Krause Fund Research
Spring 2024

Current Stock Price (as of 4/16/2024): $119.25
Target Price: $98.89-$109.99

Technology

Micron Technology, Inc. (NASDAQ:MU)

Recommendation: HOLD

Analysts

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Company Overview

With a long history that dates back to its founding in 1978, Micron Technology, Inc. is a pillar of the semiconductor industry. With its advanced DRAM, NAND, and NOR flash memory technologies, Micron—a company well-known for its expertise in memory and storage solutions—remains at the forefront of the industry. With its products' vital use in computers, servers, cellphones, automotive systems, and IoT devices, the company is well-positioned to benefit from the growing demand for digitalization. Notably, Micron's commitment to innovation is demonstrated by its contributions to game-changing technologies including 5G connectivity, driverless vehicles, and artificial intelligence.

Stock Performance Highlights

52 week High	$130.54
52 week Low	$58.03
Beta Value	1.28
Average Daily Volume (3M)	21.36 m
Average Daily Volume (10D)	25.81 m

Share Highlights

Market Capitalization	$134.55 b
Shares Outstanding	1.11 b
Book Value per share	$39.63
EPS (TTM)	$-3.43
P/E Ratio (TTM)	N/A
Dividend Yield	0.38%
Dividend Payout Ratio	31.56%

Company Performance Highlights

ROA (2023)	1.70%
ROA (2024E)	1.79%
ROE (2023)	-11.69%
ROE (2024E)	3.46%
Sales (2023)	$15.54 b
Sales (2024E)	$24.12 b

Financial Ratios

Current Ratio (MRQ)	3.74
Debt to Equity	0.30

Investment Thesis

We recommend a HOLD rating for Micron as growth outlooks look strong however geopolitical tensions and a volatile industry pose significant risks.

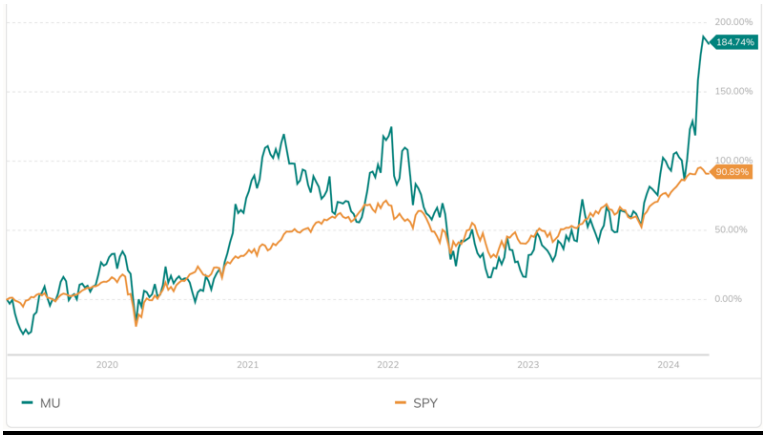
Drivers of Thesis:

- Memory chips are going to be in high demand with AI trends fueling growth opportunities for Micron.
- Micron has been a leader in memory chip innovation being the first to market with its HBM 3e chip.
- Micron last three quarters show a strong recovery from 2023 and high revenue growth across all its business segments.

Risks to Thesis:

- Micron is trading at very high multiples relative to peers because of its 2023 losses.
- Further policy changes from China could negatively impact Micron's revenue and manufacturing capabilities.
- We believe analysts have overestimated Microns growth in some key areas leading to the stock trading at a premium.

Five Year Stock Performance



Source: Portfolios Lab
https://portfolioslab.com/tools/stock-comparison/MU/SPY

Company Analysis

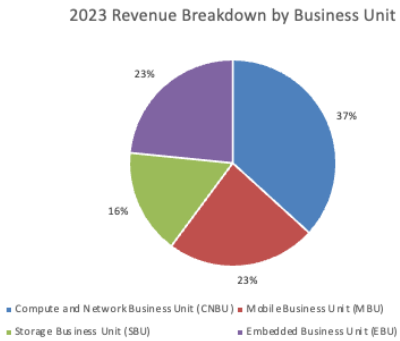
Company Overview

Micron Technology, Inc. is a leading global provider in the semiconductor sector, specializing in advanced memory and storage solutions headquartered in Boise Idaho. The company's product portfolio includes memory technologies, including dynamic random-access memory (DRAM), DRAM modules, managed NAND, ultra-bandwidth solutions, NAND flash, NOR flash, multichip packages, 3D XPoint memory, and memory cards. Micron serves data center, mobile, client, industrial, consumer, automotive, graphics, and networking markets. The company markets its products and solutions through independent sales representatives, retailers, and distributors. It has business presence across North America, Asia-Pacific, and Europe. The corporate strategy of Micron Technology is centered on making large investments in R&D to drive innovation in memory and storage solutions. The company wants to become more widely recognized in the world market and diversify into more types of products that cover a larger spectrum of memory technologies. Moreover, Micron prioritizes supply chain optimization, strategic acquisitions, and increased sustainability initiatives to support growth and resilience in the highly competitive semiconductor industry. (Source)

Revenue Analysis

Micron's 2023 total revenue was $15.54 billion down approximately 50% from the 2022. The make-up of their revenue comes from 2 main types of memory solution products, DRAM, NAND flash memory, and other (primarily NOR) (Source FactSet).

Revenue comes from different business segments in which Micron sells too. Micron's revenue comes from Compute and Networking Business Unit (CNBU), Mobile Business Unit (MBU), Embedded Business Unit (EBU), and Storage Business Unit (SBU) (source FactSet).



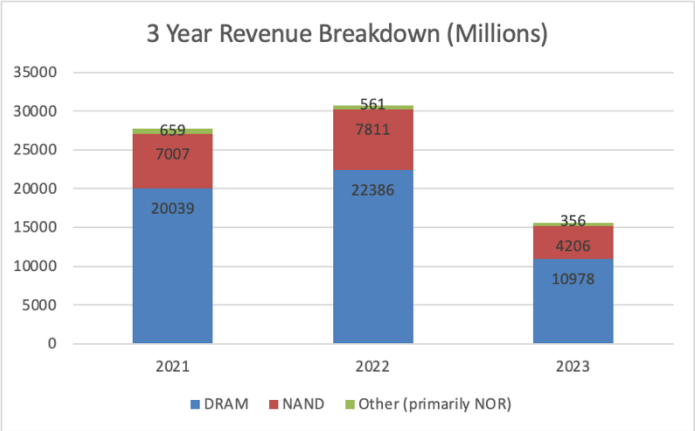
Compute and Networking Business Unit (CNBU): CNBU sells memory chips to client, cloud server, enterprise, graphics, and networking markets. The memory chips sold in this unit are primarily for PCs, cloud servers, enterprise data centers, and networking infrastructure. With the rise of AI we forecast this segment to be the biggest revenue growth for Micron over the years. According to Global Market Insights data center networking will grow by 12% CAGR by 2032. This growth is driven by the growth in cloud computing, AI applications, and 5G networks. The company is positioned to see rapid growth with HBM, DDR5, and data center SSDs due to this demand.

Mobile Business Unit (MBU): MBU primarily sells memory and storage to mobile OEMs found in smartphones and mobile devices. These products are sold to OEMs who put these chips in their devices. OEMs have begun to incorporate generative AI-based functionality. AI-enabled smartphones and devices are expected to drive growth in demand in both DRAM and NAND products. Micron will benefit from this demand as companies like Apple will need memory chips from them.

Storage Business Unit (SBU): SBU sells hard drives and other storage solutions to enterprise, cloud, and consumer clients. These customers typically use these products in their data centers. AI servers and large language models will see huge increases in demand for storage. This demand will primarily affect NAND flash product revenue for Micron. (Source)

Embedded Business Unit (EBU): EBU sells memory and storage products to the automotive and industrial industries and consumer markets. S&P global mobility estimates Microns automotive revenue to grow 20-24% CAGR to

$11.6 by 2026. The report emphasizes three main trends in the industry: Cars are becoming fully autonomous and estimates three million fully autonomous cars, more connectivity with different vehicles connecting to each other, and zonal architectures of vehicles. All these trends will require high performance low power chips to accommodate these shifts in the industry.

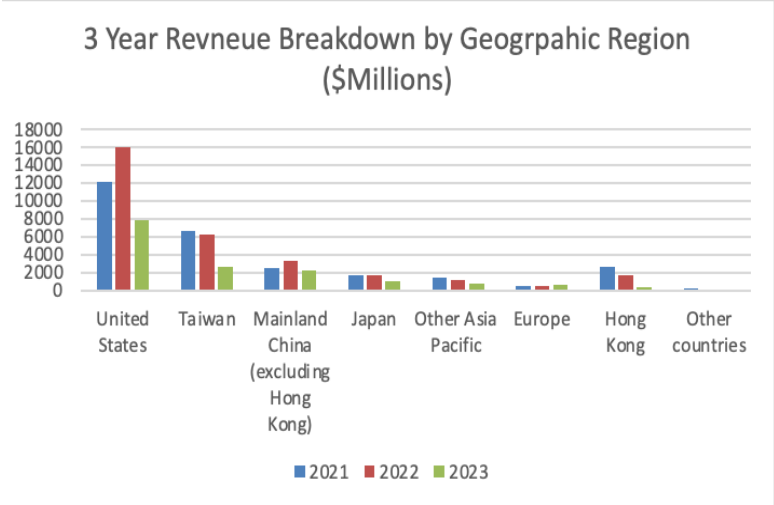


DRAM: DRAM (Dynamic Random Access Memory): is a type of volatile memory that stores data within a device. It is commonly used for the main memory in computers and other devices due to its speed and efficiency in handling large amounts of temporary data quickly. DRAM had growth rates of 38% in 2021, 12% in 2022, and -51% in 2023. The loss in revenue can be attributed DRAM products falling 57% in 2023(Source). Another factor was a decline in China sales after the CAC decision to ban Micron from selling to China businesses (Source). DRAM sales are poised to increase fueled by demand across its different business units. We expect DRAM to strongly recover in 2024. In the first two quarters of FY 24, Micron has already reported $7.6 billion in DRAM revenue. They also project Q3 total revenue to be $6.6 billion. Because of this we projected DRAM sales for 2024 to be over $17 billion in our model. All business segments that they market to are seeing significant growth (10Q source). We expect DRAM products to be the leading growth driver for Micron going forward.

NAND: NAND flash is a type of non-volatile memory that stores data. It is used primarily in solid-state drives, USB flash drives, and memory cards for reliable storage that retains data without power. NAND flashes declined by 46% in 2023. This again can be seen from the fall in demand that led to NAND prices to fall by and 55% (Source) In Microns first two quarters of FY 2024 we have already seen recovery. In the past two quarters $2.8 billion. Because of this we forecasted NAND sales to be $6.6 billion in 2024. (Source)

NOR: NOR Flash is also a type of non-volatile memory. It is used for storing firmware and boot code in embedded systems where fast read speeds are essential. NOR and other revenue decreased 41% in 2023. We expect Micron to have higher demand for its other NAND and DRAM products and little growth in this revenue segment. (10K)

Revenue by geographic Region:



In 2023, China sales declined 38.9% from 2022. The decline was because of the CACs decision to ban Micron products being sold to China. We forecast that this will continue to impact Micron's revenues going into 2024.

Micron is headquartered in the U.S., so it uses the U.S. dollar to account for revenues. Due to only half of Microns revenue coming from the U.S., the company is exposed to multiple currency risks. Since to mitigate risks, Micron uses derivative instruments to hedge their risks. Source (10k)

<u>Manufacturing sites</u>

Expense Analysis

Micron's operating expenses include Cost of goods sold, Depreciation and Amortization, R&D, and SG&A. For Microns case in the industry, we view COGS and R&D to be the most significant to compare across firms.

Cost of Goods Sold

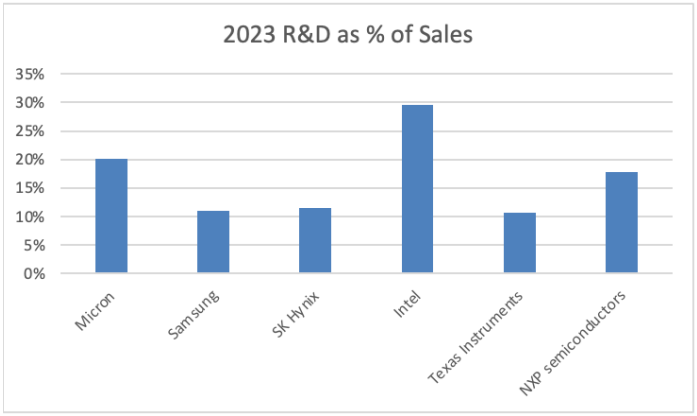
Cost of goods sold is the biggest expense on Microns income statement. Cost of revenue as a percent of sales was over 109%. This was due to the loss in revenue due to the drastic fall in memory chip prices. Through 2019-2022 Micron averaged a cost of revenue of 60.22%.

