it has contracted as it doesn't want to produce more inventory at the time. These charges have been significant at times and at other times they have declined for years:

	F2024	F2023	F2022	F2021	F2020	F2019	F2018
Revenue	$60,922	$26,974	$26,914	$16,675	$10,918	$11,716	$9,714
Gross Margin	72.7%	56.9%	64.9%	62.3%	62.0%	61.2%	59.9%
Inventory Charge	$2,200	$2,170	$354	$116	$161	$270	$48
Gross Margin Impact	-2.7%	-7.5%	-0.9%	n/m	n/m	-2.0%	n/m
Write-offs Sold	$540	$137	$111	$145	$145	$41	$35

- The size of the write-offs jumped in 2023 and 2024 because NVDA was also writing off capacity reservations.
- When these write-offs hit in a big way, the company often sees margin compression along with flat or negative sales growth.
- Some of the inventory written off is still sold. That merchandise often has little cost to assign to any future sales. These sales can have the impact of boosting margins.
    - In 2024, the $2.2 billion charge cost NVDA 270bp of gross margin. But, the $540 million from sales of written-off inventory could have added as much as 90bp back to margin.
    - In 2020, the charge was $161 million which would hurt gross margin, but sales of product written off were $145 million – that nets to almost a wash.

NVIDIA's Fabless Operating Model Has Inherent Risks

NVDA is primarily a research shop. Of its 29,600 workers, 22,200 (75%) are in R&D. It develops new semiconductor chips and then buys the wafers and contracts the manufacturing with other fabs. Research costs continually rise and we consider that a positive. We also believe that the research costs are planned and budgeted in advance. The only issue to keep in mind is when sales growth does stall – the fixed R&D spending accelerates the decline in earnings. This is obvious in fiscal 2023 and 2020:

	F2024	F2023	F2022	F2021	F2020	F2019	F2018
Revenue	$60,922	$26,974	$26,914	$16,675	$10,918	$11,716	$9,714
COGS	$16,621	$11,618	$9,439	$6,279	$4,150	$4,545	$3,892
Gross Margin	72.7%	56.9%	64.9%	62.3%	62.0%	61.2%	59.9%
R&D	$8,675	$7,339	$5,268	$3,924	$2,829	$2,376	$1,797
SG&A	$2,654	$2,440	$2,166	$1,940	$1,093	$991	$815
Oper. Margin	54.1%	20.7%	37.3%	27.2%	26.1%	32.5%	33.0%

Another problem is that many of the manufacturing arrangements require prepayments and/or longer-term commitments. NVDA must pay much of these contracted costs even if it elects to not utilize the contracted production. This has been the case in both fiscal 2023 and 2024 to the tune of $2.2 billion each year. That includes the inventory reserve and payments made for unused fab capacity.

- Prepaid expenses have risen sizeably from $791 million in fiscal 2023 to $3.08 billion in fiscal 2024. Prepaid supply and capacity agreements rose from $458 million to $2.5 billion.

- Other current assets also include $3.0 billion in fiscal 2023 and $2.5 billion in 2024 as prepaid supply and capacity agreements.

- There is also a total commitment to purchase $16.1 billion in inventory and long-term supply and capacity obligations. NVDA's auditor considers this a critical audit matter.

- Notice that operating income was $33 billion last year. The $16.1 billion in commitments is manageable. But we know if sales growth falters, NVDA could see its operating margin drop by 10%-20%, which knocks $6-$12 billion off operating income on flat sales.

It is worth mentioning that much of this contract manufacturing is done in China and Taiwan. The US government already scrutinizes what NVDA can do with its technology in those locations. Beyond having longer lockdowns than other places in the world that could impact NVDA should those recur, there are bigger political and military issues in that area. We're not going to try to quantify this or assign probabilities – just say that NVDA has greater exposure to that type of risk than many other companies we follow.

