BTIG

Equity Research

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Data and Cloud Infrastructure

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The Dawn of The Zettabyte Age

The data deluge is one of the great investment themes of our time, not only amidst the technology industry but across a growing swath of industries. As discussed in a report out today, "Data Age 2025," IDC describes the concept of the "global datasphere"—the sum total of data created, captured, and replicated, distinctive not only for its unprecedented size (163 Zettabytes by 2025) but for its rapid evolution from something that enhances our lives to something that is critical to most human activity. There are many opportunities for companies to drive and benefit from this value creation, as we're already seeing today. However, while the "data thesis" isn't controversial, and is in fact driving the valuations of many successful businesses, we think that the role data storage plays as an enabler of this value isn't being adequately recognized.

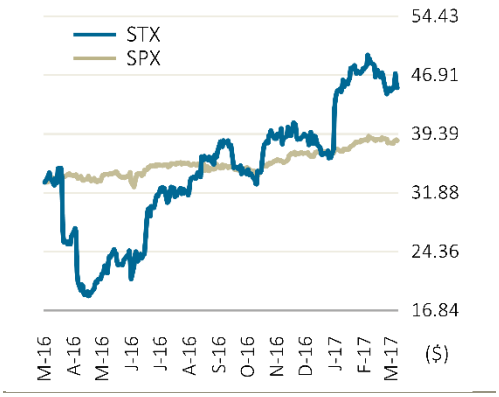
- **Data—the new barrier to entry.** There is value in many areas—systems, software, and distribution—but there is a growing consensus that identifies the real source of differentiable value as being is in the data itself. This new barrier to entry, and the possibility of a divide between companies that are "data rich" vs. "data poor," means that the race for data is more important than the race for the next algorithm or application. We explore the new and rich ways the "datasphere" will enhance productivity and how infrastructure is evolving to support it.

- **Is an enabler of value valuable?** So, data is valuable. Not exactly a hot take. But if that's true, shouldn't the infrastructure that will be required to store, protect, and provide access to that data be too? Can a bearish assessment of HDD storage technology be logically consistent with a bullish view of secular "data growth" companies, if the latter thesis is underpinned by the increasing value of data in our society? Is it possible that one of these sectors is mispriced, valuation-wise? What are the implications of the future of the data economy if there is no way to economically store data?

- **Valuation:** $55 PT reflects 12x run-rate EPS of ~$4.50. Maintain Buy.

STX	**$45.30**
12 month target	$55.00
BUY	
52 week range	$18.72 - $49.48
Dividend Yield	5.6%
Market Cap (m)	$13,499

Price Performance



Source: IDC

Estimates

	1Q16 A	2Q16 A	3Q16 A	4Q16 A	FY16 A	1Q17 A	2Q17 A	3Q17 E	4Q17 E	FY17 E	FY18 E
Sales	2,927	2,985	2,591	2,653	11,156	2,797	2,893	2,715	2,763	11,168	11,265
Diluted EPS (Adj.)	0.54	0.82	0.22	0.69	2.26	0.99	1.38	1.06	1.12	4.56	4.53
EV/Sales (x)	-	-	-	-	1.68	-	-	-	-	1.68	1.67
P/E (x)	-	-	-	-	20.00	-	-	-	-	9.94	10.01
P/FCF (x)	-	-	-	-	12.51	-	-	-	-	8.63	7.30

Source: BTIG Estimates and Company Documents ($ in millions, except per share amount)
Adjusted EPS excludes stock-based comp, amortization and acquisition related costs.

The Dawn of the Zettabye Age

Zettabyte. */ˈzedəˌbīt/.* *Noun: zettabyte; plural noun: zettabytes; noun: ZB; plural noun: ZBs.* *"A unit of information equal to one sextillion (10^{21}) or, strictly, 2^{70} bytes." According to Wikipedia, 1 ZB is equivalent to 152 million years of ultra-high definition 8K video format.*

The data deluge is one of the great investment themes of our time, not only amidst the technology industry but across the global economy as well. The key to making us a smarter and more productive planet is held in ever increasing volumes of data, and we're seeing a present day gold rush in an effort to unlock that value. In an update to its 2014 Digital Universe report, IDC has published a new White Paper, "Data Age 2025—The Evolution of Data to Life-Critical". In the study, sponsored by Seagate, IDC describes the concept of the "global datasphere"—the sum total of data created, captured, and replicated, distinctive not only for its unprecedented size (163 Zettabytes by 2025) but for its rapid evolution from something that enhances our lives to something that is critical to most human activity.

Data Data Everywhere, Nor Any Drop to Drink

While this is a rapidly changing and dynamic field, investors are by and large in agreement that data growth is a cornerstone trend for a variety of reasons, all of which are more rich and interesting than could have been conceived just ten years ago. Think of Big Data computing, connected device ecosystems and IoT, and Machine Learning and AI and the countless life and business enhancing applications that these technologies will enable and drive—predictive analytics, more efficient and agile businesses across all industries, autonomous cars, smart cities, DNA sequencing for personalized medicine and medical research—and all the network effects that will ensue.

Speaking in broad terms, investors have identified many potential ways that value is being created or will be created as the shift to a fully digital world accelerates. Companies like Google (GOOGL, Not Rated), Facebook (FB, Buy, $175 PT; Analyst: Rich Greenfield), Amazon (AMZN, Not Rated), Nvidia (NVDA, Not Rated), Adobe (ADBE, Buy, $151 PT; Analyst: Abhinav Kapur), Microsoft (MSFT, Not Rated), Uber (Private), and Netflix (NFLX, Buy, $170 PT; Analyst: Rich Greenfield), some of which have the biggest market caps in the world, are all richly valued secular growth companies because of their association with data. The ways in which these companies are contributing to and participating in this trend vary, ranging from smarter and more targeted marketing and advertising, new computing services and architectures, and new ways to create, consume, and share content, but they all have an angle in terms of cost effectively igniting and unleashing ways to take advantage in the value of data.

There is "value" in many areas—technology, systems, software, distribution, customer loyalty (or as some would say, lock-in), knowhow and expertise—but there is a growing consensus that identifies the real source of differentiable value as being is in the data itself. This new barrier to entry, and the possibility of a growing divide between companies that are "data rich" vs. "data poor," means that the race for data is more important than the race for the next

algorithm or application. Evidence of this can be seen in public market valuations and in recent M&A like Microsoft's purchase of Linkedin.

Is an Enabler of Value Valuable?

So, data is valuable. Not exactly a news flash. But if that's true, shouldn't the infrastructure that will be required to store, protect, and provide access to that data be too? Yes, there are many assumptions that are under debate—the mix of memory to disk, component cost dynamics, the slope of bit shipment growth, the percentage of data at rest versus on the fly, and other important computational and architectural considerations, which we discuss in a bit—but perennially low valuations for storage stocks seems to be sending a message about the perceived value, or lack thereof, in the storage infrastructure tier, and specifically HDD vendors, Seagate and Western Digital (WDC, Buy, $85 PT).

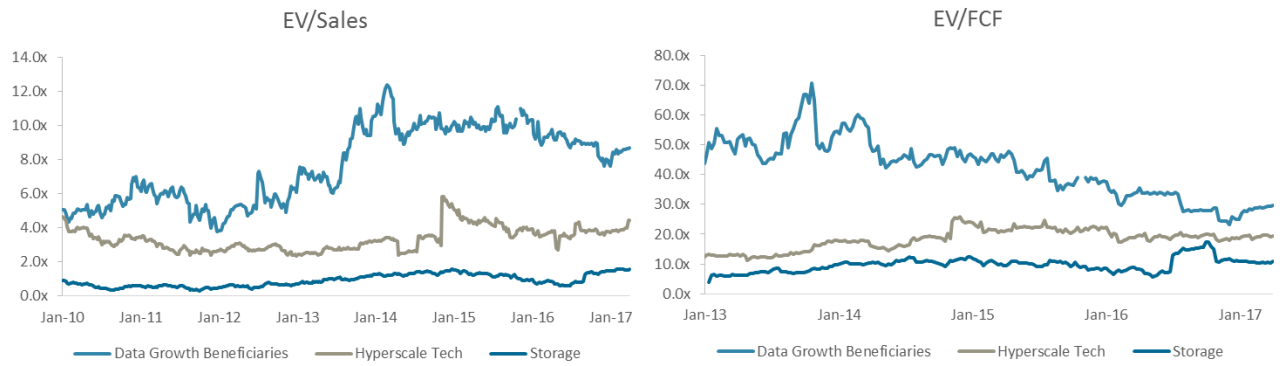
Richly Valued Data Winners and Lowly Valued Data Storage