Source

The average among these peers (excluding Micron was 62.27%. Micron's historical average is right around the industry average. We forecasted COGS by taking a 5-year historical average as a percent of sales. We believe that Micron will return to their normal COGS of around 60% as their inventory levels have improved and Prices for memory chips have rebounded.

Research and Development

Micron's second biggest expense is their R&D. For 2023, Micron's R&D expense was $3.16 billion. The expense remained almost unchanged from 2022 as R&D was $3.14. R&D is very important for Micron to make sure they continue to innovate to produce the most efficient chips.



Source

Explain forecasting

Capital Expenditures Analysis

Micron Technology's capital expenditures are mostly directed toward building and replacing its manufacturing facilities, purchasing new machinery, and implementing cutting-edge semiconductor production processes. These expenditures help with the purchase of superior manufacturing equipment as well as the building and upkeep of fabrication facilities. Microns Capex. In 2021 Capex was $10 billion, 2022 was $12 billion, and 2023 was $7.6 billion. Micron announced in 2023 that it was going to cut capex because of the oversupply of ships. The oversupply was hurting their profit margins and to reduce the stress Micron had to cut capex. Going into 2024 Micron has already given guidance that their capex will be in between $7.5-$8.0 billion. Micron has announced they will be investing $100 billion over the next 20 years for new fabrication facilities in the U.S. In our model we included an estimate of $7.75 for 2024 Capex. With the investments of new facilities, we forecasted that will increase $500 million each year. The investments in new facilities in the US will give Micron more control over their supply chain and diversify risk away from Taiwan.

Capital Structure

Micron's projects are mostly financed with their equity and reinvesting retained earnings.

However, the company does still take on debt for their investments. In 2021 their D/E ratio 0.15, 2022 was 0.14 and 2023 was 0.30. Micron has a long-term debt rating of BBB- by Standard and Poor's. This rating was recently downgraded in 2024 from 2024. Below is a table that compares Microns debt rating to similar firms.

Ticker	MU	005930-KR	00660-KR	INTC	TXN	NXPI
Long term debt rating	BBB-	AA-	BBB-	A	A+	BBB+

Micron currently had $278 million current debt while having $8.5 billion in cash. While Micron does have the lowest possible credit rating, we still forecast that Micron will have enough cash to cover its future debt obligations. Below is their long-term debt maturity schedule.

Maturities of Notes Payable

As of August 31, 2023, maturities of notes payable by fiscal year were as follows:

2024	$ 107
2025	695
2026	1,659
2027	1,780
2028	1,493
2029 and thereafter	6,450
Unamortized issuance costs, discounts, and premium, net	(35)
Hedge accounting fair value adjustment	(100)
	$ 12,049

Source: Micron 10-K

SWOT Analysis

Strengths

Micron's biggest strength is their research a development capability. Micron continues to make innovative products with key characteristics that make it better than their competition. Micron often focuses on delivering higher capacity, higher density, and better energy-efficient memory compared to competitor's chips. For example, Micron was the first company to sell its HBM3E memory before its competitors. This product will fuel AI innovation at 30% lower power consumption than competition according to Micron. The company has developed superior 3D NAND technology, which increases storage capacity without growing the chips' physical size.

Micron also excels in terms of process technology and manufacturing scale. Micron's extensive worldwide production network enables it to manufacture memory chips in large quantities, resulting in cost savings. In addition, Micron is a firm believer in quality and dependability, offering memory solutions that pass tough industry requirements after extensive testing. This is crucial for usage like automotive or industrial ones where memory failure can have serious repercussions.

Weaknesses

One of Microns weaknesses is their product diversification. The company heavily relies heavily on the memory chip market. The market for memory chips is very volatile and can have demand and price fluctuations. As seen in Micron's 2023 performance this was directly correlated as demand for memory products fell and Micron was forced to sell their products at lower prices. These price fluctuations will continue to be a weakness for Micron in the coming years.

Opportunities

The AI movement is going to spark demand and growth for Micron. The markets that Micron sells to all are integrating more advanced AI applications into more markets. The automotive sector is one of the biggest opportunities for Micron as cars are starting to become more autonomous. Software footprints in high-end vehicles are projected to significantly increase, expanding from 100 million lines of code in today's models to 1 billion lines in the coming years. These cars will need more memory storage solutions to keep up with sort of advanced technology. In addition, PC and smartphone OEMs are integrating AI into their devices as well. These companies will also need more memory capacity and fast data processing speeds which creates more opportunities to gain more market share and grow revenue.

Threats

The biggest threat that Micron faces is geopolitical tensions between the U.S. and China. China ruled that some of Micron's products pose a national security risk to China. As a result, Micron reported in their 10-k that China represented a quarter of their revenue, and that the ruling resulted in half of China revenue decreasing. They also reported that the ban may

further continue to impact China sales. With the U.S. also putting export controls on semiconductors, this poses a risk to all of Micron's products to be banned to sell to China. The impact to Microns revenue could decrease double digits which poses a significant risk to their business.

Industry Analysis

Overview

The semiconductor industry is made up of businesses that design, manufacture, and sell semiconductors. Semiconductors are small chip devices that are used in many devices. Semiconductors are found in devices such as smartphones, computers, automobiles, and much more. There are a variety of different types of semiconductors that serve different applications for devices. The semiconductor manufacturing process is very complex and includes over 1,000 steps. For this reason, the industry is made up of businesses that specialize in just designing chips (Fabless), solely manufacturing (Foundry), or doing both.

Semiconductors are either made by the business designing them or outsourced to a manufacturer known as a foundry. Below are some of the main types of semiconductors made in the industry.

Graphic Processing Units (GPUs):

Memory Chips: Memory chips are used as internal storage area for smartphones, computers automobiles, and many other devices. Their primary role is to hold data and for other semiconductor components to access that data.

Microprocessor (CPU): Microprocessors act as the brain for computers. They are most found in computers, smartphones, tablets, and computer servers.

System on chips (SoC): SoCs integrate all components of a computer or other electronic system onto a single chip. They are found in a variety of modern electronic systems, including smartphones, tablets, and some embedded systems.

Commodity ICs: Commodity ICs are very basic chips that you find in the industrials industry. They can be found in things like microwaves, TVs, toothbrushes, etc.

Analog Chips: Analog chips are integral in devices like smartphones, audio equipment, and automotive systems. They are mostly used in sensors.

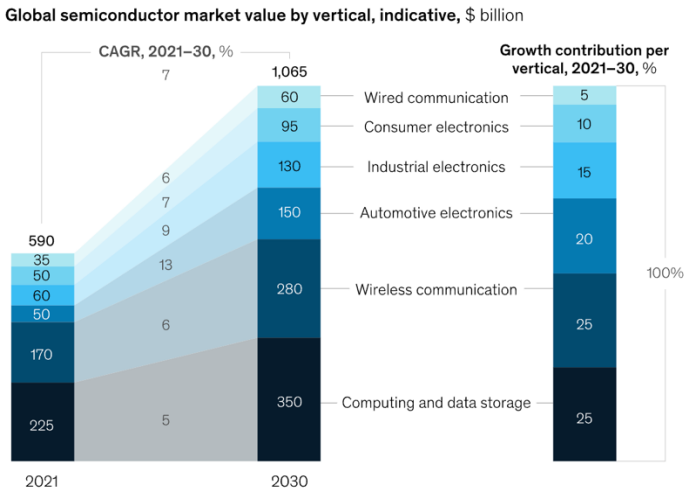
While these encompass most chips sold in the industry there are also niche and custom chips sold in this industry as well.

For this industry analysis we will not only focus on semiconductors but also the memory chip market that Micron operates in. Companies in the industry make money by selling chips and components, licensing technology, foundry services and R&D services. Semiconductor companies differentiate themselves through technological innovation, specialized product offerings, and excellence in manufacturing processes. Customers value chips that offer high bandwidth, high speed, power efficiency, high capacity, and size of chips.

Industry Trends

Artificial Intelligence and Growth Projections

One of the biggest technological changes in this industry has been the integration of artificial intelligence. The need for semiconductors has surged because to the rapid growth of AI, which is widely used in data processing, machine learning, and pattern recognition. High-performance computing and specialist AI chips are becoming more and more necessary as AI algorithms become more complicated, which is changing the semiconductor industry and creating new market opportunities. The amount of data processed and stored by AI applications is massive. This will lead to an increased semiconductor demand across different areas such as smartphones, PCs, data centers, and automotives. For this reason, semi-conductor companies are increasing R&D spend to create innovative chips that meet the demands of AI technologies.



Source McKinsey

McKinsey projects that by 2030 the semiconductor market will grow to over $1 trillion. Based on growth in these markets, we expect Micron to capitalize as Micron tailors its memory and storage products to all these markets.

Government and regulatory changes

Another trend affecting the semiconductor industry is the geopolitical trends with certain countries. Since 2018, the China and the US have been in a trade war regarding semiconductors. The two world leaders are competing for technological supremacy and economic security. In October of 2022, the Department of Commerce Bureau further put restrictions on export controls to ban the US selling high-end semiconductor chips, technology, manufacturing equipment, and know-how to China (Source). In addition, in august of 2023 Biden signed an executive order restriction on outbound investments in semiconductors, quantum information, and AI to foreign "countries of concern," including China (Source) This trade war has exposed Micron to significant risk as 25% (Source). In May of 2023 China's government deemed that Micron's products as a security risk and banned micron from selling to Chinese companies. Micron has suffered decreases in revenue because of these government restrictions. While US based semiconductor companies can position themselves well to sell in the US, these companies will lose out on sales and profits abroad in China. While current bans only affect advanced chip makers this conflict can spill into the entire industry. China currently consumes 50% of the semi-conductor market. (Source) Further escalations could significantly affect semiconductor companies if more restrictions were to occur.

In addition to this conflict, the growing tensions between Taiwan and China have caused many of the semiconductor companies to diversify their manufacturing out of the region. Currently TSMC produces 90% of the advanced global chip manufacturing. Many governments have provided incentives for companies to invest manufacturing plants in their home country in efforts to achieve more diversification from Taiwan. Companies such as TSMC, intel, Samsung, and Micron are all spending billions to create new fabrication plants outside Taiwan. Micron is spending $100 billion over twenty years in the U.S. to create new fabrication centers in New York and Arizona. This diversification will help mitigate the risk exposure it has in China. (Source)

Competition and Peer Comparison

The two primary types of memory chips are Dynamic Random Access Memory (DRAM) and NAND flash. DRAM is a volatile type of memory storage that loses its memory when turned off. NAND flash memory keeps its memory whether turned on or off and acts as storage. With Micron operating in the memory chip space, there are only a few direct competitors. Microns biggest competitors in the memory chips space are Samsung and SK Hynix both based in South Korea. All three of these companies make up a combined over 90% of DRAM market share in the memory chip space (Source). In the NAND flash space these firms combined for over 60% of market share in 2023 (source) Some other players in the NAND flash space are Western Digital Corporation (WDC) and Kioxia.

Micron is an integrated device manufacturer. This means that it designs, manufactures, and sells its chips to its customers. While it does outsource some manufacturing processes, it is relatively small compared to fabless companies. Samsung and SK Hynix also have an IDM business model

and sell products that directly compete with Micron. Because of the few competitors we decided to also compare Micron's metrics to other IDMs of relative size. We decided to include Intel (INTC), Texas Instruments (TXN), and NXP semiconductors (NXPI) in our comparisons. While these firms might directly compete to Microns products, they have similar business models and relatively similar size to Micron.

Below is a table that represents comparison of Microns metrics to other players in the industry.

Company:	Ticker	Market Cap (B$)	Revenue (2023) (B$)	Gross Margin	Net Income (B$)
Micron	MU	$ 138	$ 15.5	30.00%	$ (5.8)
Samsung	005930-	$ 407	$ 198.3	36.60%	$ 11.1
SK Hynix	00660-KR	$ 95	$ 25.1	28.31%	$ (7.0)
Intel	INTC	$ 153	$ 54.2	59.96%	$ 4.4
Texas Instruments	TXN	$ 151	$ 17.5	37%	$ 6.4
NXP semiconductors	NXPI	$ 60	$ 132.8	43%	$ 3.7

Source FactSet

As you can see Micron and SK Hynix has massive losses in 2023. The two companies solely sell memory chips and demand for these chips went down. This led to a decrease in selling prices for memory chips and the two companies as well as Samsung lost billions of dollars. DRAM and NAND prices fell by 57% and 55% during the year (source). While Samsung lost billions of dollars as well, their product diversification allowed them to remain profitable.