Working Capital Consumes Cash in Most Years

The other issue NVDA faces with its operating model is many times customers, suppliers, and manufacturers have considerable power. Here are some statements worth considering from the 10-K:

> *"we may place non-cancellable inventory orders for certain production components in advance of historical lead times, pay premiums, or provide deposits to secure future supply and capacity and may need to continue to do so"*

> *"we have granted and may continue to grant extended payment terms to some customers, particularly during macroeconomic downturns, which could impact our ability to collect payment."*

> *"Our vendors have requested and may continue to ask for shorter payment terms, which may impact our cash flow generation."*

> *"We have paid premiums and provided deposits to secure future supply and capacity, which have increased our product costs and may continue to do so."*

> *"We receive a significant amount of our revenue from a limited number of customers in our distribution and partner network."*

Above, we showed recent inventory levels of 95-100 days, which comes after some sizeable write-downs. But look at the rest of the working capital items – payables are much lower than inventories and going down:

	1/28/2024	10/29/2023	7/30/2023	4/30/2023
Accounts Payable	$2,699,000	$2,380,000	$1,929,000	$1,141,000
Adjusted COGS	$5,144,000	$4,537,000	$3,893,000	$2,390,000
Accounts Payable Days	47.7	47.7	45.1	43.4

	1/29/2023	10/30/2022	7/31/2022	5/01/2022
Accounts Payable	$1,193,000	$1,491,000	$2,421,000	$1,999,000
Adjusted COGS	$2,052,000.0	$2,602,000.0	$3,630,000.0	$2,725,000.0
Accounts Payable Days	52.9	52.1	60.7	66.8

	1/30/2022	10/31/2021	8/01/2021	5/02/2021
Accounts Payable	$1,783,000	$1,664,000	$1,474,000	$1,218,000
Adjusted COGS	$2,518,000.0	$2,342,000.0	$2,170,000.0	$1,915,000.0
Accounts Payable Days	64.4	64.7	61.8	57.9

Receivable DSOs rose in fiscal 2023 and are up considerably again in fiscal 2024 but the huge surge in sales cut the DSO. Sales growth of 125% is rare even for NVDA. We would expect DSOs to increase going forward:

	1/28/2024	10/29/2023	7/30/2023	4/30/2023
Accounts Receivable	$9,999,000	$8,309,000	$7,066,000	$4,080,000
Revenue	$22,103,000	$18,120,000	$13,507,000	$7,192,000
Accounts Receivable Days of Sales	41.2	41.7	47.6	51.6

	1/29/2023	10/30/2022	7/31/2022	5/01/2022
Accounts Receivable	$3,827,000	$4,908,000	$5,317,000	$5,438,000
Revenue	$6,051,000.0	$5,931,000.0	$6,704,000.0	$8,288,000.0
Accounts Receivable Days of Sales	57.6	75.3	72.2	59.7

	1/30/2022	10/31/2021	8/01/2021	5/02/2021
Accounts Receivable	$4,650,000	$3,954,000	$3,586,000	$3,024,000
Revenue	$7,643,000.0	$7,103,000.0	$6,507,000.0	$5,661,000.0
Accounts Receivable Days of Sales	55.4	50.7	50.1	48.6

If we look at the full change of working capital, it has consumed several billion dollars in the last three years:

	F2024	F2023	F2022
Receivables	-$6,172	$822	-$2,215
Inventory	-$98	-$2,554	-$774
Prepaid Exp	-$1,522	-$1,517	-$1,715
Payables	$1,531	-$551	$568
Accrued other Liab.	$2,025	$1,341	$581
Other L-T Liab.	$514	$252	$192
Net change Wrk Cap.	-$3,722	-$2,207	-$3,363

The accrued and other liabilities are seeing the biggest increases from "excess inventory purchase obligations" which we addressed above and customer program accruals which are rebates and and price incentives for distributors. Deferred revenues helped boost that account and the L-T Liability account.