Company Name	Ticker	Market Cap.	EV/SALES		EV/EBITDA		EV/FCF		P/E		Rev. Growth		FCF Margins	
			FY1	FY2	FY1	FY2	FY1	FY2	FY1	FY2	FY1	FY2	FY1	FY2
The Data Economy														
Apple Inc.	AAPL	$765,633	3.6x	3.4x	11.1x	10.9x	15.2x	13.3x	17.3x	16.1x	6%	8%	23%	24%
Adobe Systems Incorporated	ADBE	$64,907	8.7x	7.2x	21.0x	17.2x	24.0x	19.4x	31.9x	25.3x	22%	20%	36%	37%
Amazon.com, Inc.	AMZN	$433,274	2.6x	2.1x	21.8x	16.6x	34.1x	24.3x	NM	NM	22%	21%	8%	9%
Alibaba Group Holding Ltd.	BABA	$277,899	11.9x	9.1x	25.2x	20.0x	31.4x	26.3x	25.0x	20.0x	44%	31%	38%	34%
Salesforce.com, inc.	CRM	$58,539	5.7x	4.8x	29.2x	23.0x	29.5x	27.5x	NM	38.6x	21%	20%	19%	17%
Facebook, Inc.	FB	$418,019	10.3x	8.1x	16.5x	13.0x	31.9x	24.2x	26.2x	21.2x	37%	27%	32%	33%
Alphabet Inc.	GOOGL	$599,914	5.9x	5.1x	12.0x	10.3x	19.3x	16.7x	25.7x	21.9x	19%	16%	31%	31%
LinkedIn Corporation^	LNKD	$18,115	3.6x	3.0x	11.8x	10.2x	29.7x	18.5x	27.5x	21.5x	20%	18%	12%	16%
Microsoft Corporation	MSFT	$513,257	4.9x	4.7x	13.1x	12.4x	18.3x	16.4x	22.0x	20.1x	5%	8%	26%	27%
Netflix, Inc.	NFLX	$64,654	5.9x	4.9x	NA	37.4x	NA	NA	NA	NA	27%	20%	(17%)	(9%)
Splunk Inc.	SPLK	$8,509	7.8x	6.2x	NA	NA	NA	30.4x	NA	NA	42%	27%	16%	20%
The Data Economy			**6.4x**	**5.3x**	**18.0x**	**17.1x**	**25.9x**	**21.7x**	**25.1x**	**23.1x**	**24%**	**20%**	**20%**	**22%**
Data Enablers														
Western Digital Corporation	WDC	$24,149	1.7x	1.7x	6.5x	6.2x	14.9x	11.4x	10.1x	9.2x	44%	(1%)	11%	15%
Seagate Technology PLC	STX	$13,499	1.4x	1.4x	6.8x	6.9x	10.2x	8.8x	9.9x	10.0x	0%	1%	14%	16%
Data Enablers Average			**1.6x**	**1.6x**	**6.6x**	**6.5x**	**12.5x**	**10.1x**	**10.0x**	**9.6x**	**22%**	**(0%)**	**13%**	**16%**
Total			**5.7x**	**4.7x**	**15.9x**	**15.3x**	**23.5x**	**19.8x**	**21.7x**	**20.4x**	**24%**	**17%**	**19%**	**21%**

Source: BTIG, FactSet
**Adobe Systems Inc. (ADBE, Buy, $151 PT; Analyst: Abhinav Kapur), Salesforce, Inc. (CRM, Buy, $100 PT; Analyst: Joel Fishbein), Apple Inc. (AAPL, Buy, $165 PT; Analyst: Walt Piecyk), Facebook, Inc. (FB, Buy, $175 PT; Analyst: Rich Greenfield), Netflix, Inc. (NFLX, Buy, $170 PT; Anaylst: Rich Greenfield)*
^LinkedIn's "clean" price prior to the Microsoft acquisition announcement 6/13/16
Note: Market data as of April 03, 2017. Estimates reflect forward fiscal year.

Source: BTIG, FactSet.

Richly Valued Data Winners and Lowly Valued Data Storage



Source: BTIG, FactSet.

We've discussed the virtues of data growth and new pricing dynamics that are driving favorable trends in HDD business models for some time (and not always to a warm reception), but we again consider the implication of a bearish view on HDD fundamentals.

It seems to us that a pessimistic outlook on HDD as a meaningful constituent of the 2025 storage tier necessarily means belief in one of three things—

- **Hundreds of billions of dollars of memory investment.** That memory manufacturers (and their sources of financing) are able and willing to invest the tens of billions of incremental capital required to double production at much lower rates of return at a time when they are just figuring out how not to lose money (never mind that that the slowing of Moore's law is providing a headwind to bit growth)

- **Data won't get stored.** That data growth will persist as commonly thought but the percentage that requires storage will decline precipitously because it can be discarded

- **The "data world" thesis is a bust.** That the "data world" thesis is overhyped and that data is actually not as valuable as commonly thought, that projections of data growth are too optimistic, and that information technology isn't driving the type of industry transformation that we all talk about, set to deliver only modest gains in productivity

The third item is of particular interest to us, because it presents the notion that the "data thesis" is in fact wrong. But doesn't that necessarily mean that there is a fundamental disconnect playing out in public market valuations?

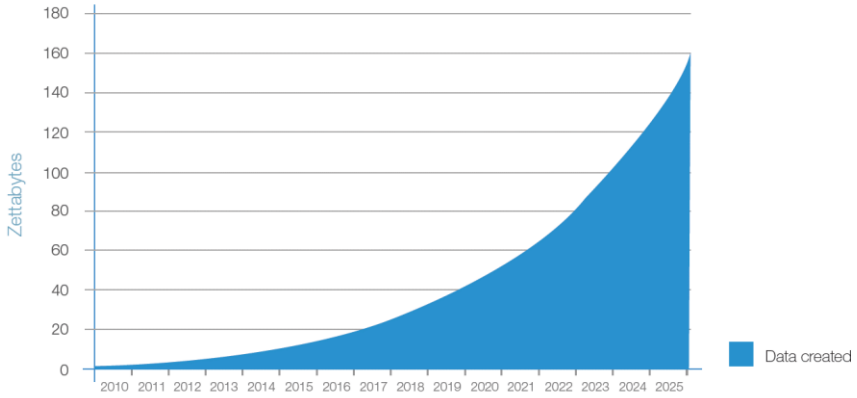
Can a bearish assessment of HDD storage technology be logically consistent with a bullish view of secular "data growth" companies, if the latter thesis is underpinned by the increasing value of data in our society?

Is it possible that one of these sectors is mispriced, valuation-wise? What are the implications of the future of the data economy if there is no way to economically store data?

What's Driving the Datasphere?

We've argued that data growth is here to stay, and IDC's Data Age 2025 report takes a deep look into the future of data creation. According to the report, the size of the "datasphere"—the aggregate amount of digital information created—will reach 163 ZBs by 2025, a staggering ten-fold increase from the 16.1 ZBs of data generated last year, reflecting massive amounts of utility unlocked by the role of data in our society.

Annual Size of the Global Datasphere



Source: IDC's Data Age 2025 study, sponsored by Seagate, March 2017

But what's more interesting than huge volume of data that will be created is the changing nature of data creation and utilization. According to IDC, there are five key trends intensifying the role of data—

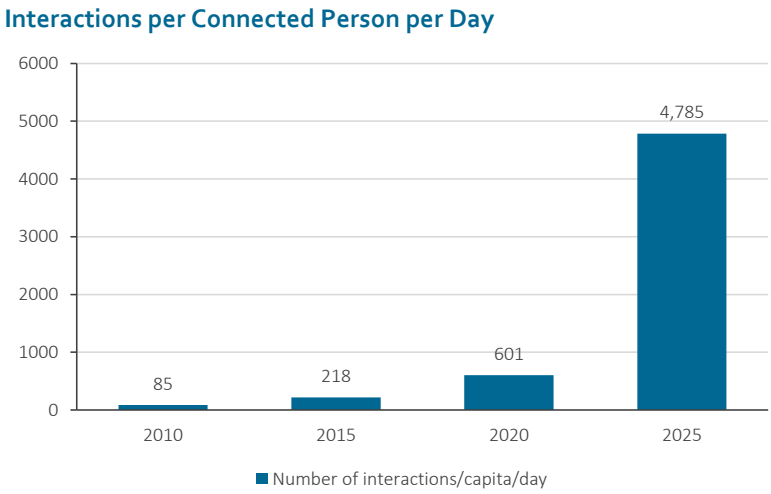
- **Data, which has enhanced our lives, is becoming business and life critical.** In the past, data has been siloed, remote, inaccessible, and underutilized. But losing a spreadsheet, while inconvenient, isn't the end of the world. Increasingly, driving down the road in a car, providing healthcare, or maintaining business continuity is making the real-time use of data a critical activity. IDC estimates that hypercritical data will grow at a 54% CAGR over the next ten years, outgrowing total datasphere growth of 30%.

Data Criticality Over Time

Data Type	CAGR 2015 to 2025
All Data. Includes all data in the global datasphere.	30%
Potenitally critical. Data that may be necessary for the continued, convenient operation of users' daily lives.	37%
Critical. Data known to be necessary for the expected continuity of users' daily lives.	39%
Hypercritical. Data with direct and immediate impact on the health and well-being of users. (Examples include commerical air travel, medical applications, control systems, and telemetry. This category is heavy in metadata and data from embedded systems.)	54%

Source: IDC's Data Age 2025 study, sponsored by Seagate, March 2017

- **Interconnected devices and IoT.** The new frontier of computing is at the edge (more on that in a bit), whereby billions of interconnected devices will in aggregate create a new distributed computing tier, where decisions made using data are made in situ rather than in today's paradigm of cloud backhaul and centralized processing. Sensor-related data represents a new class of data—data that captures actual information about, and of the world, rather than just storing human generated records.



Source: IDC's Data Age 2025 study, sponsored by Seagate, March 2017

Even back of the envelope thinking easily demonstrates the kind of scale at play—7 billion people on the planet is the theoretical TAM for smart phones, but with sensors in everything from running shoes to traffic signals, the number grows into the hundreds of billions. IDC estimates that embedded data will constitute 20% of all data created by 2020.

- **Real-time data.** The holy grail of data is to make better decisions about the future, and many real-life decisions need to be made on the fly. Businesses need to react quickly to changing conditions. Self-driving cars have to react instantaneously to objects on the road. Autonomously behaving equipment must be proactively addressed *before* failure. IDC estimates that IoT data will make up 95% of real-time data by 2025.

- **Machine Learning and Artificial Intelligence.** The combination of massive data volumes and the need for decision making agility requires the use of more advanced cognitive systems for autonomous data processing at scale. In combination with the new edge computing tier, we see nothing less than a rapidly spinning fly wheel for data generation. IDC estimates that by 2024, the amount of data subject to analysis will be 5.2 ZB, growing by a factor of 50. The amount of analyzed data interacting with cognitive systems will grow by a factor of 100, to 1.4 ZB in 2025.

- **Security.** The increasing value of data and the increasing volume of data created and processed within new applications and devices opens up a massive new attack surface, which will have to be secured. So far, we're losing that war.