Although Micron does not have a P/E ratio due to negative their EPS we compared them to other firms in the industry based on R&D % of sales, P/S, P/B, and EV/EBITA multiples.

Company:	Ticker	P/S	P/B	EV/EBITDA	R&D % of Sales
Micron	MU	8.43	2.97	62.76	20.04%
Samsung	005930-KR	2.05	1.62	10.64	10.94%
SK Hynix	00660-KR	3.79	2.42	27.23	11.44%
Intel	INTC	2.82	1.45	18.86	29.56%
Texas Instruments	TXN	8.64	8.91	18.13	10.63%
NXP semiconductors	NXPI	4.51	6.80	13.68	17.77%

Source S&P Global

As you can see, Micron's relative multiples are high compared to the group. Particularly with EV/EBITDA and P/S multiples.

Porters Five Forces

Competitive Rivals: HIGH

The semiconductor industry is an extremely competitive landscape. Companies are constantly trying to innovate are bring the best chip products to market. Competition is driven customers wanting the most advanced high-powered chips. The demand of these chips has risen substantially for these memory chips due to AI computing and software. These companies all spend billions of dollars in R&D to produce the most advanced chips for their customers. In Microns case there are only a few big competitors, Samsung, and SK Hynix. To keep up with the competition, Micron will have to continue to make innovative memory chips to gain market share from its competitors. Although some memory chips have similar applications, these memory chips tend to be specialized for their customers. However, it is likely that customers can turn to other competitors and have them make custom chips for them as well. This also intensifies competition for customers.

Threats of New Entrants: LOW

The threat of potential new entrants is very low in this industry. Building out infrastructure and manufacturing sites for semiconductors costs billions of dollars to establish. It can cost companies $10-$20 billion dollars to establish a semiconductor manufacturing facility and can take 3-5 years to finish construction (source) The industry is dominated by only a handful of players that have a substantial amount of capital and infrastructure already in place. For these reasons, starting a company in this space would be very difficult

Bargaining Power of Suppliers: HIGH

In the semiconductor industry the supplier bargaining power is high. There are only a limited number of suppliers for certain earth materials used to make semiconductors. In addition, for semiconductors there are no substitutes for the materials needed. Suppliers of silicon wafers, chemicals and gasses, and advanced manufacturing equipment are all concentrated with only a few big suppliers of these necessary manufacturing components. Because of this, suppliers are more easily able to set prices and set quantities they want to sell. For Micron this could result in hurting profit margins if they are unable

to buy from another supplier offering lower prices.

Bargaining Power of Buyers: HIGH
Bargaining power of buyers in this industry is high. Buyers of semiconductors typically buy in big quantities in the form of contracts. Because of this format buyers can negotiate with suppliers on the price they pay. The large quantities bought by OEMs makes companies like Micron dependent on their sales. For Micron the high bargaining power of buyers allows customers to demand favorable terms in their contracts with them. This could lead Micron having to sell their products at lower prices.

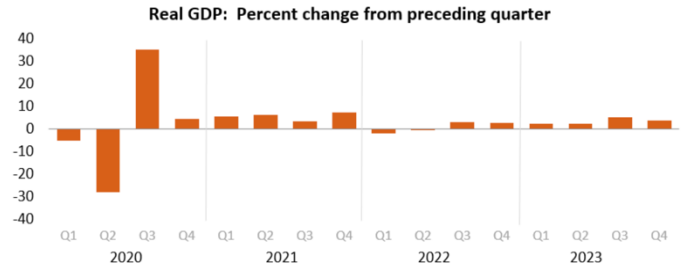
Threats of Substitute Products: LOW

The threat of substitute products is low for semiconductors. In this industry there is no current substitution for semiconductors. Semiconductors are very customized for certain products. It takes years to design and develop advanced semiconductors so the substitutes for this product would be low. A low number of substitutions gives Micron a competitive edge over its competitors.

Economic Analysis

Real GDP

The Real GDP is the market value of all goods and services within in a country, adjusted for inflation. Real GDP is crucial for the technology sector as it reflects economic health, influencing investment, consumer spending, and business expansion. A growing real GDP boosts demand for technology products and services, encourages innovation, and enhances global competitiveness in the tech industry. In the past, technology companies tend to do very well in periods when Real GDP is growing. Despite high interest rates, Real GDP in the U.S. had moderate real GDP growth increasing 2.5%.

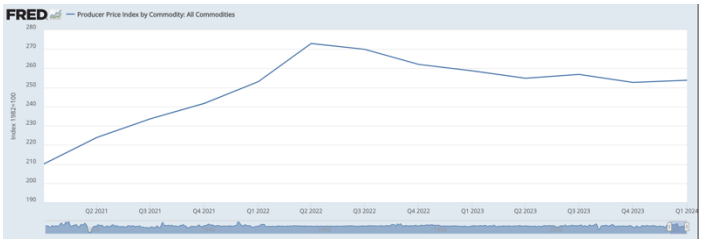


In 2024, we believe Real GDP will remain at moderate growth increasing 1.5-2.0%. This is due to a slowdown in consumer spending and the economy beginning to cool after high interest rates.

For our long term forecast we believe impacted by the Feds rate cuts. Lowering interest rates will lower the borrowing cost which in turn will encourage borrowing. The encouraged borrowing will likely lead to an increase in consumer spending and boost investments which will help fuel the economy. We forecast the Fed to begin cutting rates in September of 2024. We believe that in 2025, Real GDP will increase 3.00% and stabilize at that rate for the coming years. Considering semiconductor companies are very cyclical industry this growth in Real GDP will help bolster investments and demand for semiconductors.

Producer Price Index

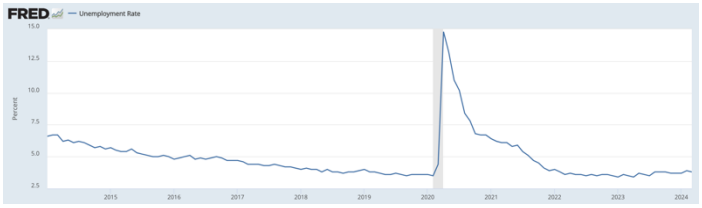
PPI is a group of indexes that measure the average change over time in selling prices received by U.S. producers in a given period. If the inflation of producers selling prices rise faster than the rate of consumer inflation, corporate profits tend to be squeezed. The PPI of all commodities has been decreasing since Q2 of 2022 from 272 to 253 in Q1 of 2024.



This high PPI will cause materials and cost of manufacturing higher for tech companies. Semiconductors in particular use materials like silicon, copper, and germanium. The cost of these materials can greatly impact a semiconductors business. We forecast that PPI will slowly use as inflation comes down over the next year. In the short-term we forecast that the high PPI will negatively affect Microns profit margins with a higher cost of manufacturing. As PPI comes down with inflation, in the long term, technology companies' margins will benefit. Just found this chart so must add

Unemployment

The unemployment rate is a very important indicator for the technology sector. After high unemployment rates during COVID-19 the rate has come down to 3.8% as of March 2024.



For tech companies, low unemployment can both positively and negatively affect their companies. On one hand we see wage pressures increase because of a limited supply of workers that leads to lower competition. There is also a smaller talent pool of skilled workers that companies like Micron need to innovate. On the other hand, low unemployment numbers can lead to an increase in consumer spending which positively affects tech companies.

We forecast that the unemployment rate to be 4.00% - 4.30% in 2024 after the economy slows down. In the years after that we believe the unemployment rate will continue to hover around 4 percent. These low employment numbers could lead to layoffs for Micron if wage compensation increases.

Interest Rates

Federal Funds rate determines the rate in which banks overnight lend to one another. The Fed made rate hikes to fight inflation and has since held them at a target range of 5.25-5.50 percent. A high federal funds rate increases has increased treasury borrowing costs.

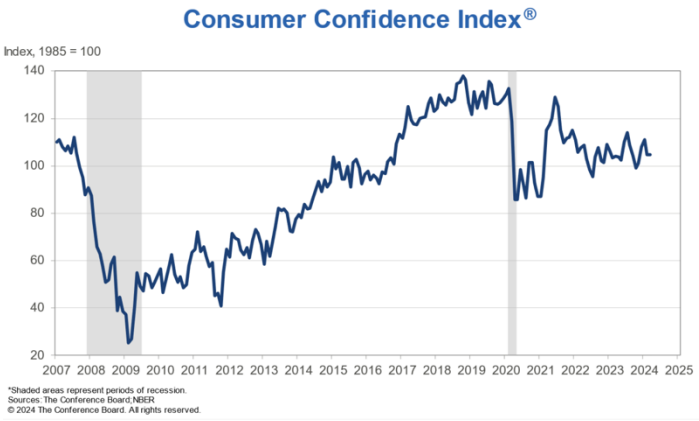
The 10-year treasury yield has increased because of the high Federal Funds Rate. This will increase the cost of capital as high treasury yields result in higher corporate bond yields for businesses. The higher cost of capital will likely decrease consumer spending and corporate financing strategies. For Micron, this could negatively impact industries such as consumer electronics and automotives in which they sell to.

We forecast that treasury yields will likely see a decrease when the federal funds rate decreases. In the coming months we expect the economy to slow down. We estimate that the federal reserve will begin cutting rates in September of 2024 with a target range of 5.00% - 5.25%. By the end of 2025 we expect the target rate to decrease to 4.00-4.25%. While these rate cuts will help decrease the cost of capital, the treasury yield will remain high for Micron and will have a harder time financing their capital expenditures growth.

Consumer Confidence Index

The Consumer Confidence Index reflects the level of optimism or pessimism that consumers feel about the overall state of the economy. The Conference board measures the index having 5,000 households take a survey about the state of the economy. A higher Consumer Confidence Index typically leads to increased consumer spending and increased stock performance. The

index was 104.7 in March, essentially unchanged from a downwardly revised 104.8 in February.

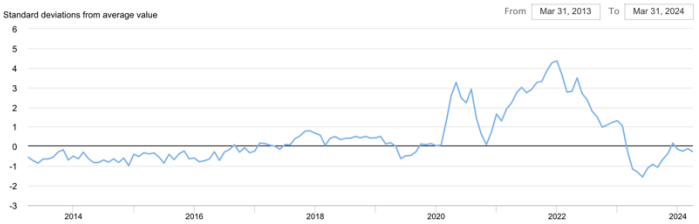


Compared to historical levels, the Consumer Confidence Index is high. However, consumer confidence has still not reached its pre pandemic levels. We believe that Consumer confidence Index will remain relatively unchanged in the Q2 of 2024. However, in 2025 we believe rate cuts will help bolster consumer confidence back to pre-pandemic levels. For Micron, we forecast that this will have a positive impact on Micron revenue in 2025. Demand for semiconductors will increase, and Micron will make it easier to sell their products at higher prices.

The Supply Chain

The supply chain is critical for the technology sector and particularly semiconductor companies. Many technology companies depend on key semi-conductors to go into their devices. Disruptions in supply chain can lead to production slowdown in numerous electronic devices, including smartphones, computers, and cars. This can have negative impacts on losses of revenue and earnings.

The Global Supply Chain Pressure Index (GSCPI) is a crucial metric developed by the Federal Reserve Bank of New York to measure the intensity of disruptions in global supply chains. In March of 2024 the average standard deviations from average supply chain value decreased to -0.27 from February reading of -0.11



As seen by this chart, supply chain pressures have decreased substantially since 2022. Supply chain disruptions have recovered due to COVID-19 related disruptions recovering. Although pressures have increased back to zero standard deviations and has remained close to zero since November of 2023. Micron recovered since the chip shortage after missing out on hundreds of millions in revenue. In addition, Micron and other semiconductor companies are improving the supply chain by building out more fabrication and AT centers to increase their capacity. We forecast that supply chain pressures will continue to remain low in 2024. This will allow Micron to help meet product demand and maintain good relationships with their customers.

Valuation Methodology

DCF and Economic Profit analysis

With our DCF and EP model we calculated an intrinsic value share price of $113.69. We believe this share price most accurately affects the value of a current Micron share today. In our models we projected all financial statements, NOPLAT, and invested capital for our firm.

Revenue Assumptions

For our revenue growth projections, we closely aligned our revenue projections with FactSet consensus. While we do believe the growth for Microns revenue will be strong, we believe analysts are overestimating Micron's growth in 2025. We agreed with revenue growth reaching over 50% in 2024 however we forecasted that a lot of this is attributed to memory prices rebounding from last year, and Micron fixing their inventory balances. We project Micron to have strong revenues but think China sale declines will impact their revenue further. In 2025 we decreased Microns revenue from consensus down to 36% which is still strong growth. We will

expect strong growth, but less than what analysts are projecting.