Warranty Reserve Looks Too Small

NVDA does provide warranty protection to repair or replace defective products. In 2009, the company experienced a major problem with defective products being installed in many thousands of locations before it was discovered which led to huge warranty claims. Before the event, NVDA had a warranty accrual of only $5.7 million, or just over 0.1% of sales. Look how much warranty accruals rose in response to the problem:

Warranties	F2012	F2011	F2010	F2009
Beginning Balance	$108	$93	$151	$6
New Warranty Accrual	$7	$194	$171	$203
Warranty Accrual used	-$97	-$179	-$93	-$58
Ending Balance	$18	$108	$93	$151
New Accrual % Sales	0.2%	5.5%	5.1%	5.9%

The 2009 warranty issue took three years to resolve and was consuming 5% of the company's margin the entire time. This type of event recurring is a very real risk any company in NVDA's market faces. At this point, warranty accruals are $306 million. Against sales of $60.9 billion that represents only 0.5% of sales and the accrual in 2024 was slightly less than that. This could be an area where NVDA sees an increase in expense going forward to adequately reserve for the potential cost of future warranty claims.

Adding Back Stock Compensation Is One Area of Non-GAAP EPS Where We Take Issue

As far as adjustments from GAAP to non-GAAP earnings, NVDA is very high quality. It does not add back its inventory write-offs which are material. It does not make many acquisitions, and many are very small relative to NVDA's current size. It does add back the transaction costs and gains/losses on investments. The only big adjustment is adding back stock compensation.

Looking at the adjustments to operating income for 4Q24 – non-GAAP results were $1.134 billion higher than reported GAAP results. Of that total stock compensation was $993 million and some amortization was $137 million. This was 23 cents of the non-GAAP EPS of $5.16.

The issue we have is NVDA is proving the stock compensation is a cash item because it is spending more to repurchase shares to reduce dilution than the stock compensation and isn't adding much to EPS either. For fiscal 2024, NVDA added back $3.5 billion in stock compensation but spent $9.5 billion repurchasing stock. The non-GAAP EPS was $12.97 and they only saw 6 cents in incremental EPS from the stock repurchase.

Appendix- History of Past NVDA Blowups

One of the interesting things about Nvidia is it has been a hot growth company many times in the last 20+ years. Many new markets have been created over the year such as Microsoft's introduction of the *Xbox,* the rollout of advanced smartphones, new gaming platforms, and notepad computers. NVDA has been right there to produce fast high-end chips for all these devices. Several times NVDA has seen demand for these products explode rapidly and then very quickly, growth levels off and even declines. We wanted to look at several periods when NVDA was growing rapidly before the rate of growth vanished and the stock was crushed to see what triggered the problems:

2001-2004 – The Xbox

From 1Q01, and a low price of $8.75 per share, NVDA rose above $40 much of that year on the prospect of the new *Xbox*. In fiscal 2002, NVDA hit a peak of $71.71 in its 4Q02 ending in January. Two quarters later in fiscal 2Q03, the stock was $7.70 after the company wrote off $21 million of inventory related to XBox.

FY ended:	Jan 04	Jan 03	Jan 02	Jan 01
Revenue	$1,822.9	$1,909.4	$1,369.5	$735.3
Cost of Goods	$1,294.1	$1,327.3	$850.2	$462.4
Gross Margin	29.0%	30.5%	37.9%	37.1%
R&D Spending	$270.0	$224.9	$154.8	$86.0
SG&A Spending	$165.2	$151.5	$98.9	$58.7
	4Q	**3Q**	**2Q**	**1Q**
Fiscal 03 DSI	43.8	57.9	79.2	61.5
Fiscal 02 DSI	61.6	47.3	52.1	52.9

- We can see the huge sales jump in fiscal 2002 vs. 2001. The reason given was a big increase in XBox demand.
- In 2Q03, NVDA wrote off $21 million of inventory largely related to some Xbox product and noted that Xbox margins were lower than other sales. The 79 DSI is after the $21 million write-off. However, notice that DSIs kept rising even with stronger sales.
- Look at what finished goods DSIs did. DSI's rose rapidly in 4Q, again in 1Q, and by the time it jumped in 2Q, the stock was falling.