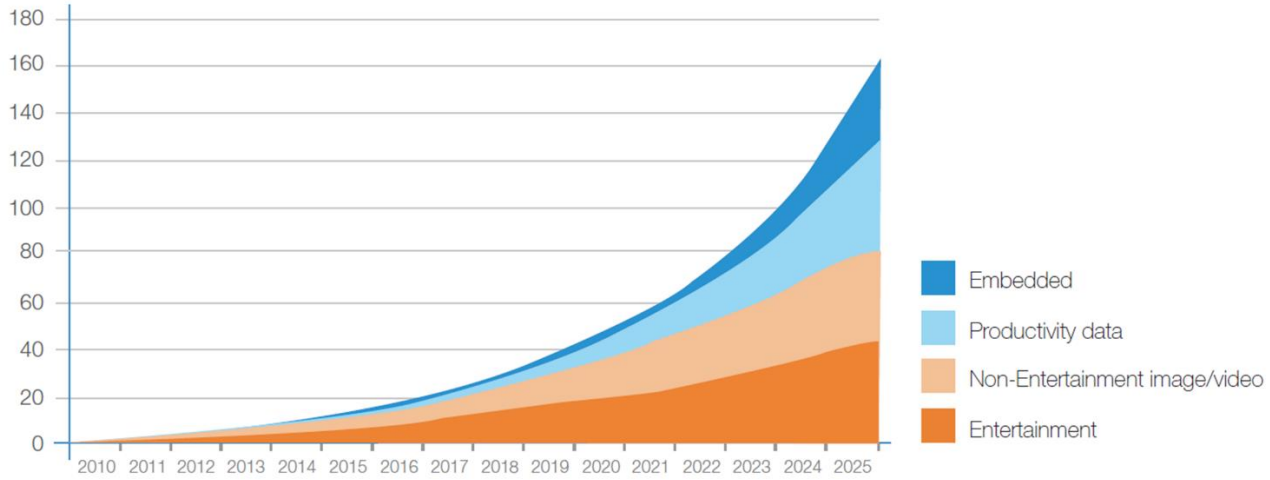
Each of these considerations points to higher volumes of data, but also richer and more valuable data content. Including network effects that we have yet to fully appreciate. Consider the vast majority of data created to date has largely been human created—in many cases the result of a human being typing into a keyboard or some other human activity. Going forward, data will be increasingly machine generated, in an autonomous fashion, and at much

faster speeds. Machine to machine communications. Sensors. Autonomous vehicles. Robots.

Or consider that to date, data stored or created has been mostly structured data—text and numbers associated with human activity. Increasingly, data collected will be an actual attempt to capture the physical and virtual world around us. Telemetry data. Vision, location, movement, and everything else about the environment. And then we'll need to create and store data that describes and categorizes that data—metadata.

To that end, the value of environmental data, whether it's for transportation, security or surveillance, sales optimization, or an industrial automation, and whether the application is commercial, medical, or military, is in having a sequential stream of data in order to provide context for prediction and decision making.

Data Creation by Type (Zettabytes)



Source: IDC's Data Age 2025 study, sponsored by Seagate, March 2017

Looking forward, we have only started to scratch the surface of the potential value creation from data analysis. As Susan Athey of Stanford recently discussed, the application of machine learning for predictive analytics is starting to classify and complex relatively simply problems—trying to predict website traffic or classify images and text—but solving more complicated business and social problems or trying to gain insight into public policy outcomes is a much more difficult task.

To solve these more dynamic puzzles—like trying to understand the impact of raising the minimum wage, predictive modelling will need to include causal inferences, particularly because so many real world problems don't come with a closed set of empirical data. Marrying pure prediction with causal inference is a more daunting challenge, but new techniques here will further drive up the value of data. Fortunately, the increasingly powerful commercial incentives will drive more and more resources towards leveraging Big Data to solve problems.

This all may sound trite and banal in the context of technology investing, and we hesitate to dive into enigmatic intangibles when building an investment

case for stocks, but if there is doubt about the value of data buried within storage company valuations, it's more important than ever to explore what's happening in the datasphere, both in terms of the aggregate growth in data volumes involved but also the dynamic activity that's driving increased data diversity and richness.

The Datasphere is Triggering Changes in the Computing Paradigm, and is Changing Storage Too

But how do we think about where and how stuff will be stored, particularly in the context of the boom in demand for flash memory technologies and rapidly changing computation modalities? As the role of data changes, this will trigger news ways in how data is stored in the context of radical changes to compute models. What is happening to storage with the rise of cloud computing and the associated massive centralization in storage and compute? What happens when compute gets pushed back out to the edge to support the internet of things?

The first chapter in this story begins with the birth of the information age in the 1960's when computing was centralized in mainframe stacks, a scarce resource concentrated within the world's most deep pocketed organizations. Starting in the 1980's, the client/server wave started to democratize computing in a distributed hub and spoke model. Over the past 15 years, the cloud/mobile paradigm has seen a reversion to centralized computing—data aggregation and processing performed in cloud data centers, but data access and use via thin and light client devices.

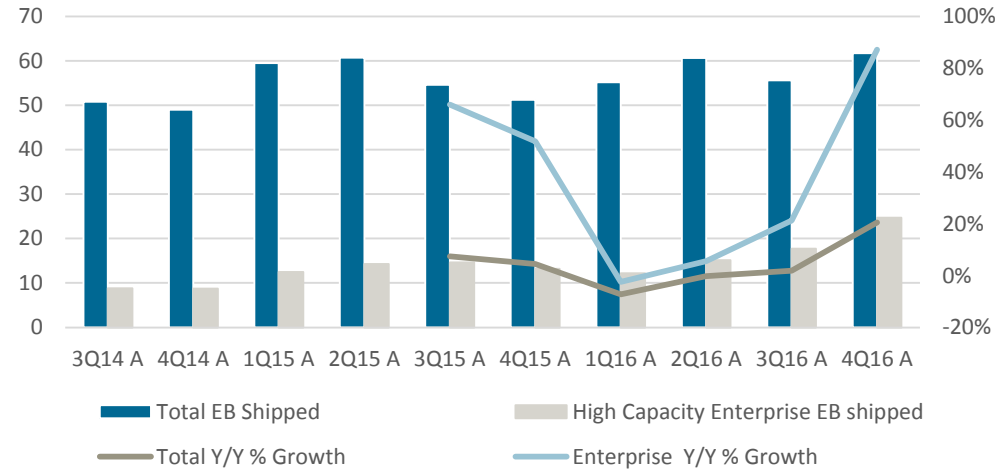
Evolution of Computing

Before 1980	1980-2000	2000-2020	After 2020
Mainframes	**Client-Server**	**Cloud-Mobile**	**Intelligent Edge**
Centralized	Distributed	Centralized	Distributed
Limited adoption—high end enterprise, government, and education	Broader enterprise adoption, some consumer	Mass consumerization; life enhancing applications	Ubiquitous adoption; life critical applications
Thousands of devices, millions of users	Hundreds of millions of devices and users	Billions of devices and users	Hundreds of billions of devices, billions of users
Strucutred data	Mostly structured	Structured and unstructured	Inreasingly unstructured

Source: BTIG, "The End of Cloud Computing" Presentation by Peter Levine of Andreessen Horowitz, December 16, 2016.

In recent quarters, even as the mobile/client edge increasingly retires HDDs in favour of thin, light and fast memory storage, we have seen the demand for higher capacity centralized storage growth. EB growth within enterprise HDDs has seen significant acceleration as Google, Amazon, Microsoft, and other cloud service providers build-out capacity for their IaaS offerings while others like Facebook build out capacity to support a wide array of new data-intensive services and applications.

The Cloud Effect—Enterprise Exabyte Growth for Seagate is Accelerating



Source: BTIG, Seagate.

Annual Cloud Capex Forecast ($m)

Cloud Capex				
($in millions)	FY15 A	FY16 A	FY17 E	FY18 E
Capex				
Apple	11,247	12,734	13,298	14,392
Google	9,915	10,183	11,725	13,079
Microsoft	5,944	8,343	10,000	11,700
IBM	3,763	3,726	3,849	3,946
Amazon	4,638	6,736	7,463	8,433
Facebook	2,523	4,491	7,250	8,505
Alibaba	1,242	1,706	2,231	2,756
Tencent	1,187	1,653	1,786	2,085
Baidu	917	877	982	1,192
Salesforce	284	464	513	583
Total	41,660	50,913	59,097	66,671

Cloud Capex Growth				
	FY15 A	FY16 A	FY17 E	FY18 E
y/y % change				
Apple	18%	13%	4%	8%
Google	-10%	3%	15%	12%
Microsoft	8%	40%	20%	17%
IBM	0%	-1%	3%	3%
Amazon	-5%	45%	11%	13%
Facebook	38%	78%	61%	17%
Alibaba	57%	37%	31%	24%
Tencent	38%	39%	8%	17%
Baidu	16%	-4%	12%	21%
Salesforce	-2%	63%	11%	14%
Total	6%	22%	16%	13%

Source: BTIG, FactSet. Bloomberg.

More and more, we'll see flash at the edge where data is consumed, either in the device (your cell phone) or in a performance tier in the data center (SSDs, all flash arrays). But below this "consumption tier" will be a centralized repository for content, mostly in the cloud, most of which we believe will be supported by HDDs.