Cost of Goods Sold

Micron's COGS as a percentage of sales ranged from 30%-40% from 2019-2022. In 2023 it was 59.2% which was higher due to the price fluctuations of memory chips. We projected COGS by taking the average past 5 years COGS as a percentage of sales and multiplied it by our revenue forecasts.

R&D Expense

Micron typically has a R&D expense that stays around 10% of sales although 2023 was at 20%. Since R&D can vary based on technological advancements, we decided to directly tie it to sales. We projected R&D by taking the average past 5 years R&D as a percentage of sales and multiplied it by our revenue forecasts.

Cost of Equity

We applied the CAPM model to estimate Micron's cost of equity, selecting the yield of the US 10-year Treasury bond as our risk-free rate. We incorporated Aswath Damodaran's implied market risk premium for April 2024. Additionally, we used the 5-year monthly raw beta for Micron from Bloomberg as our beta value. Using these inputs, we determined that Micron's cost of equity is 9.91%

WACC

For our WACC we calculated the cost of equity to be 9.91% and the after-tax cost of debt to be 4.21% for Micron. Micron has a capital structure of 90.38% equity and 9.62% debt. With these inputs we were able to calculate WACC for Micron. We used the WACC to discount all our projected cash flows back to today to compute the present value. This ultimately gave us an intrinsic value of $113.69 per share.

Relative Valuation Analysis

Our relative valuation we computed a share price of 29.49 for 2024 and 63.36 for 2025. The companies we included were all IDMs in the semiconductor industry. The companies were Samsung, SK Hynix, Intel, Texas Instruments, and NXP semiconductors. Micron currently does not have a P/E ratio due to negative earnings last year. For 2024 the recovery for Micron we forecast Micron 2024 to be 1.39 and increase to 4.15 in 2025. While we project Microns EPS will increase substantially in future years, Microns price is currently trading at very high P/E ratios on bullish future earnings. We believe that the stock is currently overvalued based on this valuation multiples as we believed the market has priced in overestimated gains. Because some of the bad year in 2023 we are putting more emphasis on our DCF and EP valuations but still factor these multiples into our sell rating.

Dividend Discount Model

Our dividend discount model calculated the intrinsic value share price of $75.25. Micron started its dividend and share repurchase program in 2022. We projected 3% share repurchase growth and a increase of 1 cent per year for dividends. Based on this valuation method Micron's shares are very overvalued. However, we are putting more emphasis on DCF/EP valuation models for Micron shares.

Sensitivity Analysis

CV EPS Growth and Cost of Equity (DDM)

The two largest factors when creating the dividend discount model leading to a projected implied stock price are the cost of equity and the CV of earnings per share growth. The CV of earnings per share growth is a crucial part of calculating the intrinsic share price and has a large effect on the continuing value which makes about 99% of Micron's intrinsic value in the dividend discount model. With our assumption that the CV of EPS growth will be at 4.00% and the cost of equity will be at 9.62%, the intrinsic share price is $81. Keeping the cost of equity the same, moving the CV of EPS growth down to 3.40%, the intrinsic share price moves to $78 and moving the growth up to 4.30% moves the intrinsic price to $83. Conversely, keeping the CV of EPS growth the same, moving the cost of equity down to 9.32% will move the intrinsic price to $84 and moving the cost of equity up to 9.92% will move the intrinsic share price to $75. With our cost of equity ranging from 9.32% to 9.92% and the CV of EPS growth ranging from 3.40% to 4.30%, we believe these are attainable marks for Micron which we have modeled in our analysis. Based on these assumptions the estimated stock price is $73-$89.

CV EPS Growth

Cost of Equity \ 80.82	3.40%	3.60%	3.80%	4.00%	4.10%	4.20%	4.30%
9.32%	83.55	84.70	85.93	87.26	87.96	88.68	89.44
9.42%	81.56	82.64	83.79	85.02	85.67	86.35	87.06
9.52%	79.64	80.65	81.72	82.87	83.48	84.11	84.77
9.62%	77.79	78.73	79.73	80.81	81.37	81.96	82.57
9.72%	76.00	76.88	77.82	78.82	79.35	79.89	80.46
9.82%	74.27	75.09	75.97	76.90	77.40	77.91	78.43
9.92%	72.60	73.37	74.19	75.06	75.52	75.99	76.48

Risk Free Rate and CV NOPLAT Growth

We utilized the risk-free rate and the CV of NOPLAT growth to assess the impact of fluctuations in these factors on a corporation like Micron, who's profit growth has fluctuated over the years. Our analysis revealed a substantial decrease in intrinsic share price as the risk-free rate escalates, and a notable increase as the rate declines. This trend likely holds true across the broader market: heightened risk-free rates prompt investors to seek safer investment avenues such as government bonds, which could hurt companies like Micron who is more susceptible compared to larger corporations with more steady profit growth. Micron's unpredictable NOPLAT growth provides investors with a degree of uncertainty, which could amplify risks. This analysis gains significance given the current high risk-free rates (4.63% as of 4/15/24). Regarding the CV of NOPLAT growth, an increase corresponds to a rise in intrinsic share price, while a decrease results in a decline. Based on our sensitivity analysis of these variables, we estimate the stock price to range between $102 and $129.

Risk Free Rate

CV NOPLAT Growth \ 113.69	3.95%	4.05%	4.15%	4.25%	4.35%	4.45%	4.55%
4.70%	118.03	115.05	112.20	109.47	106.85	104.34	101.92
4.80%	119.64	116.57	113.63	110.81	108.11	105.52	103.04
4.90%	121.34	118.16	115.12	112.22	109.43	106.77	104.21
5.00%	123.13	119.84	116.69	113.69	110.82	108.07	105.43
5.10%	125.02	121.60	118.35	115.24	112.27	109.43	106.72
5.20%	127.00	123.46	120.08	116.87	113.80	110.86	108.06
5.30%	129.10	125.42	121.91	118.58	115.40	112.36	109.47

WACC and CV NOPLAT Growth

We chose to analyze the CV of NOPLAT growth and WACC as they are the primary components of DCF valuation. Given that the continuing value of NOPLAT growth largely influences DCF valuation, we aimed to assess the sensitivity of these variables and their impact on our valuation framework. We set the CV of NOPLAT growth at 5% based on Micron's growth prospects and the steady demand for semiconductors. Micron's forecasted cash flows over the projection period, along with the CV of NOPLAT growth, are discounted by the WACC. Our analysis revealed a sizable amount of sensitivity from our valuation model to these two factors.

We tested the WACC within the range of 8.80% to 9.40% and the CV of NOPLAT growth from 4.70% to 5.30%. Our findings indicated that as the CV of NOPLAT growth increased, so did the intrinsic stock price, while an increase in the WACC led to a decrease in the intrinsic stock price. Our valuation model showed a high sensitivity to these variables, resulting in an intrinsic stock price ranging between $101 and $130.

CV NOPLAT Growth

WACC	105.69	4.70%	4.80%	4.90%	5.00%	5.10%	5.20%	5.30%
	8.80%	119.08	120.72	122.46	124.29	126.21	128.24	130.39
	8.90%	115.72	117.26	118.88	120.57	122.36	124.24	126.23
	9.00%	112.53	113.96	115.47	117.05	118.71	120.46	122.30
	9.10%	109.48	110.82	112.23	113.70	115.25	116.87	118.58
	9.20%	106.57	107.82	109.14	110.51	111.95	113.47	115.06
	9.30%	103.79	104.96	106.19	107.47	108.82	110.23	111.71
	9.40%	101.13	102.23	103.37	104.57	105.83	107.14	108.52

Beta and Equity Risk Premium

In our analysis of the discounted cash flow analysis and the dividend discount model, we identified beta and equity risk premium as important factors in valuation. To measure the sensitivity of Apple's intrinsic share value to changes in these metrics affecting the cost of equity, we conducted a sensitivity test. Our analysis revealed that reducing beta to 0.94 elevated Apple's intrinsic value to $152, indicating reduced risk. Conversely, raising it to 1.54 resulted in downside risk, causing the intrinsic share value to fall to $79. Similarly, a decrease in the equity risk premium to 4.03% suggests decreased risk to Apple's cash flows, boosting the intrinsic share value to $116. An increase to 4.63% leads to a decline in price to $97. These adjustments significantly impact the discounted cash flow model, indicating a large amount of volatility in the intrinsic value if these metrics are altered.

Beta

Equity Risk Premium	105.69	0.94	1.04	1.14	1.24	1.34	1.44	1.54
	4.03%	166.85	146.19	129.66	116.14	104.89	95.39	87.25
	4.13%	161.58	141.58	125.57	112.47	101.56	92.34	84.45
	4.23%	156.60	137.22	121.70	108.99	98.40	89.45	81.79
	4.33%	151.89	133.09	118.03	105.69	95.41	86.71	79.26
	4.43%	147.43	129.18	114.55	102.56	92.57	84.11	76.86
	4.53%	143.19	125.46	111.24	99.59	89.86	81.64	74.58
	4.63%	139.16	121.93	108.10	96.75	87.29	79.28	72.41

Cost of Equity and Pre-Tax Cost of Debt

When evaluating Micron’s stock, it's important to consider the dynamics of its cost of equity and pre-tax cost of debt, as these factors have a significant influence over our cash flow discount rate. These shape our valuation methodologies, particularly the DCF and DDM. Through sensitivity testing of these variables against our discounted cash flow valuation, we gained insights into the stock's intrinsic value. Our analysis indicates that a downward adjustment of the cost of equity to 9.02% has minimal impact, lowering the intrinsic price by less than a dollar.

Similarly, an increase in the cost of equity to 10.22% has little effect, raising the value by less than a dollar. Adjusting the pre-tax cost of debt also produces marginal effects on the intrinsic share price, with no significant alterations in its value. This shows the strength of the semi-conductor industry and Micron’s business in debt-related parameters and shows that the demand for the products will continue to be strong.

Cost of Equity

Pre-tax Cost of ebt	105.69	9.02%	9.22%	9.42%	9.62%	9.82%	10.02%	10.22%
	4.68%	106.64	106.67	106.70	106.73	106.77	106.80	106.83
	4.88%	106.32	106.36	106.39	106.42	106.45	106.49	106.52
	5.08%	106.01	106.04	106.08	106.11	106.14	106.17	106.21
	5.38%	105.55	105.58	105.61	105.65	105.68	105.71	105.74
	5.58%	105.24	105.28	105.31	105.34	105.37	105.40	105.44
	5.78%	104.94	104.97	105.00	105.04	105.07	105.10	105.13
	5.98%	104.64	104.67	104.70	104.73	104.77	104.80	104.83

Citations

Real GDP

1. "Gross Domestic Product: An Economy's All" *International Monetary Fund,* 15 June 2019, https://www.imf.org/en/Publications/fandd/issues/Series/Back-to-Basics/gross-domestic-product-GDP

Real GDP

2. "Gross Domestic Product, Fourth Quarter and Year 2023 (Third Estimate), GDP by Industry, and Corporate Profits." *Bureau of Economics and Analysis*

https://www.bea.gov/news/2024/gross-domestic-product-fourth-quarter-and-year-2023-third-estimate-gdp-industry-and

3. Retail Sales Real GDP

Mutikani ,Lucia. "Strong US retail sales underscore economy's momentum heading into 2024." *Reuters,* 17 January 2024, https://www.reuters.com/markets/us/us-retail-sales-beat-expectations-december-2024-01-17/

4. PPI

"Producer Price Index By Commodities." *FRED,* 11 April 2024, https://fred.stlouisfed.org./series/PPIACO#0

PPI

"Average silicon prices in the United States from 2018 to 2023, by type." *Statista,* 22 March 2024, https://www.statista.com/statistics/301564/us-silicon-price-by-type/

Unemployment

"Unemployment Rate." *FRED,* 5 April 2024, https://fred.stlouisfed.org/series/UNRATE

10 Year Treasury Yield

"Market Yield on U.S. Treasury Securities at 10-Year Constant Maturity, Quoted on an Investment Basis." *FRED*, 12 April 2024, https://fred.stlouisfed.org/series/DGS10

FFR

"Federal Funds Target Range - Upper Limit." *FRED,* 16 April 2024, https://fred.stlouisfed.org/series/DFEDTARU

Consumer Confidence Index

"US Consumer Confidence Little Changed in March." *The Conference Board,* 26 March 2024, https://www.conference-board.org/topics/consumer-confidence

Supply chain

Mayer, Marina. "Supply Chain Delays Cause Some Companies 15% Loss in Revenue." *Supply and Demand Chain,* 12 April 2023, https://www.sdcexec.com/sourcing-procurement/erp/news/22820454/anvyl-supply-chain-delays-cause-some-companies-15-loss-in-revenue-study

Supply Chain

"Global Supply Chain Pressure Index." *Federal Reserve Bank of New York,* March 2024, https://www.newyorkfed.org/research/policy/gscpi#/interactive

Supply Chain

"Issue Brief: Supply Chain Resilience." *The White House,* 30 November 2023, https://www.whitehouse.gov/cea/written-materials/2023/11/30/issue-brief-supply-chain-resilience/#:~:text=As%20the%20pandemic%20faded%2C%20supply,strengthening%20and%20diversifying%20supply%20chains.