	4Q	3Q	2Q	1Q
Fiscal 03 DSI	34.6	49.8	64.2	46.1
Fiscal 02 DSI	35.7	27.4	35.4	33.9

- Xbox sales continued in 2003 and drove sales higher – but gross margin dropped in a material way and then growth vanished in in 2004.

- Also notice that NVDA didn't slash other costs – it kept growing its R&D spending which hurt margins on flat sales.

- After the high of $71.71 in 4Q02, NVDA dropped 90% in two quarters. It did not top that high again until 3Q07.

2006-2009 High-End Gaming PCs, High-Feature Cell Phones

NVDA survived the slowdown in Xbox sales and saw new markets pick up. These included better smartphones being released and many customers trading up. Gaming chips were still making huge advances in graphics and speed. Many were gaming on more expensive PC systems. Businesses were upgrading PCs as well. NVDA not only didn't have much pressure on inventory – they were reducing reserves in that area.

The stock split 2 for 1 in 2006. To flow with the prior section, we multiplied the share price by 2. In 2006, the stock was back in the low $30s, and the $60s in 2007. It reached its new peak in 3Q08 (Aug/Sept/Oct 2007) at $79.34. By 1Q09 (Feb/Mar/Apr 2008) the stock already declined 30-54%. By 4Q09 – the stock was $11.50. Again, we saw NVDA give back years of gains in a rapid decline:

	Jan 09	Jan 08	Jan 07	Jan 06
Revenue	$3,424.9	$4,097.9	$3,068.8	$2,375.7
Cost of Goods	$2,250.6	$2,228.6	$1,768.3	$1,465.7
Gross Margin	34.3%	45.6%	42.4%	38.3%
R&D Spending	$855.9	$691.6	$553.5	$357.1
SG&A Spending	$362.2	$341.3	$293.5	$202.1
	4Q	**3Q**	**2Q**	**1Q**
Fiscal 09 DSI	144.2	90.0	53.0	59.9
Fiscal 08 DSI	50.0	46.4	49.2	63.5
Fiscal 07 DSI	65.4	69.9	87.2	80.2
Inventory Reserve	$86.9	$32.9	$39.7	$48.3
Reserve % Gross Inv	13.9%	8.4%	10.1%	15.9%

- There was monster growth in fiscal 2007 and 2008. Margins were rising. NVDA was even reducing its inventory reserve which helped margins more.

- During fiscal 2008 (mostly calendar 2007), PC sales continued to be very strong and so were Sony products. However, Cell phone growth was turning negative during fiscal 2008.

- In 1Q09, NVDA was guiding to some PC slowdown and lower cell phones. It was seeing gross margin turn down slightly.

- In 2Q09, NVDA had a warranty issue and took a $196 million charge. Gross margin was under pressure from falling pricing.

- In 3Q09, NVDA was cutting the workforce by 6.5%

- In 4Q09, inventory was backing up and NVDA took a $50 million charge to write off inventory.

- Notice that the jump in finished goods hit very quickly. DSIs doubled in one quarter and nearly doubled in the next:

	4Q	3Q	2Q	1Q
Fiscal 09 DSI	100.9	56.7	28.1	32.4
Fiscal 08 DSI	30.5	21.8	31.5	31.8
Fiscal 07 DSI	34.7	37.1	47.1	45.7

- The problems didn't end in 2010 either. NVDA took another $164.4 million charge to boost warranties and the inventory reserve was $64.8 million on a $207 million drop in inventories. The reserve was still 16.4% of gross inventory.

- In 2011, the warranty charge reached $475.9 million and the inventory reserve was $118.5 million or 22.0% of gross inventory.

- The stock didn't top its fall of 2007 price of $72 until the spring of 2016.

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