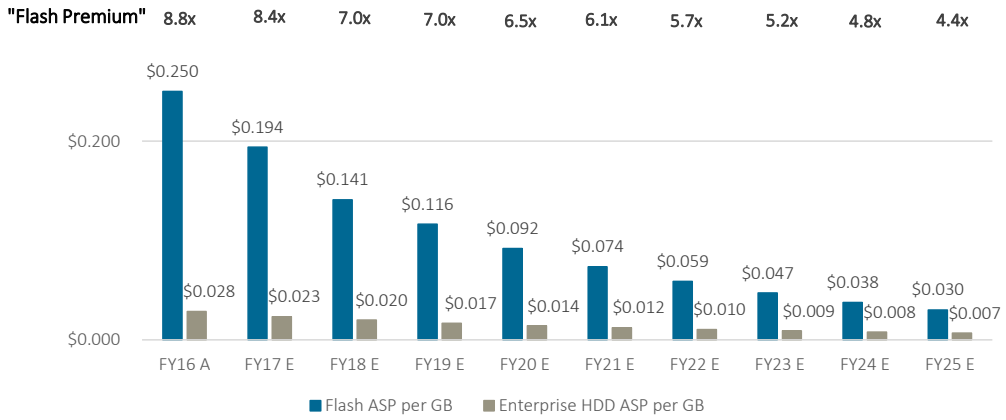
HDDs Required to Store Data Economically

Why HDDs? Because they're cheaper. In the cloud, economies of scale rule the day and the form factor restrictions that have led consumers to trade capacity for convenience don't apply. The difference of the cost of the media is close to an order of magnitude. There are power and cooling savings to be made from replacing disk with flash, but given the magnitude of the premium, we wouldn't expect memory to be widely used in capacity optimized applications.

And this isn't likely to change much. While aerial density improvements in HDD technologies have started to slow, NAND scaling is seeing significant

technical challenges that are requiring both innovation and increased capital investment to overcome. Based on current trends, a meaningful gap between the two should persist for years to come.

Flash Memory Will Be at a Price Premium for a Long Time



Source: BTIG, Gartner.

Livin' on the Edge—A Generational Shift in How We Process Data

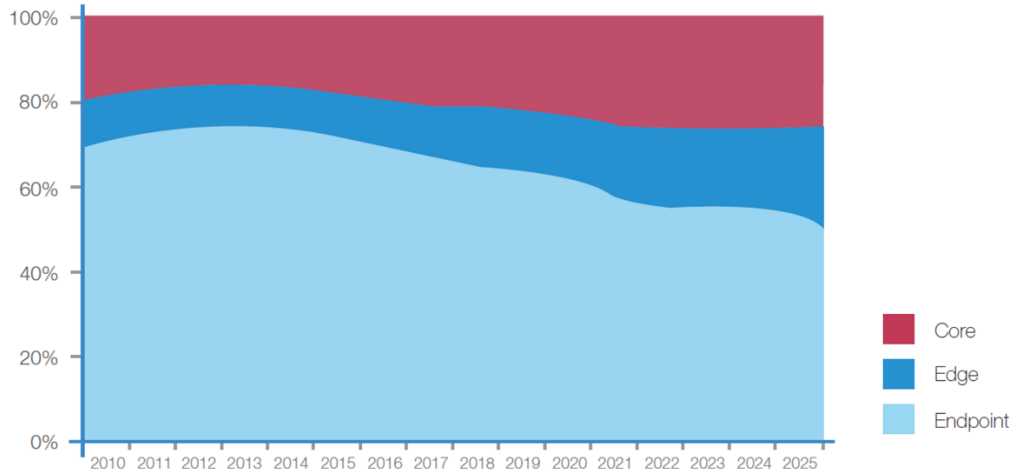
What's next? The rise of real-time data processing and decision making at the edge, driven by IoT and enabled by Machine Learning and AI and the sustained cost reductions in hardware and connectivity, is leading to yet another radical shift in the computing paradigm.

While we don't think this necessarily spells the end of cloud computing, as Peter Levine of Andreessen Horowitz has proposed, a new distributing computing tier is emerging. Devices on the edge—industrial equipment and manufacturing, autonomous cars and drones, surgical robots, jet engines, street signs, kitchen appliances, self-cleaning toilets, you name it, and the interconnected embedded systems therein, in aggregate represent a new layer of computing that will have to act and make decisions autonomously.

At the edge, agility is prioritized over power and performance, because machines will need to sense (cameras, radar, accelerometers, and other sensors collecting data about the environment or the device), infer (analyze the data to understand something useful, often with Machine Learning), and act (do something useful in order to affect future outcomes), all in a rapid feedback loop.

Because of the short response requirements for devices acting dynamically and autonomously at the edge, according to Levine, this new processing tier at the edge represents another pendulum shift away from the cloud-centralized computing modality of today's world.

Accelerating Towards the Edge (% of Data Created)



Source: IDC's Data Age 2025 study, sponsored by Seagate, March 2017.

What are the implications for infrastructure? Regarding high performance computing at the edge, an additional factor is that Moore's law is decelerating. This means that we won't achieve high performance by using traditional CPUs shrunk to ever smaller dimensions, but with purpose driven silicon optimized for applications like computer vision and deep neural networks. It's an interesting opportunity for start-ups in the chip space, since Intel (INTC, Not Rated) doesn't have a natural strangle-hold on these markets. Clearly Nvidia and maybe FPGA manufacturers like Xilinx (XLNX, Not Rated) have designs on this space as well.

Clearly, high performance and increased computing agility will require faster access to data, not only by keeping data locally on the device but also in memory, either in DRAM, NAND, or new classes of memory like 3D Crosspoint or ReRam. But data generation begets storage requirements. With increasing deployment of high performance computing applications at the edge, the cloud will be used for centralized learning in those applications because the need to learn from the aggregate of all data across edge devices. Thus, we see this as a new market and not something that will cannibalize cloud usage in the same way client-server disrupted the mainframe business or in the same way mobile brought the PC market to its knees.

Machine Learning—Learning on Storage in the Cloud

Think about what Machine Learning really means. In layman's terms, ML is the use of data to define a software program's behavior instead of using explicitly programmed (human designed) rules. The advantage is that the resulting system scales to handle more complex scenarios than could be handled by a "hand crafted" human designed program.

A canonical example is image recognition. Imagine if you are trying to determine the objects present in a visual scene, given an unstructured pixel image as input. It's impossible for a programmer to explicitly design a program that will do this accurately. Instead, the best approach is to first collect a training data set in which millions of images are labeled with metadata that describes the location and type of objects present in the image. This data is fed

into a machine learning system which generalizes from these examples. Under the hood, the system automatically adjusts a model with millions of parameters until the model "fits" the training data. The resulting model is then able to take raw image input and produce structured metadata describing the objects in the scene in the same format specified by the training data set.

One can use the same basic approach of fitting a complex model to training data in many different application areas. Many other "prediction scenarios" will be increasingly handled in this way. Often the main challenge when deploying ML is obtaining a sufficiently representative training data set in the first place, and from a commercial perspective this is really the main barrier to entry. The actual ML techniques themselves have been considered "black magic" in the past, but over the next few years we expect them to become open sourced and commoditized, which will support widespread application of ML. The point here is that the application of ML at the high performance edge requires a heavy data footprint, a valuable and differentiating resource in itself, which will need to be supported by cost optimized volumes of centralized storage in huge quantities.

The Cloud Will Support and Augment, Not be Replaced by, the Intelligent Edge

There are plenty of new cloud applications that we think will continue to drive growth and don't require super high performance edge devices. The move towards AI personal assistant driven e-commerce is one possibility ("hello Alexa"), but there are many examples across a number of industry verticals. For many applications, responses from the cloud will arrive with low enough latency that will obviate the need for dynamic decision making within edge devices.

For example, verticals like health care, finance, retail (and probably many others) will be big consumers of cloud for ML/AI. Many health care applications won't need HPC at the edge because the decision loop happens on a longer time scale than self-driving cars (unlike needing split second processing to swerve around a stray cat crossing the street, medical professionals can upload genetic sequences or radiological images and wait a few seconds for the analysis).

Even more simply, even with dominance of the memory tier at the edge, some data will need to be retained on lower cost storage. Think of a camera on a drone, recording high definition video. The memory capacity on board can hold minutes or even hours of data, but not hundreds or thousands of hours. The only way to retain data economically at present is to off load to disk.

The Undiscovered Country—Thinking About New Applications

Accordingly, storage is both an enabler of the higher performance edge and a consequence of it. Either way, storage is a fundamentally crucial part of the infrastructure that will support the datasphere. Of course, this will encompass HDDs, SSDs, memory, software, systems, and new architectures to make it all tick, and the mix of these technologies is important and relevant. But what's more interesting in our view is the new applications and capabilities it will enable.

While it may require some imagination beyond the 90-day reporting cycle, and things will play out in unforeseen ways, our conclusion is that the demand for data storage will continue in a sustainable way. Cloud service providers are clearly the most identifiable source of this demand today, but if data is of long-run strategic value to our economy and indeed to our broader society, what other unknown sources of TAM could arise?

This will likely result in new applications of data storage, with increasing design considerations for retaining data closer to and in support of the intelligent edge, including those that involving rotating media, and indeed new ways and form-factors for deploying this media.

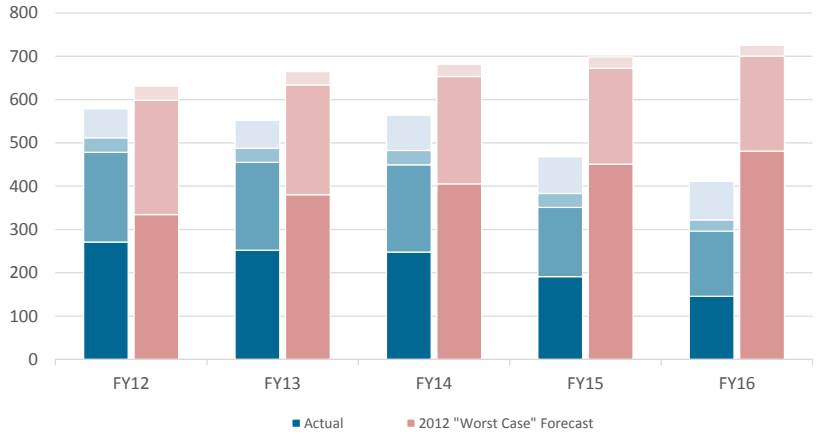
Take for example the concept of the "collection view" of data center disk storage. In a recent White Paper, Google forecasts future requirements for data storage and proposes alternative design options. Specifically, they introduce the concept of "the collection view," a design philosophy based on the notion that disks will increasingly be deployed as a large collection and thus efforts should be made to optimize the aggregate of a group of disks' properties (e.g., resiliency via optimized redundancy, performance, capacity, latency, and cost), with less regard for individual disks. According to Google, a new era of "data center disks" is approaching, noting that the demand for cloud storage far outpaces the "considerable" rate of innovation of disks and that exponential growth in demand implies that most disks in the future will be deployed in data centers.