Industry Analysis AI

"How Will the Rise of AI Affect the Semiconductor Industry."*Flyking Technology*, 1 March 2024, https://www.linkedin.com/pulse/how-rise-ai-affect-semiconductor-industry-flykingtech-6epdc/

Industry analysis chart

"A gen AI risk assessment." *McKinsey,* 10 April 2024, https://www.mckinsey.com/featured-insights/sustainable-inclusive-growth/chart-of-the-day/a-gen-ai-risk-assessment

Geo political tensions In two Places

Wessner, Charles et al. "Balancing the Ledger: Export Controls on U.S. Chip Technology to China." *Center For Strategic and International Studies* 21 February 2024, https://www.csis.org/analysis/balancing-ledger-export-controls-us-chip-technology-china

China Sales Comnsuptoion

Araya, Daniel. "Will China Dominate the Global Semiconductor Market?" *Centre for International Governance Innovation,* 8 January 2024, https://www.cigionline.org/articles/will-china-dominate-the-global-semiconductor-market/#:~:text=The%20Chinese%20market%20is%20already,of%20the%20US%20tech%20sector.

Taiwan dependence

Tobin Meaghan et al. "Economy vs. environment: Some Taiwanese consider cashing in their chips" *The Washington Post,* 9 October 2023,

https://www.washingtonpost.com/world/2023/10/09/taiwan-tsmc-chip-manufacturer-fab/

Micron 100 Billion
"What They Are Reading in the States: Syracuse Post-Standard: Biden: Micron's computer chip deal in Syracuse area 'another win for America.'" *The White House,* 5 October 2022, https://www.whitehouse.gov/briefing-room/statements-releases/2022/10/05/what-they-are-reading-in-the-states-syracuse-post-standard-biden-microns-computer-chip-deal-in-syracuse-area-another-win-for-america/

Potential new entrants
Farschi, Nate. "Who's Going to Pay for American-Made Semiconductors?" *BuiltIn,* 22 March 2022, https://builtin.com/hardware/american-made-semiconductor-costs

Peer Comp

Factset, https://www.factset.com/

S&P Global Capital IQ Pro, https://www.spglobal.com/marketintelligence/en/solutions/sp-capital-iq-pro

Peer comp analysis
"Memory pricing set to take off in 2H-2023." *Yole Group,* 7 June 2023, https://www.yolegroup.com/strategy-insights/memory-pricing-set-to-take-off-in-2h-2023/

Company overview
"Micron Technology Inc: Overview." *Global Data,* https://www.globaldata.com/company-profile/micron-technology-inc/

Capex Micron invesntments
"Micron Pledges Up to $100 Billion for Semiconductor Factory in New York." *New York Times,* 4 October 2022, https://www.nytimes.com/2022/10/04/technology/micron-chip-clay-syracuse.html

Strengths
Micron website
https://www.micron.com/products/memory/hbm/hbm3e?gad_source=1&gclid=CjwKCAjwoPOwBhAeEiwAJuXRhwOCZLngR9GLL8K_yS7sHS_OBk23zhlQegCvJ2wAxTSUQeS7P4SDzBoC6n4QAvD_BwE
Quote for automotive sector

Automotive Demand
Jacobs, Chris "New research shows cars need more memory than a rocket." *Micron*, December 2023, https://my.micron.com/about/blog/applications/automotive/new-research-shows-cars-need-more-memory-than-a-rocket

Revneue Computing
"Data Center Networking Market." *Global Market Insights,* https://www.gminsights.com/industry-analysis/data-center-networking-market

Storage business Unit demand
10k

DDM
Nellis, Stephen. "Micron kicks off dividend payments, shifts to 'opportunistic' share buybacks" *Reuters,* August 2 2021, https://www.reuters.com/technology/micron-declares-quarterly-dividend-10-cents-2021-08-02/

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This report was created by students enrolled in the Security Analysis (6F:112) class at the University of Iowa. The report was originally created to offer an internal investment recommendation for the University of Iowa Krause Fund and its advisory board. The report also provides potential employers and other interested parties an example of the students' skills, knowledge and abilities. Members of the Krause Fund are not registered investment advisors, brokers or officially licensed financial professionals. The investment advice contained in this report does not represent an offer or solicitation to buy or sell any of the securities mentioned. Unless otherwise noted, facts and figures included in this report are from publicly available sources. This report is not a complete compilation of data, and its accuracy is not guaranteed. From time to time, the University of Iowa, its faculty, staff, students, or the Krause Fund may hold a financial interest in the companies mentioned in this report.

Micron

Sensitivity Tables

CV EPS Growth

Cost of Equity	3.40%	3.60%	3.80%	4.00%	4.10%	4.20%	4.30%
9.32%	86.75	87.94	89.22	90.59	91.32	92.07	92.86
9.42%	84.71	85.83	87.02	88.31	88.98	89.69	90.42
9.52%	82.75	83.80	84.91	86.11	86.74	87.40	88.08
9.62%	80.86	81.84	82.88	84.00	84.59	85.20	85.83
9.72%	79.03	79.95	80.92	81.96	82.51	83.08	83.67
9.82%	77.27	78.12	79.03	80.00	80.52	81.05	81.60
9.92%	75.56	76.36	77.21	78.12	78.59	79.09	79.60

CV NOPLAT Growth

WACC	4.70%	4.80%	4.90%	5.00%	5.10%	5.20%	5.30%
8.80%	123.92	125.64	127.44	129.34	131.35	133.46	135.69
8.90%	120.43	122.03	123.71	125.48	127.34	129.30	131.37
9.00%	117.11	118.60	120.17	121.81	123.54	125.36	127.28
9.10%	113.94	115.33	116.79	118.33	119.94	121.63	123.41
9.20%	110.91	112.21	113.58	115.01	116.51	118.08	119.74
9.30%	108.01	109.23	110.51	111.85	113.24	114.71	116.25
9.40%	105.24	106.39	107.58	108.83	110.13	111.50	112.94

Risk Free Rate

CV NOPLAT Growth	3.95%	4.05%	4.15%	4.25%	4.35%	4.45%	4.55%
4.70%	106.31	106.31	106.31	106.31	106.31	106.31	106.31
4.80%	107.49	107.49	107.49	107.49	107.49	107.49	107.49
4.90%	108.71	108.71	108.71	108.71	108.71	108.71	108.71
5.00%	109.99	109.99	109.99	109.99	109.99	109.99	109.99
5.10%	111.33	111.33	111.33	111.33	111.33	111.33	111.33
5.20%	112.74	112.74	112.74	112.74	112.74	112.74	112.74
5.30%	114.22	114.22	114.22	114.22	114.22	114.22	114.22

Beta

Equity Risk Premium	0.94	1.04	1.14	1.24	1.34	1.44	1.54
4.03%	172.53	151.41	134.51	120.69	109.18	99.44	91.11
4.13%	167.14	146.70	130.33	116.93	105.76	96.32	88.23
4.23%	162.05	142.24	126.37	113.37	102.53	93.36	85.51
4.33%	157.24	138.02	122.62	109.99	99.47	90.56	82.92
4.43%	152.67	134.02	119.06	106.79	96.55	87.89	80.46
4.53%	148.34	130.22	115.67	103.74	93.79	85.35	78.12
4.63%	144.22	126.60	112.45	100.84	91.15	82.94	75.89

Cost of Equity

Pre-tax Cost of ebt	9.02%	9.22%	9.42%	9.62%	9.82%	10.02%	10.22%
4.68%	110.57	110.70	110.82	110.95	111.07	111.19	111.32
4.88%	110.25	110.37	110.50	110.62	110.74	110.87	110.99
5.08%	109.93	110.05	110.17	110.30	110.42	110.54	110.67
5.38%	109.45	109.57	109.69	109.82	109.94	110.06	110.18
5.58%	109.13	109.25	109.38	109.50	109.62	109.74	109.86
5.78%	108.82	108.94	109.06	109.18	109.30	109.43	109.55
5.98%	108.50	108.62	108.75	108.87	108.99	109.11	109.23

Micron

Revenue Decomposition

Scale in Millions

Fiscal Years Ending Aug. 31	2019	2020	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
DRAM	15,250	14,510	20,039	22,386	10,978	17,245	23,159	27,144	30,881	34,281	37,302	40,259	43,132	45,902	48,556
NAND	6,935	6,131	7,007	7,811	4,206	6,664	9,553	10,585	11,557	12,459	13,286	14,035	14,747	15,421	16,055
Other (primarily NOR)	1,216	794	659	561	356	210	233	294	309	324	340	357	375	394	414
Total	**23,401**	**21,435**	**27,705**	**30,758**	**15,540**	**24,119**	**32,945**	**38,023**	**42,746**	**47,064**	**50,927**	**54,651**	**58,254**	**61,717**	**65,024**
DRAM Growth % Change		-4.85%	38.10%	11.71%	-50.96%	57.09%	34.29%	17.21%	13.77%	11.01%	8.81%	7.93%	7.14%	6.42%	5.78%
NAND Growth % Change		-11.59%	14.29%	11.47%	-46.15%	58.44%	43.35%	10.80%	9.18%	7.81%	6.63%	5.64%	5.08%	4.57%	4.11%
Other (primarily NOR) Growth % Change		-34.70%	-17.00%	-14.87%	-36.54%	-41.01%	10.95%	26.18%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Total		**-8.40%**	**29.25%**	**11.02%**	**-49.48%**	**55.21%**	**36.59%**	**15.41%**	**12.42%**	**10.10%**	**8.21%**	**7.31%**	**6.59%**	**5.94%**	**5.36%**

Micron Technology (MU)

Income Statement

(In Millions)

Fiscal Years Ending Aug. 31	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Revenue	27,705	30,758	15,540	24,119	32,945	38,023	42,746	47,064	50,927	54,651	58,254	61,717
Cost of Goods Sold	11,068	9,744	9,200	9,890	13,508	15,591	17,527	19,298	20,882	22,409	23,886	25,306
Depreciation & Amortization	6,214	7,116	7,756	7926	7889	8017	8222	8489	8805	9159	9544	9953
Gross Margin (Loss)	10,423	13,898	(1,416)	6,303	11,547	14,415	16,997	19,277	21,241	23,083	24,824	26,458
Selling, General & Administrative	894	1,066	920	979	1,337	1,543	1,735	1,910	2,067	2,218	2,365	2,505
Research and Development Expenses (Might want to forecast different)	2,663	3,116	3,114	3,007	4,108	4,741	5,330	5,868	6,350	6,814	7,263	7,695
Restructure and Asset Impairments	488	48	171	153	209	241	271	299	323	347	370	392
Other operating expense (income), net	95	(34)	124	-	-	-	-	-	-	-	-	-
Operating income (loss)	6,283	9,702	(5,745)	2,164	5,893	7,890	9,660	11,200	12,500	13,704	14,827	15,866
Interest income	37	96	468	520	391	504	698	957	1,276	1,650	2,079	2,562
Interest expense	183	189	388	**717**	**466**	**514**	**547**	**581**	**614**	**646**	**679**	**712**
Other non-operating income (expense), net	81	(38)	7	-	-	-	-	-	-	-	-	-
Income (loss) before taxes, net income attributable to noncontrolling interest & equity in net income (loss) of equity method investees	6,218	9,571	(5,658)	1,967	5,818	7,879	9,811	11,576	13,162	14,708	16,226	17,716
Income tax provision (benefit)	394	888	177	429	1,268	1,718	2,139	2,524	2,869	3,206	3,537	3,862
Equity in net income (loss) of equity method investees	37	4	2	10	14	16	18	19	21	22	24	25
Net income (loss)	**5,861**	**8,687**	**(5,833)**	**1,528**	**4,536**	**6,146**	**7,655**	**9,033**	**10,272**	**11,479**	**12,665**	**13,829**
Weighted average shares outstanding - basic	1,120	1,112	1,093	1,096	1,094	1,088	1,084	1,081	1,078	1,075	1,073	1,070
Net earnings (loss) per share - basic	5.23	7.81	(5.34)	1.39	4.15	5.65	7.06	8.36	9.53	10.67	11.81	12.92
Total Shares Outstanding	1,119	1,094	1,098	1,089	1,086	1,083	1,080	1,077	1,074	1,071	1,069	1,067
Cash Dividends Declared per share	0.01	0.44	0.48	0.49	0.50	0.51	0.52	0.53	0.54	0.55	0.56	0.57