We can't formulate with precision how this will play out, but it does bring us back to data growth, which is the single biggest factor that drives our bullish stance on storage media as an industry, inclusive of disk and flash.

How Much, How Fast, and Where?

Wall Street remains unconvinced that the HDD industry will participate in the data growth boom, with many likely to suggest that the "datasphere" of 2025 will leave HDDs far behind. This is because annual HDD unit numbers have fallen close to the ~400 million mark, levels that would have been considered a doomsday scenario just a few years ago (see below for a comparison of Gartner's 2012 "Worst Case Scenario" unit forecast vs. actuals). Unit volumes are off a stunning ~40% from the 650 million mark reached in 2010. So it's understandable that a great number of investors conclude that the industry is "structurally challenged," to say the least.

Known Unknowns—2012 "Worst Case Scenario " Forecast vs. Actual (Millions of HDD Units)

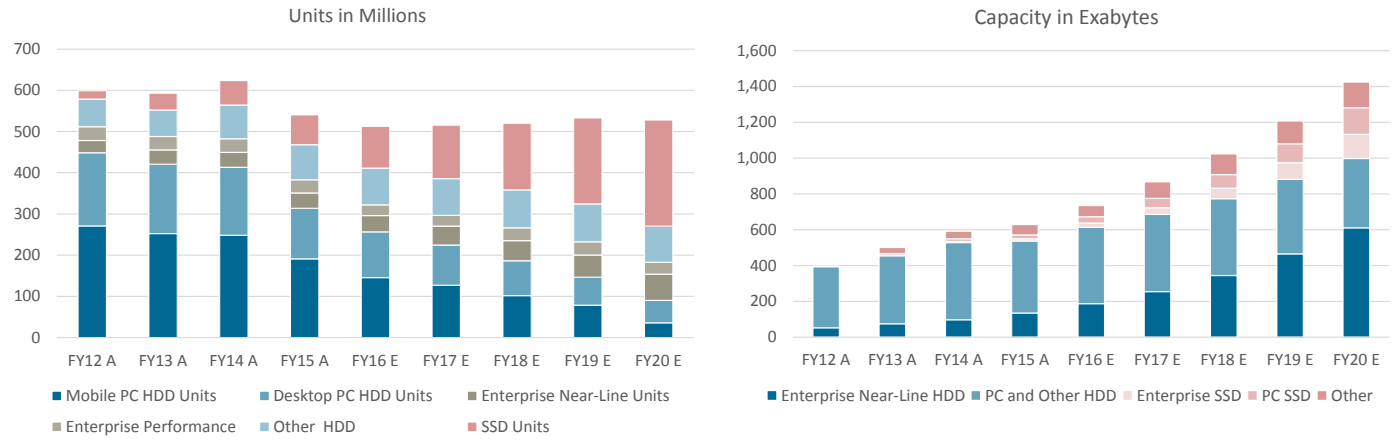


Source: BTIG, Gartner.

However, we think it's the wrong conclusion. Nothing that we suggest in this report is particularly novel or complicated. Thinking about disk drives and flash memory coexisting as complementary technologies is actually pretty straightforward when put on paper, but for some reason continues to be hard for many to get comfortable with. Not only for the reasons above but also because Zettabyte-scale data forecasts have been out there for years while HDD shipment numbers have mostly disappointed quarter after quarter.

Looking at Exabyte (and soon to be Zettabyte) shipments helps paint a better picture of the health of the HDD market. While we believe units will continue to decline, HDD bit share will be significantly higher than memory for the foreseeable future, on our view (we project bit parity in 2025).

Time to Start Tracking Bits and Stop Counting Spindles



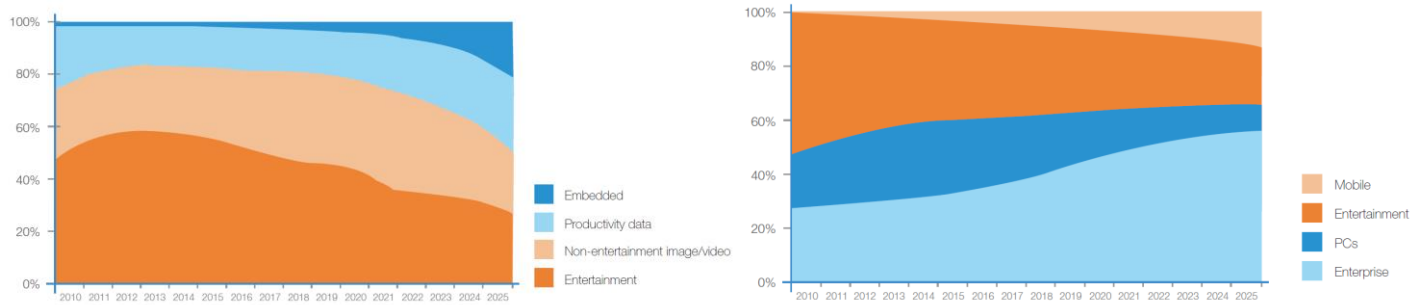
Source: BTIG, Gartner.

How Much Data and Where—The Demand Side of Storage

But how much and where? There are two ways to looks the distribution of storage bits between HDD and memory, demand side and supply side. First, looking at the demand side. By 2025, embedded data and productivity data will constitute almost half of all data created, increasing from around 20%

today. Increasingly, however, less data will be actually stored at the edge, and major trends including mobile, social, Big Data analytics, high definition video, and cloud computing are driving increased data storage in enterprise and cloud environments.

Data by Type vs. Where Data is Stored (% of Data Created)



Source: IDC's Data Age 2025 study, sponsored by Seagate, March 2017.

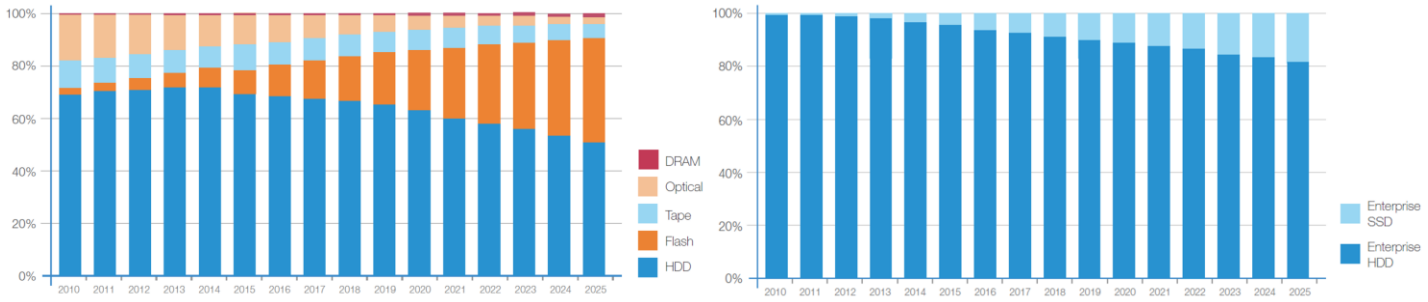
Memory has massive advantages in speed and agility over disk, and therefore will be the dominant storage media of the intelligent edge. But the edge will represent a minority share of where data is actually stored.

The last complication to consider when thinking about data storage is the amount of data that will be retained vs. the amount of data that can be discarded after use. The vast majority of real-time data will be discarded after it's been used and transferred. Streaming services will rely on storing metadata—knowledge about the event that occurred and the data employed—rather than the data itself. IoT data likewise will be retained as long as it is useful, with smart criteria determining which data, how long, and in what form it should be retained.

This is because there isn't enough storage on the planet to retain the datasphere. As IDC points out, it would take 16 billion of today's highest capacity 12TB enterprise HDDs to store the 163ZB datasphere expected in 2025. Or more than a billion HDDs to store today's datasphere. This compares to the 43M near-line drives shipped in 2016 at an average capacity of only 5TB and a total of 8 billion units the HDD industry has shipped over the past two decades.

Still, the amount of data that will be retained in storage is vast. IDC estimates that the storage shipments inclusive of HDD, flash, tape, and memory over the next four years will surpass 5.5 ZB shipped across all media types over the last 10. To keep up with storage demands through 2025, IDC estimates that 19 ZB must ship in aggregate over the next eight years.

Data by Type vs. Where Data is Stored

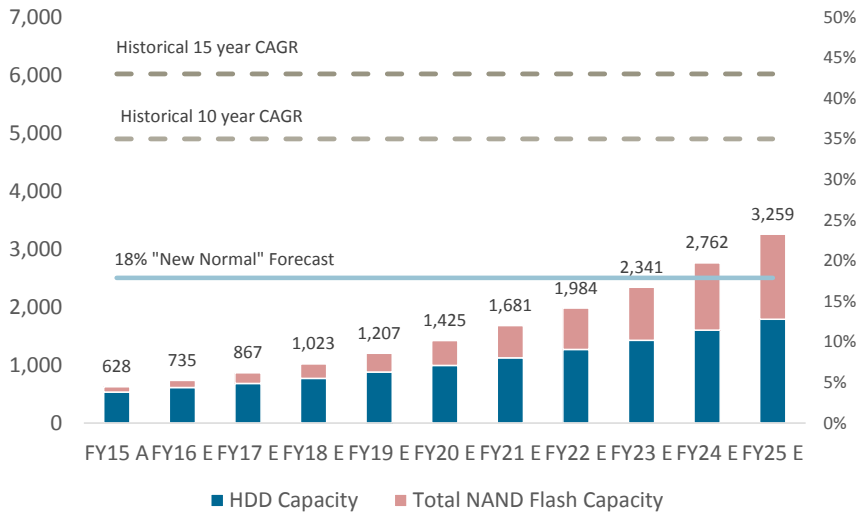


Source: IDC's Data Age 2025 study, sponsored by Seagate, March 2017.