Micron

Balance Sheet

Fiscal Years Ending Aug. 31	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
Assets													
Current assets:													
Cash & equivalents	7,763	8,262	8,577	5,902	8,068	11,869	16,952	23,242	30,642	39,125	48,692	59,321	71,008
Short-term investments	870	1,069	1,017	1,068	1,121	1,177	1,235	1,297	1,361	1,429	1,500	1,575	1,653
Receivables	5,311	5,130	2,443	4,027	5,500	6,348	7,136	7,857	8,502	9,124	9,725	10,303	10,855
Inventories	4,487	6,663	8,387	6,746	9,215	10,636	11,957	13,165	14,245	15,287	16,295	17,263	18,188
Other current assets	502	644	820	560	765	883	992	1,092	1,182	1,268	1,352	1,432	1,509
Total current assets	19,907	21,781	21,244	18,303	24,669	30,912	38,272	46,652	55,933	66,233	77,564	89,895	103,214
Non-current assets:													
Long-term marketable investments	1,765	1,647	844	886	930	976	1,025	1,076	1,130	1,186	1,245	1,307	1,372
Property, plant & equipment	33,213	38,549	37,928	37,752	38,362	39,345	40,623	42,133	43,828	45,669	47,625	49,672	51,792
Operating lease right-of-use assets	551	678	666	663	674	691	713	740	770	802	836	872	909
Intangible assets	349	421	404	329	278	231	188	146	104	62	20	-	-
Deferred tax assets	782	702	756	728	645	533	394	230	43	(166)	(397)	(649)	(921)
Goodwill	1,228	1,228	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150
Other noncurrent assets	1,054	1,277	1,262	1,325	1,391	1,460	1,533	1,609	1,689	1,773	1,862	1,954	2,052
Total non-current assets	38,942	44,502	43,010	42,833	43,430	44,387	45,626	47,084	48,714	50,476	52,341	54,307	56,354
Total assets	**58,849**	**66,283**	**64,254**	**61,135**	**68,099**	**75,299**	**83,899**	**93,737**	**104,647**	**116,709**	**129,905**	**144,203**	**159,568**
Liabilities and shareholder equity:													
Current liabilities:													
Accounts payable and accrued expenses	5,325	6,090	3,958	5,374	7,340	8,471	9,524	10,486	11,346	12,176	12,979	13,750	14,487
Current debt	155	103	278	517	706	814	916	1,008	1,091	1,171	1,248	1,322	1,393
Other current liabilities	944	1,346	529	757	1,033	1,193	1,341	1,476	1,598	1,714	1,827	1,936	2,040
Total current liabilities	6,424	7,539	4,765	6,647	9,079	10,478	11,780	12,970	14,035	15,061	16,054	17,008	17,919
Non-current Liabilities:													
Long-term debt	6,621	6,803	13,052	8,144	8,856	9,358	9,878	10,402	10,920	11,448	11,983	12,523	13,064
Noncurrent operating lease liabilities	504	610	603	602	612	627	648	672	699	728	759	792	826
Noncurrent unearned government incentives	808	589	727	330	330	330	330	330	330	330	330	330	330
Other noncurrent liabilities	559	835	987	740	1,011	1,166	1,311	1,444	1,562	1,677	1,787	1,893	1,995
Total non-current liabilities	8,492	8,837	15,369	9,815	10,808	11,482	12,167	12,848	13,511	14,183	14,859	15,538	16,215
Total liabilities	**14,916**	**16,376**	**20,134**	**16,462**	**19,887**	**21,960**	**23,947**	**25,818**	**27,546**	**29,243**	**30,913**	**32,546**	**34,134**
Shareholders' equity:													
Common stock	9,575	10,320	11,160	11,160	11,160	11,160	11,160	11,160	11,160	11,160	11,160	11,160	11,160
Retained earnings	39,051	47,274	40,824	41,815	45,804	51,396	58,487	66,947	76,637	87,524	99,589	112,807	127,156
Treasury stock	(4,695)	(7,127)	(7,552)	(7,990)	(8,441)	(8,905)	(9,383)	(9,876)	(10,384)	(10,906)	(11,445)	(11,999)	(12,570)
Accumulated other comprehensive income (loss)	2	(560)	(312)	(312)	(312)	(312)	(312)	(312)	(312)	(312)	(312)	(312)	(312)
Total Micron Technology Inc. shareholders' equity (deficit)	**43,933**	**49,907**	**44,120**	**44,673**	**48,212**	**53,339**	**59,952**	**67,919**	**77,101**	**87,466**	**98,992**	**111,656**	**125,434**
Total liabilities and equity	**58,849**	**66,283**	**64,254**	**61,135**	**68,099**	**75,299**	**83,899**	**93,737**	**104,647**	**116,709**	**129,905**	**144,203**	**159,568**

Micron

Historical Cash Flow Statement

Fiscal Years Ending Aug. 31	2019	2020	2021	2022	2023
Cash flows from operating activities:					
Net income (loss)	6,358	2,710	5,861	8,687	(5,833)
Adjustments to reconcile net income (loss) to net cash provided by operating activities:					
Depreciation expense & amortization of intangible assets	5,424	5,650	6,214	7,116	7,756
Provision to write-down inventories to estimate market values	-	-	-	-	1,831
Stock-based compensation	243	328	378	514	596
Goodwill impairment	-	-	-	-	101
Restructure and asset impairments	(97)	40	454	44	11
Loss (gain) on debt repurchases & conversions	396	(40)	1	83	-
Change in operating assets and liabilities:					
Receivables	2,431	(723)	(1,446)	190	2,763
Inventories	(1,528)	(489)	866	(2,179)	(3,555)
Accounts payable & accrued expenses	(174)	725	210	744	(2,104)
Other	(160)	40	(50)	(18)	(7)
Net cash flows from operating activities	**13,189**	**8,306**	**12,468**	**15,181**	**1,559**
Cash flows from investing activities:					
Expenditures for property, plant & equipment	(9,780)	(8,223)	(10,030)	(12,067)	(7,676)
Purchases of available-for-sale securities	(4,218)	(1,857)	(3,163)	(1,770)	(723)
Proceeds from maturities of available-for-sale securities	1,541	814	1,250	1,321	1,566
Proceeds from sales of available-for-sale securities	1,504	1,458	856	294	25
Procceeds from sales and maturities of available-for-sale securities	3,045	2,272	2,106	1,615	1,591
Proceeds from government incentives	748	262	495	115	710
Proceeds from sale of Lehi, Utah fab	-	-	-	888	-
Other	120	(43)	3	(366)	(93)
Net cash flows from investing activities	**(10,085)**	**(7,589)**	**(10,589)**	**(11,585)**	**(6,191)**
Cash flows from financing activities:					
Proceeds from issuance of debt	3,550	5,000	1,188	2,000	6,716
Repayments of debt	(3,340)	(4,366)	(1,520)	(2,032)	(761)
Payments of dividends to shareholders	-	-	-	(461)	(504)
Repurchases of common stock - repurchase program	-	-	-	(2,432)	(425)
Payments on equipment purchase contracts	(75)	(63)	(295)	(141)	(138)
Other cash flows from financing activities	(23)	(118)	140	211	95
Net cash flows from financing activities	**(2,438)**	**(317)**	**(1,781)**	**(2,980)**	**4,983**
Effect of changes in currency exchange rates on cash, cash equivalents & restricted cash	26	11	41	(106)	(34)
Net increase (decrease) in cash, cash equivalents & restricted cash	692	411	139	510	317
Cash, cash equivalents & restricted cash at beginning of period	6,587	7,279	7,690	7,829	8,339
Cash, cash equivalents & restricted cash at end of period	**7,279**	**7,690**	**7,829**	**8,339**	**8,656**

Micron

Forecasted Cash Flow Statement

Fiscal Years Ending Aug. 31	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
Cash, cash equivalents and restricted cash										
Operating Activities:										
Net income (loss)	1,528	4,536	6,146	7,655	9,033	10,272	11,479	12,665	13,829	14,968
Add depreciation	7,926	7,889	8,017	8,222	8,489	8,805	9,159	9,544	9,953	10,381
Changes in Receivables	(1,584)	(1,473)	(848)	(789)	(721)	(645)	(622)	(602)	(578)	(552)
Changes in Inventories	1,641	(2,469)	(1,420)	(1,321)	(1,208)	(1,081)	(1,042)	(1,008)	(969)	(925)
Changes in other current assets	260	(205)	(118)	(110)	(100)	(90)	(86)	(84)	(80)	(77)
Change in intangible assets	75	51	47	43	42	42	42	42	20	-
Change in deferred tax assets	28	83	112	139	164	187	209	231	252	272
Other non-current assets	(63)	(66)	(69)	(73)	(76)	(80)	(84)	(88)	(93)	(97)
Changes in accounts payable	1,416	1,966	1,131	1,052	962	861	830	803	771	737
Changes in other current liabilities	228	277	159	148	135	121	117	113	109	104
Change in noncurrent liabilities	(247)	271	156	145	132	119	114	111	106	101
Net cash flows from operating activities	11,207	10,860	13,313	15,113	16,854	18,511	20,116	21,727	23,320	24,912
Investing Activities:										
Changes in investments	(93)	(97)	(102)	(107)	(113)	(118)	(124)	(130)	(137)	(144)
Change in government incentives	(397)	-	-	-	-	-	-	-	-	-
Change in lease ROU assets	3	(11)	(17)	(22)	(27)	(30)	(32)	(34)	(36)	(37)
Changes in goodwill	-	-	-	-	-	-	-	-	-	-
Capital expenditures	(7,750)	(8,500)	(9,000)	(9,500)	(10,000)	(10,500)	(11,000)	(11,500)	(12,000)	(12,500)
Net cash flows from investing activities	(8,237)	(8,608)	(9,119)	(9,630)	(10,139)	(10,648)	(11,156)	(11,665)	(12,173)	(12,681)
Financing Activities:										
Changes in current debt	239	189	109	101	92	83	80	77	74	71
Changes in long term debt	(4,908)	712	502	520	524	518	528	535	540	541
Changes in lease liabilities	(1)	10	16	20	24	27	29	31	33	34
Payment of dividends	(537)	(547)	(555)	(564)	(573)	(582)	(591)	(601)	(610)	(619)
Repurchases of common stock	(438)	(451)	(464)	(478)	(493)	(507)	(523)	(538)	(555)	(571)
Net cash flows from financing activities	(5,646)	(87)	(392)	(401)	(425)	(462)	(477)	(496)	(517)	(544)
Net change in cash	(2,675)	2,166	3,801	5,083	6,290	7,401	8,483	9,566	10,630	11,687
Beginning Cash and cash equivilants	8,577	5,902	8,068	11,869	16,952	23,242	30,642	39,125	48,692	59,321
Ending Cash and cash equivalents	**5,902**	**8,068**	**11,869**	**16,952**	**23,242**	**30,642**	**39,125**	**48,692**	**59,321**	**71,008**