Further, most of the ZB growth in NAND flash comes from the shift away from optical media as we consume less digital content via optical disk. HDD as a percentage of bits still constitutes about 50% of storage shipments in 2025, with Enterprise HDD constituting more than 80% if the enterprise HDD/SSD mix.

This forecast, at least directionally, reflects trends incorporated into our own HDD bit mix forecasts, which conservatively reflects below trend data growth of 18% (HDD plus NAND bit shipment combined).

The "New Normal" of 18% Data Growth, 1.8ZB HDD by 2025



Source: BTIG

At two cents a Gigabyte (down from ~$0.04 today), we're looking at HDD industry revenue figures that are $20-30 billion. Seagate's management team has talked publicly about an opportunity that is $30-40 billion based on 1.5-2.0 Zettabytes of HDD storage, which is higher than assumptions underlying our modelling but possible on not unreasonable data growth rates (and certainly not higher than historical trend).

While the Street doesn't publish numbers this far, our conversations with the investment community suggest that consensus is likely below the $20 billion mark in 2020, with rapid declines thereafter. Again, easy to forecast when modelling unit TAM collapsing 15% year on year, but ultimately incorrect, in

our view, if one thinks about the increasing value and growth of data from a bit perspective.

Our conservative base case capacity growth forecasts of 18%, yielding about a Zettabye in HDD demand in 2020, equates to about $9 billion in HDD revenue for Seagate at current ~40% market share, consistent with our unit model of 130 million units at $70 ASP. Higher capacity growth forecast of 27%, above trailing five year trend but below 10 and 15 year trend, could add a billion in revenues for both Seagate and Western Digital.

Making reasonable assumptions on market share, non-HDD contribution, gross margin, opex, and other items like share count, our capacity modelling suggests F2019 will see earnings power in the $4.00-$6.00 range and F2020 in the $5.00-$7.00 range if we're in the ballpark in terms of Zettabyte scenarios. Data growth closer to the view of Seagate and other third party groups like IDC and Gartner would suggest upside to this number, as well as scenarios where Seagate gains meaningful market share if Toshiba exits the business. This compares to sell-side consensus which of $4.50 in EPS power, which has been upwardly revised from ~$3.00 following Seagate's strong December quarter.

Capacity Model F2020 EPS Sensitivity

		Exabyte Growth (5 Year CAGR)				
		F2020 EPS Sensitivity Gross Margin Assumption: 30.5%				
		18%	19%	21%	22%	24%
ASP Decline (5 Year CAGR)	(20%)	$2.25	$2.72	$3.22	$3.74	$4.25
	(18%)	3.20	3.73	4.29	4.88	5.46
	(16%)	4.24	4.85	5.48	6.14	6.79
	(14%)	5.39	6.07	6.78	7.53	8.26
	(12%)	6.66	7.42	8.21	9.05	9.87

		NPV Stock Sensitivity on 10x F20 EPS Gross Margin Assumption: 30.5%				
ASP Decline (5 Year CAGR)	(20%)	$19.30	$23.34	$27.59	$32.05	$36.42
	(18%)	27.43	32.00	36.81	41.86	46.80
	(16%)	36.39	41.55	46.97	52.67	58.24
	(14%)	46.25	52.05	58.15	64.56	70.83
	(12%)	57.07	63.57	70.42	77.61	84.64

		12 Month Upside from current price ($38) Gross Margin Assumption: 30.5%				
ASP Decline (5 Year CAGR)	(20%)	-49%	-39%	-27%	-16%	-4%
	(18%)	-28%	-16%	-3%	10%	23%
	(16%)	-4%	9%	24%	39%	53%
	(14%)	22%	37%	53%	70%	86%
	(12%)	50%	67%	85%	104%	123%

Source: BTIG

How Much Data and Where—The Supply Side of Storage

If HDDs are indeed structurally challenged, and if one subscribes to the "datasphere" thesis as proposed here, then other technologies (primarily memory) will necessarily have to pick up the slack. For this to happen, massive amounts of additional capital will be required to build new foundries. While we expect investment in memory to continue, especially if the Chinese successfully develop or obtain the requisite IP to enter the market in a

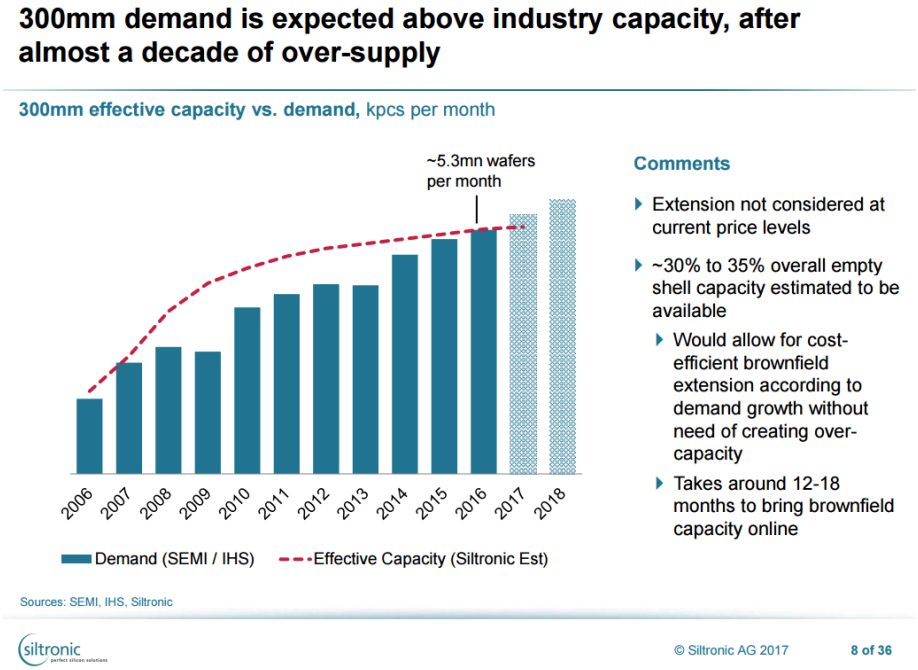
meaningful way, it's important to be mindful of the degree of capital we're talking about.

Using rough numbers, assume that building a factory capable of ~10% of today's global output (125 thousands wafer starts per month) would equate to capital input of ~$7 billion at *leading* edge production, and a multiple of that at lagging processes. While new fabs continue to be built, this is a huge barrier, particularly given the types of financial leverage already deployed across the industry. To put it in other terms, on the back of the same envelope, a bearish outlook on the HDD industry implies an expectation that ~$70 billion of incremental capital will be made available to supply the HDD bit shortfall with memory bits. And this assumes that consumers of storage are willing to pay a significantly higher ASP per GB in order to insure a return on that investment to the suppliers of capital. That is a big assumption.

Then there's Moore's law. Lagging 3D yields has demonstrated the technical difficulties in driving scaling, and it's unlikely that cost reductions going forward can keep up with historical trends. This certainly means that the old days of 80% bit growth are long gone, with 30%-40% likely the new normal. This new cost reduction paradigm means less incentive to deploy incremental capital for new geometries and more incentive to make current ones more profitable.

Then there's silicon supply and demand from other technologies. Memory consumes about half of the global silicon wafer market, which has not been able to keep up with demand—wafer suppliers have all noted a shortage of silicon, with inventory falling and as allocation is being carried out as orders outpace production.

Raw Wafer Capacity in Short Supply



Source: Siltronic AG

To boot, CPU, GPU, networking, and other consumers of silicon are seeing demand from the very same drivers behind the growth of storage in the datasphere. It turns out GPUs used for ML applications consumes a lot of silicon, yielding a relatively small number of chips per wafer. Meanwhile hyperscale build outs continue with increasingly dense configurations of compute and storage. And overtime IoT, sensors, and connected devices represent additional demand for silicon.

Then you have to consider ROI. Contrary to popular belief, ramping memory production is (at least partially) a function of ROI, which can be a complicated formulation at the intersection of technology, process transition, yield, pricing, and market demand. But in simplest terms, as Enzo Ferrari said, "you should always build one less car than the market demands." The entire history of the memory market has been defined by manufacturers walking a tightrope between undersupply and oversupply given the implications of volatile pricing against high fixed costs. Barring an unforeseen technology breakthrough in an industry that has actually seen declining returns on investment, it would be wildly irrational for the memory vendors to spend additional billions of dollars to dramatically increase flash supply because of the negative impact it would have on pricing and therefore ROI.

Indeed, the behavior of memory manufacturers seems to reflect a change of heart. Some of this could be due to external factors to become more profitable (unprofitable nuclear power reactors, faulty smartphones, alleged bribery charges, activist investors), but it's not a stretch to imagine profit generation being more of a focus than in prior years.

Net, the extent to which HDDs are structurally challenged by the growth of NAND flash as an alternative is bounded by how much global capital is available for investment at dubious levels of ROI. The proliferation of SSDs in data center applications, the falling cost of NAND, the increasing capacity from 3D NAND, and exciting new applications can all be true at the same time HDDs makers grow annual output to a Zettabyte and beyond.

A Thought Experiment—Might Storage Be a Secular Growth Business?