Micron

Common Size Balance Sheet

Fiscal Years Ending Aug. 31	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
Assets													
Current assets:													
Cash & equivalents	28.02%	26.86%	55.19%	35.24%	35.24%	35.24%	35.24%	35.24%	35.24%	35.24%	35.24%	35.24%	35.24%
Short-term investments	3.14%	3.48%	6.54%	4.43%	3.40%	3.09%	2.89%	2.76%	2.67%	2.61%	2.58%	2.55%	2.54%
Receivables	19.17%	16.68%	15.72%	16.69%	16.69%	16.69%	16.69%	16.69%	16.69%	16.69%	16.69%	16.69%	16.69%
Inventories	16.20%	21.66%	53.97%	27.97%	27.97%	27.97%	27.97%	27.97%	27.97%	27.97%	27.97%	27.97%	27.97%
Other current assets	1.81%	2.09%	5.28%	2.32%	2.32%	2.32%	2.32%	2.32%	2.32%	2.32%	2.32%	2.32%	2.32%
Total current assets	71.85%	70.81%	136.71%	75.88%	74.88%	81.30%	89.53%	99.12%	109.83%	121.19%	133.15%	145.66%	158.73%
Non-current assets:													
Long-term marketable investments	6.37%	5.35%	5.43%	3.67%	2.82%	2.57%	2.40%	2.29%	2.22%	2.17%	2.14%	2.12%	2.11%
Property, plant & equipment (Is this net)	119.88%	125.33%	244.07%	156.52%	116.44%	103.48%	95.03%	89.52%	86.06%	83.56%	81.75%	80.48%	79.65%
Operating lease right-of-use assets	1.99%	2.20%	4.29%	2.75%	2.04%	1.82%	1.67%	1.57%	1.51%	1.47%	1.44%	1.41%	1.40%
Intangible assets	1.26%	1.37%	2.60%	1.36%	0.84%	0.61%	0.44%	0.31%	0.20%	0.11%	0.03%	0.00%	0.00%
Deferred tax assets	2.82%	2.28%	4.86%	3.02%	1.96%	1.40%	0.92%	0.49%	0.08%	-0.30%	-0.68%	-1.05%	-1.42%
Goodwill	4.43%	3.99%	7.40%	4.77%	3.49%	3.02%	2.69%	2.44%	2.26%	2.10%	1.97%	1.86%	1.77%
Other noncurrent assets	3.80%	4.15%	8.12%	5.49%	4.22%	3.84%	3.59%	3.42%	3.32%	3.24%	3.20%	3.17%	3.16%
Total non-current assets	140.56%	144.68%	276.77%	177.59%	131.83%	116.74%	106.74%	100.04%	95.65%	92.36%	89.85%	87.99%	86.67%
Total assets	212.41%	215.50%	413.47%	253.47%	206.71%	198.04%	196.27%	199.17%	205.48%	213.55%	223.00%	233.65%	245.40%
Liabilities and shareholder equity:													
Current liabilities:													
Accounts payable	19.22%	19.80%	25.47%	22.28%	22.28%	22.28%	22.28%	22.28%	22.28%	22.28%	22.28%	22.28%	22.28%
Current debt	0.56%	0.33%	1.79%	2.14%	2.14%	2.14%	2.14%	2.14%	2.14%	2.14%	2.14%	2.14%	2.14%
Other current liabilities	3.41%	4.38%	3.40%	3.14%	3.14%	3.14%	3.14%	3.14%	3.14%	3.14%	3.14%	3.14%	3.14%
Total current liabilities	23.19%	24.51%	30.66%	27.56%	27.56%	27.56%	27.56%	27.56%	27.56%	27.56%	27.56%	27.56%	27.56%
Non-current laibilities:													
Long-term debt	23.90%	22.12%	83.99%	33.76%	26.88%	24.61%	23.11%	22.10%	21.44%	20.95%	20.57%	20.29%	20.09%
Noncurrent operating lease liabilities				2.50%	1.86%	1.65%	1.52%	1.43%	1.37%	1.33%	1.30%	1.28%	1.27%
Noncurrent unearned government incentives	2.92%	1.91%	4.68%	1.37%	1.00%	0.87%	0.77%	0.70%	0.65%	0.60%	0.57%	0.53%	0.51%
Other noncurrent liabilities	2.02%	2.71%	6.35%	3.07%	3.07%	3.07%	3.07%	3.07%	3.07%	3.07%	3.07%	3.07%	3.07%
Total non-current liabilities	30.65%	28.73%	98.90%	40.70%	32.81%	30.20%	28.46%	27.30%	26.53%	25.95%	25.51%	25.18%	24.94%
Total liabilities	53.84%	53.24%	129.56%	68.25%	60.36%	57.76%	56.02%	54.86%	54.09%	53.51%	53.07%	52.73%	52.50%
Shareholders' equity:													
Common stock	34.56%	33.55%	71.81%	46.27%	33.87%	29.35%	26.11%	23.71%	21.91%	20.42%	19.16%	18.08%	17.16%
Retained earnings	140.95%	153.70%	262.70%	173.37%	139.03%	135.17%	136.82%	142.25%	150.48%	160.15%	170.95%	182.78%	195.55%
Treasury stock	-16.95%	-23.17%	-48.60%	-33.13%	-25.62%	-23.42%	-21.95%	-20.98%	-20.39%	-19.96%	-19.65%	-19.44%	-19.33%
Accumulated other comprehensive income (loss)	0.01%	-1.82%	-2.01%	-1.29%	-0.95%	-0.82%	-0.73%	-0.66%	-0.61%	-0.57%	-0.54%	-0.51%	-0.48%
Total Micron Technology Inc. shareholders' equity (deficit)	158.57%	162.26%	283.91%	185.22%	146.34%	140.28%	140.25%	144.31%	151.39%	160.04%	169.93%	180.92%	192.90%
Total liabilities and equity	212.41%	215.50%	413.47%	253.47%	206.71%	198.04%	196.27%	199.17%	205.48%	213.55%	223.00%	233.65%	245.40%

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Common Size Income Statement

Fiscal Years Ending Aug. 31	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
Revenue	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	39.9%	31.7%	59.2%	41.0%	41.0%	41.0%	41.0%	41.0%	41.0%	41.0%	41.0%	41.0%	41.0%
Depreciation & Amortization	22.4%	23.1%	49.9%	32.9%	23.9%	21.1%	19.2%	18.0%	17.3%	16.8%	16.4%	16.1%	16.0%
Gross Margin (Loss)	37.6%	45.2%	(9.1%)	**26.1%**	**35.0%**	**37.9%**	**39.8%**	**41.0%**	**41.7%**	**42.2%**	**42.6%**	**42.9%**	**43.0%**
Selling, General & Administrative	3.2%	3.5%	5.9%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%
Research and Development Expenses (Might want to forecast different)	9.6%	10.1%	20.0%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
Restructure and Asset Impairments	1.8%	0.2%	1.1%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Other operating expense (income), net	0.3%	(0.1%)	0.8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Operating income (loss)	22.7%	31.5%	(37.0%)	9%	18%	21%	23%	24%	25%	25%	25%	26%	26%
Interest income	0.1%	0.3%	3.0%	2%	1%	1%	2%	2%	3%	3%	4%	4%	5%
Interest expense	0.7%	0.6%	2.5%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Other non-operating income (expense), net	0.3%	(0.1%)	0.0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Income (loss) before taxes, net income attributable to noncontrolling interest & equity in net income (loss) of equity method investees	22.4%	31.1%	(36.4%)	8%	18%	21%	23%	25%	26%	27%	28%	29%	29%
Income tax provision (benefit)	1.4%	2.9%	1.1%	2%	4%	5%	5%	5%	6%	6%	6%	6%	6%
Equity in net income (loss) of equity method investees	0.1%	0.0%	0.0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Net income (loss)	21.2%	28.2%	(37.5%)	6%	14%	16%	18%	19%	20%	21%	22%	22%	23%

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Value Driver Estimation

Fiscal Years Ending Aug. 31	2018	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
NOPLAT:														
Total net sales		27,705	30,758	15,540	24,119	32,945	38,023	42,746	47,064	50,927	54,651	58,254	61,717	65,024
Less: Total cost of sales		(11,068)	(9,744)	(9,200)	(9,890)	(13,508)	(15,591)	(17,527)	(19,298)	(20,882)	(22,409)	(23,886)	(25,306)	(26,662)
Less: Research & Development		(2,663)	(3,116)	(3,114)	(3,007)	(4,108)	(4,741)	(5,330)	(5,868)	(6,350)	(6,814)	(7,263)	(7,695)	(8,107)
Less: SG&A		(894)	(1,066)	(920)	(979)	(1,337)	(1,543)	(1,735)	(1,910)	(2,067)	(2,218)	(2,365)	(2,505)	(2,639)
Less Depreciation and Amortization		(6,214)	(7,116)	(7,756)	(7,926)	(7,889)	(8,017)	(8,222)	(8,489)	(8,805)	(9,159)	(9,544)	(9,953)	(10,381)
Plus: Implied Interest on operating leases		27	26	32	32	37	40	44	48	54	60	67	75	85
EBITA		**6,893**	**9,742**	**(5,418)**	**2,349**	**6,139**	**8,171**	**9,976**	**11,547**	**12,877**	**14,111**	**15,263**	**16,333**	**17,320**
Provision for Income Tax		394	888	177	429	1,268	1,718	2,139	2,524	2,869	3,206	3,537	3,862	4,180
Plus: tax shield on operating lease interest		6	6	7	7	8	9	10	11	12	13	15	16	19
Plus: tax shield on interest expense		43	46	85	156	102	112	119	127	134	141	148	155	162
Plus: Restructure and asset impairments		106	10	37	33	46	53	59	65	70	76	81	85	90
Less: Other non-operating Income (expense) net		43	46	85	156	102	112	119	127	134	141	148	155	162
Less: equity in net income (loss) of equity method investees		9	1	0	2	3	3	4	4	5	5	5	6	6
Less: tax shield on interest income		9	23	102	113	85	110	152	209	278	360	453	558	675
Total adjusted taxes		**489**	**880**	**119**	**354**	**1,234**	**1,666**	**2,052**	**2,386**	**2,669**	**2,930**	**3,174**	**3,400**	**3,607**
Changes in Deffered Taxes		74	(83)	(50)	26	(207)	(178)	(202)	(221)	(238)	(259)	(279)	(300)	(319)
NOPLAT		**6,478**	**8,779**	**(5,587)**	**2,021**	**4,698**	**6,327**	**7,722**	**8,939**	**9,970**	**10,921**	**11,810**	**12,634**	**13,393**
Invested Capital (IC):														
Normal cash	8,163	7,442	8,262	4,174	6,478	8,849	10,213	11,482	12,642	13,679	14,679	15,647	16,577	17,465
Accounts Recievable	5478	5,311	5,130	2,443	4,027	5,500	6,348	7,136	7,857	8,502	9,124	9,725	10,303	10,855
Inventory	3595	4,487	6,663	8,387	6,746	9,215	10,636	11,957	13,165	14,245	15,287	16,295	17,263	18,188
Other current operating assets	164	502	644	820	560	765	883	992	1,092	1,182	1,268	1,352	1,432	1,509
Operting current assets	17,400	17,742	20,699	15,824	17,811	24,329	28,079	31,567	34,756	37,608	40,358	43,019	45,576	48,018
Accounts Payable	4611	5,325	6,090	3,958	5,374	7,340	8,471	9,524	10,486	11,346	12,176	12,979	13,750	14,487
Other current operating liabilities	408	944	1,346	529	757	1,033	1,193	1,341	1,476	1,598	1,714	1,827	1,936	2,040
Operating current liabilities	5,019	6,269	7,436	4,487	6,130	8,373	9,664	10,864	11,962	12,944	13,890	14,806	15,686	16,526
Net operating working capital	12,381	11,473	13,263	11,337	11,681	15,956	18,415	20,702	22,794	24,665	26,468	28,213	29,890	31,492
Plus: net PPE	23672	33,213	38,549	37,928	37,752	38,362	39,345	40,623	42,133	43,828	45,669	47,625	49,672	51,792
Plus: PV of operating leases	427	484	587	602	679	734	815	898	999	1,112	1,245	1,399	1,578	1,788
Invested Capital	**36,480**	**45,169**	**52,398**	**49,867**	**50,112**	**55,052**	**58,576**	**62,224**	**65,926**	**69,605**	**73,383**	**77,237**	**81,141**	**85,071**
Free Cash Flow (FCF):														
NOPLAT		6,478	8,779	(5,587)	2,021	4,698	6,327	7,722	8,939	9,970	10,921	11,810	12,634	13,393
Change in IC (CapEx)		4,416	7,229	(2,531)	245	4,940	3,523	3,648	3,703	3,679	3,777	3,854	3,904	3,931
FCF		2,062	1,549	(3,056)	1,777	(242)	2,803	4,074	5,236	6,291	7,144	7,955	8,730	9,462
Return on Invested Capital (ROIC):														
NOPLAT		6,478	8,779	(5,587)	2,021	4,698	6,327	7,722	8,939	9,970	10,921	11,810	12,634	13,393
Beginning IC		40,754	45,169	52,398	49,867	50,112	55,052	58,576	62,224	65,926	69,605	73,383	77,237	81,141
ROIC		15.90%	19.43%	-10.66%	4.05%	9.38%	11.49%	13.18%	14.37%	15.12%	15.69%	16.09%	16.36%	16.51%
Economic Profit (EP):														
Beginning IC		40,754	45,169	52,398	49,867	50,112	55,052	58,576	62,224	65,926	69,605	73,383	77,237	81,141
x (ROIC - WACC)		6.53%	10.07%	-20.02%	-5.31%	0.01%	2.13%	3.82%	5.01%	5.76%	6.33%	6.73%	7.00%	7.14%
EP		2,663	4,550	(10,492)	(2,647)	7	1,173	2,239	3,114	3,799	4,406	4,940	5,404	5,797
Defered Taxes Net (DTA - DTL)					Deferred Tax Liabilities Forecast									
Nert change	1019	772	689	639	665	458	280	78	-143	-382	-640	-920	-1220	-1539
		74	-83	-50	26	-207	-178	-202	-221	-238	-259	-279	-300	-319
DTL														
	-3	-10	-13	-117	63.4	187.5	253.9	316.1	373.0	424.1	473.9	522.8	570.8	617.8
		2.54%	1.46%	66.10%	14.78%	14.78%	14.78%	14.78%	14.78%	14.78%	14.78%	14.78%	14.78%	14.78%