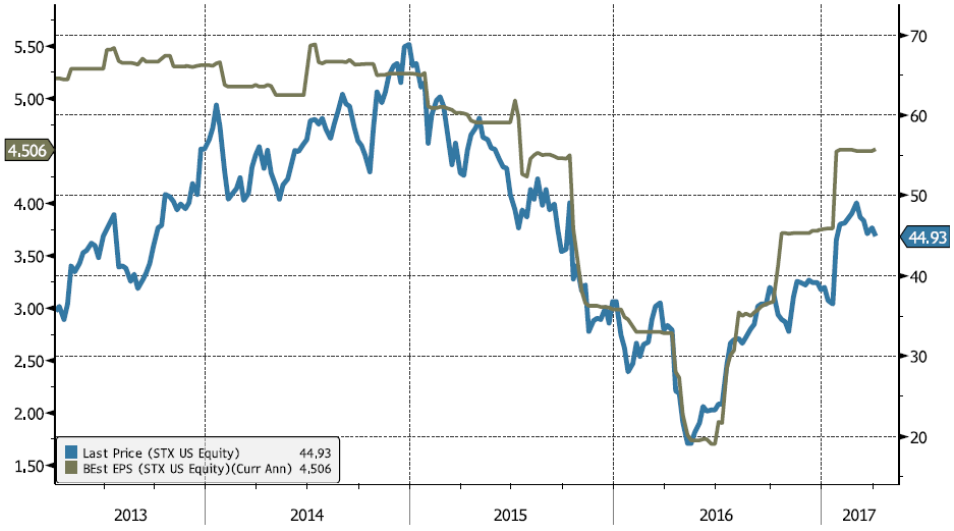
We believe that we are on the frontend of a big transformation in how we use data, both in business and in daily life. As IDC proposes, data is becoming increasingly critical to more and more activities. This will sustain data growth well into the Zettabyte range in the years to come. But what's more interesting is all of the ways data itself is becoming more valuable. There are many opportunities for companies to drive and benefit from this value creation, as we're already seeing today. For example, our colleague Abhinav Kapur recently upgraded Adobe based on its role in helping customers come to grips with their digital transformations. BTIG's media analyst Rich Greenfield recently upgraded Facebook based in part increasing success with its video strategy and monetization effort and recently opined on how Netflix has a competitive advantage in better video compression technology, which is critical in driving a better user experience as consumer consume more and more high definition video.

However, while the "data thesis" isn't controversial, and is in fact driving the valuations of many successful businesses, we think that the role storage plays as an enabler of value is still widely disputed. Simply put, there is no other way to store the type of data that will be created economically without HDDs, something not fully reflected in investor thinking.

Back to the original question we raise about the value of storage not being recognized in HDD stocks. Here's a thought experiment. Assume for just a moment—

- That storage is a secular growth business tied to the increasing value in data.
- That Wall Street assessed storage stocks based on this long-term secular outlook, not on a 90 day reporting cycle or the vicissitudes of seasonal change in demand, PC trends, or lumpiness in cloud service provider spending.
- That stock action wasn't tied to a narrow outlook, where a particularly bad quarter and a near-term annual EPS outlook of $2.50 (C1Q16) followed by several good quarters and an upwardly revised outlook of $4.50 (C4Q16) didn't drive STX to $19 then to $45 over a ten month period.
- That the future of data doesn't change that radically in just three quarters.

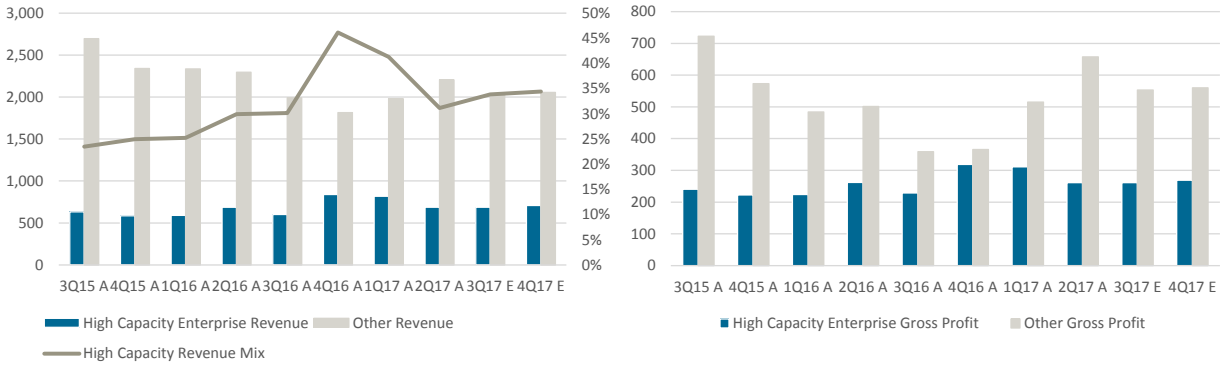
Historical Consensus EPS Estimate (L) vs. STX Price Performance (R)



Source: Bloomberg

Ok. Now consider Seagate's high capacity ("Nearline") enterprise storage business. On a capacity shipment basis, EB growth was 63% in C16, equating to roughly $2.7 billion in revenue. This reflects high capacity revenue growth of ~15% versus the rest of the business, which was down about 25%, and expansion of enterprise revenue mix from 21% to 32%. Gross profit contribution, by our rough estimation, could already be approaching 50%. Clearly, this reflects a tale of two cities—one of growth and one of decline.

Seagate—Stripping Out the Near-Line Business ($ in Millions)



Source: BTIG, Seagate, and Gartner.

For the sake of our thought experiment and applying a valuation framework reflective of the "data thesis"—let's say a high teens multiple (well below leading software and data stocks)—to the now roughly 1/3 of Seagate's business (at 38% gross margin estimate and proportionate opex, other income, and tax rate) that is helping to fuel the bourgeoning datasphere, we get to $35-$36 per share.

At today's stock price of $45, that implies the rest of the business is worth ~$9 per share, which is something that investors get at ~4x earnings. The rest of the business encompasses PC, mission critical HDD, DVR, and gaming, devices that we expect to continue to decline. But it also encompasses external drives, surveillance, and systems, businesses that should continue to be relevant or even grow going forward. Don't forget that this business is effectively a duopoly.

Thought Experiment—Applying a Secular Growth Valuation Framework

$ millions, except per share	F2017	F2018	Comment
Nearline EB shipments	91	112	2H17 0% Q/Q growth, F18 Y/Y 23% growth
ASP	$0.033	$0.028	15% decline
Nearline revenues	3,007	3,137	4% growth
Gross profit	1,143	1,192	GM undisclosed, enterprise portfolio
Gross margin	38%	38%	carries 30-50% gross margins
Opex	491	484	Proportional to rest of biz
as % of revenue	16%	15%	
Operating profit	652	708	
Operating margin	22%	23%	Higher than consolidated ~14% OM
Other income	(35)	(35)	Proportional to rest of biz
Pretax income	616	672	
Taxes	38	41	
Tax rate	6%	6%	Proportional to rest of biz
Net income	578	631	
Nearline EPS	**$2.01**	**$2.23**	
Shares	288	283	Premium multiple compared to historical,
Multiple	18.0x	16.0x	although at a meaningful discount to
NL value per share	**$36.20**	**$35.64**	other secular data growers
Rest of business, implied	$9.40	$9.96	
Implied multiple	3.7x	4.3x	Investors get the remained of the biz for 4x

Source: BTIG

In conclusion, is it possible that Wall Street continues to miss that the enablers of data value are valuable? We believe both Seagate and WD are underappreciated ways to invest in the data opportunity. Unlike their enterprise storage systems brethren, these companies are vital in enabling and unlocking value in the datasphere in an economically compelling way.

Near-Term Outlook

Seagate's December quarter results reflected impressive execution on both cost reduction and product portfolio realignment fronts and again was indicative of the structural bull thesis—sustained HDD bit growth demand as the industry transitions from lower margin, low capacity client use cases to higher margin, high capacity cloud and enterprise deployments. But more importantly, at least from a stock perspective, positive trends are now starting to materialize in much improved near-term earnings outlook. C2017 EPS guidance of "at least" $4.50 was meaningfully above consensus outlook of $3.80 and prior indication of $3.75-4.00, and a major reversal from the $2.50 provided last May when the perception was that the sky was falling. The world is changing the way it consumes digital storage, from client/server to cloud/mobile, and HDDs are very much part of this new paradigm. Costs continue to come out of the business, factory utilization is back at healthy levels, pricing is stable, gross margins are at post-flood highs (32%, vs. F2016 of 25%), and revenue mix continues to move away from PC (24% of total). Perhaps most telling, Seagate appears poised to deliver revenue growth in CY17 on double digit capacity growth despite unit numbers that continue to dwindle.

We think investor attention is still on sustainability of trends, particularly in the CSP segment, where admittedly visibility is limited, but we see several factors that should help mitigate lumpiness, including a broadening/diversification of CSP customers, increasing secular demand for IaaS services, and emergence of a refresh cycle. Furthermore, Seagate continues to pivot the product portfolio towards a wider range of high capacity applications beyond this segment (surveillance, gaming, DVR etc.).

STX's most recent outlook called for typical seasonal patterns in calendar 1Q, implying stronger 2H trends relative to 1H. Calendar 2017 should see HDD capacity growth comfortably in double digits, which will contribute to y/y revenue growth after two years of declines. We assume high capacity EB growth to be flat sequentially in 1H off a very strong 2H16, with an improvement in 2H. WDC provides less visibility into HDD mix, but we expect similar trends, with overall topline aided by continued strength in the memory market.

Valuation

We model ~$4.50 in run-rate earnings power, which yields a $55 PT based on 12x. We think there is room for upside to this number moving forward, particularly as our 29% gross margin assumption could be conservative given how mix is likely to trend, but note this is hard to forecast from quarter to quarter with precession.