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Weighted Average Cost of Capital (WACC) Estimation

Cost of Equity:		
Risk-Free Rate	4.54%	
Beta	1.24	
Equity Risk Premium	4.33%	
Cost of Equity	**9.91%**	
Cost of Debt:		
Risk-Free Rate	4.54%	
Implied Default Premium	0.84%	
Pre-Tax Cost of Debt	5.38%	
Marginal Tax Rate	22%	
After-Tax Cost of Debt	**4.21%**	
Market Value of Common Equity:		**MV Weights**
Total Shares Outstanding	1098	
Current Stock Price	$119.25	
MV of Equity	**130,937**	90.38%
Market Value of Debt:		
Short-Term Debt		
Current Portion of LTD	278	
Long-Term Debt	13052	
PV of Operating Leases	602	
MV of Total Debt	**13,932.14**	9.62%
Market Value of the Firm	**144,869**	100.00%
	Estimated WACC	**9.36%**

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Relative Valuation Models

Ticker	Company	Price	EPS 2024E	EPS 2025E	P/E 24	P/E 25	Est. 5yr EPS gr.	PEG 24	PEG 25
005930-KR	Samsung	$58.99	3.52	$4.97	16.76	11.87	57.2	0.29	0.21
00660-KR	SK Hynix	$133.72	$10.75	$16.92	12.44	7.90	4.0	3.11	1.98
INTC	Intel	$35.69	$1.34	$2.24	26.63	15.93	43.1	0.62	0.37
TXN	Texas Instruments	$166.33	$5.08	$6.51	32.74	25.55	10.0	3.27	2.55
NXPI	NXP semiconductors	$233.61	$13.58	$15.45	17.20	15.12	9.2	1.88	1.65
			Average		**21.16**	**15.28**		**1.83**	**1.35**
MU	Micron	$119.25	1.39	4.15	85.5	28.7	10.0	8.6	2.9

Implied Relative Value:

P/E (EPS24)	**$**	**29.49**
P/E (EPS25)	**$**	**63.36**
PEG (EPS24)	**$**	**25.57**
PEG (EPS25)	**$**	**56.06**

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Discounted Cash Flow (DCF) and Economic Profit (EP) Valuation Models

Key Inputs:

CV Growth of NOPLAT	5.00%	Need to Assume
CV Year ROIC	16.51%	
WACC	9.36%	
Cost of Equity	9.91%	

Fiscal Years Ending Aug. 31	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
DCF Model:										
Free Cash Flow (FCF)	1,777	(242)	2,803	4,074	5,236	6,291	7,144	7,955	8,730	9,462
Continuing Value (CV)										214,079
PV of FCF	1,625	(203)	2,143	2,848	3,347	3,678	3,819	3,888	3,902	95,679
Value of Operating Assets:	120,727									
Non-Operating Adjustments										
Excess Cash	4,403									
Investments	1,861									
Other non current assets	1,262									
Value of Debt	(13,932)									
Value of Equity	114,321									
Shares Outstanding	1,098									
Intrinsic Value of Last FYE	104.12									
Implied Price as of Today	**109.99**									
EP Model:										
Economic Profit (EP)	(2,647)	7	1,173	2,239	3,114	3,799	4,406	4,940	5,404	5,797
Continuing Value (CV)										132,938
PV of EP	(2,420)	6	897	1,565	1,991	2,221	2,355	2,415	2,415	59,415
Total PV of EP	70,860									
Invested Capital (last FYE)	49,867									
Value of Operating Assets:	120,727									
Non-Operating Adjustments										
Excess Cash	4,403									
Investments	1,861									
Other non current assets	1,262									
Value of Debt	(13,932)									
Value of Equity	114,321									
Shares Outstanding	1,098									
Intrinsic Value of Last FYE	104.12									
Implied Price as of Today	**109.99**									

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Dividend Discount Model (DDM) or Fundamental P/E Valuation Model

Fiscal Years Ending	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
EPS	$ 1.39	$ 4.15	$ 5.65	$ 7.06	$ 8.36	$ 9.53	$ 10.67	$ 11.81	$ 12.92	$ 14.02
Key Assumptions										
CV growth of EPS	4.00%	Need to make assumption								
CV Year ROE	13.41%									
Cost of Equity	9.91%									
Future Cash Flows										
P/E Multiple (CV Year)										11.87
EPS (CV Year)										$ 14.02
Future Stock Price										$ 166.42
Dividends Per Share	0.49	0.50	0.51	0.52	0.53	0.54	0.55	0.56	0.57	
Discounted Cash Flows	0.45	0.41	0.38	0.36	0.33	0.31	0.28	0.26	0.24	71.11
Intrinsic Value as of Last FYE	$ 74.13									
Implied Price as of Today	$ 78.32									

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Key Management Ratios

Fiscal Years Ending Aug. 31	2019	2020	2021	2022	2023	2024E
Liquidity Ratios:						
Quick Ratio (LA/CL)	1.24	1.23	1.34	1.24	2.01	1.05
Current Ratio (CA/CL)	2.58	2.71	3.10	2.89	4.46	2.75
Cash Ratio (Cash/CL)	1.12	1.15	1.21	1.10	1.80	0.89
Asset-Management Ratios:						
Total Asset Turnover (Rev/Assets)	1.42	1.19	1.39	1.41	0.73	1.32
Recievable Turnover (Rev/Avg. AR)	5.40	6.03	6.01	5.89	4.10	7.46
Day in Recievable Turnover (365/RT)	67.64	60.51	60.75	61.95	88.94	48.95
Financial Leverage Ratios:						
Debt/Equity	0.16	0.17	0.15	0.14	0.30	0.19
Debt/Total Assets	0.12	0.12	0.12	0.10	0.21	0.14
Debt to Captial (TD/(TD + TSE)	0.15	0.16	0.15	0.14	0.21	0.16
Profitability Ratios:						
Return on Equity (NI/Beg TSE)	19.17%	7.55%	15.03%	19.77%	-11.69%	3.46%
Gross Profit Margin (Rev-COGS/Rev)*100	45.73%	30.57%	37.62%	45.18%	-9.11%	26.13%
Return on Assets (Net Income/Total Assets)	2.28%	2.07%	1.90%	1.68%	1.70%	1.79%
Payout Policy Ratios:						
Dividend Payout Ratio (Dividend/EPS)	-	-	0%	5.63%	-8.99%	35.15%
Total Payout Ratio ((Divs. + Repurchases)/NI)	-	-	0%	22.69%	1.35%	-6.50%
Total Rention Ratio (1- Payout Ratio)	-	-	0%	77.31%	98.65%	106.50%

2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
1.01	1.25	1.54	1.89	2.28	2.69	3.13	3.58	4.05
2.72	2.95	3.25	3.60	3.99	4.40	4.83	5.29	5.76
0.89	1.13	1.44	1.79	2.18	2.60	3.03	3.49	3.96
1.34	1.23	1.12	1.01	0.91	0.83	0.75	0.69	0.63
6.92	6.42	6.34	6.28	6.23	6.20	6.18	6.16	6.15
52.77	56.87	57.57	58.14	58.62	58.86	59.05	59.23	59.39
0.20	0.19	0.18	0.17	0.16	0.14	0.13	0.12	0.12
0.14	0.14	0.13	0.12	0.11	0.11	0.10	0.10	0.09
0.18	0.17	0.17	0.16	0.15	0.14	0.13	0.12	0.11
10.15%	12.75%	14.35%	15.07%	15.12%	14.89%	14.48%	13.97%	13.41%
35.05%	37.91%	39.76%	40.96%	41.71%	42.24%	42.61%	42.87%	43.03%
1.61%	1.44%	1.29%	1.15%	1.03%	0.92%	0.83%	0.74%	0.67%
12.05%	9.02%	7.37%	6.34%	5.67%	5.15%	4.74%	4.41%	4.14%
-2.12%	-1.47%	-1.12%	-0.89%	-0.73%	-0.60%	-0.49%	-0.40%	-0.32%
102.12%	101.47%	101.12%	100.89%	100.73%	100.60%	100.49%	100.40%	100.32%

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Present Value of Operating Lease Obligations

(in millions)

Fiscal Years Ending Aug. 31	2018	2019	2020	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
Year 1	37.0	54.0	70.0	68.0	66.0	62.0	59.2	56.1	53.3	50.6	48.1	45.7	43.4	41.2	39.1	37.2
Year 2	43.0	64.0	69.0	69.0	80.0	77.0	81.7	82.7	85.7	87.7	90.4	92.8	95.5	98.1	100.9	103.7
Year 3	50.0	63.0	65.0	61.0	70.0	76.0	84.9	93.4	103.6	114.5	126.8	140.2	155.1	171.6	189.9	210.0
Year 4	50.0	59.0	55.0	50.0	67.0	76.0	94.0	111.5	135.1	161.9	195.1	234.4	282.1	339.3	408.2	491.0
Year 5	45.0	53.0	47.0	47.0	64.0	74.0	93.2	112.5	138.8	169.3	207.8	254.2	311.5	381.4	467.2	572.2
Thereafter	391.0	459.0	401.0	372.0	463.0	453.0	503.5	526.2	567.3	602.3	644.4	686.7	733.3	782.3	835.0	891.0
Total Minimum Payments	616.0	752.0	707.0	667.0	810.0	818.0	916.5	982.3	1083.8	1186.3	1312.4	1454.1	1621.0	1814.0	2040.3	2305.1
Less: Cumulative Interest	188.9	224.1	199.8	183.3	223.1	215.9	237.6	248.1	268.4	288.0	313.3	341.7	375.7	415.3	462.1	517.2
PV of Minimum Payments	**427.1**	**527.9**	**507.2**	**483.7**	**586.9**	**602.1**	**678.9**	**734.2**	**815.3**	**898.3**	**999.2**	**1112.4**	**1245.3**	**1398.7**	**1578.2**	**1787.9**
Implied Interest in Year 1 Payment		**23.0**	**28.4**	**27.3**	**26.0**	**31.6**	**32.4**	**36.5**	**39.5**	**43.9**	**48.3**	**53.8**	**59.8**	**67.0**	**75.3**	**84.9**
Pre-Tax Cost of Debt	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%
Years Implied by Year 6 Payment	8.7	8.7	8.5	7.9	7.2	6.1	5.4	4.7	4.1	3.6	3.1	2.7	2.4	2.1	1.8	1.6
Expected Obligation in Year 6 & Beyond	45	53	47	47	64	74	93	113	139	169	208	254	312	381	467	572
Present Value of Lease Payments																
PV of Year 1	35.1	51.2	66.4	64.5	62.6	58.8	56.2	53.2	50.6	48.0	45.6	43.3	41.2	39.1	37.1	35.3
PV of Year 2	38.7	57.6	62.1	62.1	72.0	69.3	73.6	74.4	77.1	79.0	81.4	83.6	86.0	88.4	90.9	93.4
PV of Year 3	42.7	53.8	55.5	52.1	59.8	64.9	72.5	79.9	88.6	97.9	108.3	119.8	132.6	146.6	162.2	179.5
PV of Year 4	40.5	47.8	44.6	40.5	54.3	61.6	76.2	90.4	109.5	131.3	158.2	190.1	228.8	275.1	331.0	398.1
PV of Year 5	34.6	40.8	36.2	36.2	49.2	56.9	71.7	86.6	106.8	130.3	159.9	195.6	239.7	293.5	359.5	440.3
PV of 6 & beyond	235.4	276.5	242.4	228.2	288.8	290.5	328.7	349.8	382.7	411.8	445.8	480.0	517.1	555.9	597.4	641.3
Capitalized PV of Payments	427.1	527.9	507.2	483.7	586.9	602.1	678.9	734.2	815.3	898.3	999.2	1112.4	1245.3	1398.7	1578.2	1787.9

Micron

Valuation of Options Granted under ESOP

Current Stock Price	$119.25
Risk Free Rate	4.25%
Current Dividend Yield	0.48%
Annualized St. Dev. of Stock Returns	40.00%

Range of Outstanding Options	Number of Shares	Average Exercise Price	Average Remaining Life (yrs)	B-S Option Price	Value of Options Granted
Range 1	10,000	5.00	2.24	$ 113.43	$ 1,134,287
Range 2	20,000	9.00	5.40	$ 109.05	$ 2,181,075
Range 3	30,000	10.00	4.35	$ 108.48	$ 3,254,365
Range 4	20,000	12.00	6.40	$ 106.56	$ 2,131,159
Range 5	20,000	15.00	8.24	$ 104.30	$ 2,085,991
Range 6					$ -
Range 7					$ -
Range 8					$ -
Range 9					$ -
Total	100,000	$ 10.70	5.54	$ 110.81	**$ 10,786,877**