STX Estimate and Valuation Summary

Seagate BTIG Est. Summary	Jun-17	Jun-18	Jun-19	Jun-20
($ in millions, except per share)	FY17 E	FY18 E	FY19 E	FY20 E
Revenue	$11,169	$11,265	$10,676	$10,095
TAM	426.0	378.3	337.8	269.2
Units	152.4	145.0	134.8	125.5
ASP	67.5	71.2	71.9	72.6
Operating income	1,564.5	1,527.0	1,476.3	1,553.3
EPS	4.56	4.53	4.42	4.76
FCF	1,563.6	1,812.9	1,704.7	1,750.2
Capex	455.1	450.6	427.0	403.8
Year over year growth				
Revenue	*0.1%*	*0.9%*	*(5.2%)*	*(5.4%)*
Units	*(9.8%)*	*(4.9%)*	*(7.0%)*	*(6.9%)*
Operating income	*71.5%*	*(2.4%)*	*(3.3%)*	*5.2%*
EPS	*101.2%*	*(0.7%)*	*(2.2%)*	*7.7%*
FCF	*43.1%*	*15.9%*	*(6.0%)*	*2.7%*
Valuation Summary				
EV/Revenues	1.4x	1.4x	1.5x	1.6x
P/E	**9.9x**	**10.0x**	**10.2x**	**9.5x**
P/E ex cash	**11.7x**	**11.8x**	**12.0x**	**11.2x**
EV/FCF	10.2x	8.8x	9.3x	9.1x
P/FCF	8.6x	7.3x	7.6x	7.3x

Source: BTIG

BTIG Data and Cloud Infrastructure Comparables ($ in millions, except per share data)

Company Name	Ticker	Rating	Recent Price	Price Target	Implied Return	Market Cap.	P/E		EV/SALES		EV/EBITDA		EV/FCF		Rev. Growth		FCF Margins	
							FY1	FY2	FY1	FY2	FY1	FY2	FY1	FY2	FY1	FY2	FY1	FY2
Data Infrastructure																		
Nimble Storage, Inc.	NMBL	NEUTRAL	$12.50	NA	NA	$1,102	NM	NM	1.9x	1.6x	NM	NM	NM	NM	25%	19%	(10%)	(5%)
NetApp, Inc.	NTAP	NEUTRAL	$41.65	NA	NA	$11,704	15.3x	12.6x	1.4x	1.4x	5.8x	5.1x	7.4x	5.7x	4%	1%	19%	24%
Nutanix, Inc. Class A	NTNX	NEUTRAL	$18.15	NA	NA	$3,412	NM	NM	4.1x	3.1x	NM	NM	NM	NM	67%	35%	(4%)	3%
Pure Storage, Inc. Class A	PSTG	BUY	$10.18	$14	38%	$2,749	NM	NM	2.2x	1.7x	NM	NM	NM	NM	38%	31%	(0%)	7%
Data Infrastructure Average							**15.3x**	**12.6x**	**2.4x**	**1.9x**	**5.8x**	**5.1x**	**7.4x**	**5.7x**	**33%**	**22%**	**1%**	**7%**
Storage Systems and Media																		
Seagate Technology PLC	STX	BUY	$45.30	$55	21%	$13,499	9.9x	10.0x	1.4x	1.4x	6.8x	6.9x	10.2x	8.8x	0%	1%	14%	16%
Western Digital Corporation	WDC	BUY	$82.14	$85	3%	$24,149	10.1x	9.2x	1.7x	1.7x	6.5x	6.2x	14.9x	11.4x	44%	(1%)	11%	15%
Micron Technology, Inc.	MU	NA	$28.64	NA	NA	$33,222	6.8x	5.7x	2.0x	1.8x	NA	NA	NM	NA	58%	9%	(21%)	NA
Storage Systems and Media Average								**8.3x**	**1.7x**	**1.7x**	**6.6x**	**6.5x**	**12.5x**	**10.1x**	**34%**	**3%**	**1%**	**16%**
Tech Benchmarks																		
Apple Inc.*	AAPL	BUY	$143.70	$165	15%	$765,633	17.3x	16.1x	3.6x	3.4x	11.1x	10.9x	15.2x	13.3x	6%	8%	23%	24%
Cisco Systems, Inc.	CSCO	NA	$33.58	NA	NA	$169,243	14.2x	14.1x	2.7x	2.7x	7.7x	7.9x	10.6x	NA	(2%)	2%	25%	26%
Hewlett Packard Enterprise Co.	HPE	NA	$17.57	NA	NA	$30,616	9.2x	9.2x	0.7x	0.7x	4.3x	NA	20.1x	NA	(6%)	0%	(3%)	5%
International Business Machines	IBM	NA	$174.50	NA	NA	$166,246	12.8x	12.7x	2.5x	2.5x	10.5x	10.2x	14.9x	NA	(2%)	(0%)	14%	15%
Intel Corporation	INTC	NA	$36.16	NA	NA	$176,497	13.3x	12.9x	3.1x	3.1x	8.2x	7.5x	15.2x	NA	1%	3%	16%	19%
Microsoft Corporation	MSFT	NA	$65.55	NA	NA	$513,257	22.0x	20.1x	4.9x	4.7x	13.1x	12.4x	18.3x	16.4x	5%	8%	26%	27%
Oracle Corporation	ORCL	BUY	$44.61	$47	5%	$187,540	16.9x	15.6x	4.9x	4.8x	11.0x	10.7x	15.1x	14.6x	2%	5%	33%	32%
SAP SE Sponsored ADR	SAP	NA	$98.21	NA	NA	$117,754	24.0x	21.9x	5.2x	4.8x	16.0x	14.5x	30.4x	NA	9%	7%	17%	18%
Tech Benchmarks Average							**16.2x**	**15.3x**	**3.5x**	**3.3x**	**10.2x**	**10.6x**	**17.5x**	**14.8x**	**2%**	**4%**	**19%**	**20%**
Total					**17%**		**14.3x**	**13.3x**	**2.8x**	**2.6x**	**9.2x**	**9.2x**	**15.7x**	**11.7x**	**17%**	**9%**	**11%**	**16%**

*Apple Inc. (AAPL, Buy, $165 PT; Analyst: Walter Piecyk)

Source: BTIG, FactSet

Note: Market data as of April 03, 2017. Estimates reflect forward fiscal year.

Capacity Model "New Normal" Base Case

Capacity Model (in millions, unless otherwise stated)	FY11 A	FY12 A	FY13 A	FY14 A	FY15 A	FY16 E	FY17 E	FY18 E	FY19 E	FY20 E	FY21 E	FY22 E	FY23 E	FY24 E	FY25 E	FY26 E
Base Case																
Capacity (EB)																
HDD	355.1	393.7	454.5	527.5	536.6	613.1	685.0	772.5	881.4	997.3	1,126.4	1,269.6	1,427.9	1,602.0	1,792.6	1,999.9
Flash	20.3	32.7	45.5	64.0	91.5	121.7	182.1	250.7	326.0	427.4	554.8	714.1	912.9	1,160.1	1,466.7	1,846.1
Total	375.4	426.4	500.0	591.5	628.1	734.8	867.1	1,023.2	1,207.4	1,424.7	1,681.1	1,983.7	2,340.8	2,762.2	3,259.3	3,846.0
Growth																
HDD	19%	11%	15%	16%	2%	14%	12%	13%	14%	13%	13%	13%	12%	12%	12%	12%
Flash	90%	61%	39%	41%	43%	33%	50%	38%	30%	31%	30%	29%	28%	27%	26%	26%
Total	22%	14%	17%	18%	6%	17%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Mix																
HDD	95%	92%	91%	89%	85%	83%	79%	76%	73%	70%	67%	64%	61%	58%	55%	52%
Flash	5%	8%	9%	11%	15%	17%	21%	25%	27%	30%	33%	36%	39%	42%	45%	48%
ASP per GB																
HDD	$0.094	$0.098	$0.075	$0.063	$0.052	$0.043	$0.036	$0.031	$0.026	$0.022	$0.019	$0.016	$0.014	$0.012	$0.011	$0.009
y/y % change	-18%	5%	-24%	-17%	-16%	-18%	-15%	-15%	-15%	-15%	-15%	-14%	-14%	-13%	-13%	-12%
Flash			$0.635	$0.465	$0.337	$0.250	$0.194	$0.141	$0.116	$0.092	$0.074	$0.059	$0.047	$0.038	$0.030	$0.024
y/y % change				-27%	-28%	-26%	-22%	-27%	-17%	-21%	-20%	-20%	-20%	-20%	-20%	-20%
Flash premium			8.5x	7.4x	6.4x	5.8x	5.3x	4.5x	4.4x	4.1x	3.9x	3.6x	3.3x	3.1x	2.8x	2.5x
HDD revenues	$33,356.3	$38,723.0	$34,116.1	$33,031.9	$28,079.7	$26,309.1	$24,984.4	$23,949.2	$23,225.6	$22,338.0	$21,444.8	$20,787.7	$20,223.4	$19,740.3	$19,327.6	$18,975.1
y/y % change					-15%	-6%	-5%	-4%	-3%	-4%	-4%	-3%	-3%	-2%	-2%	-2%
HDD revenues																
Seagate	11,484.8	16,108.8	13,844.2	13,559.0	11,258.0	9,997.5	9,743.9	9,459.9	9,290.2	9,046.9	8,792.4	8,626.9	8,493.8	8,389.6	8,310.9	8,254.2
Western Digital	9,234.6	15,173.5	14,680.7	14,455.8	12,372.2	11,049.8	10,243.6	9,879.0	9,638.6	9,326.1	9,006.8	8,730.8	8,493.8	8,290.9	8,117.6	7,969.5
Share																
Seagate	34%	42%	41%	41%	40%	38%	39%	40%	40%	41%	41%	42%	42%	43%	43%	44%
Western Digital	28%	39%	43%	44%	44%	42%	41%	41%	42%	42%	42%	42%	42%	42%	42%	42%
Toshiba						20%	20%	19%	19%	18%	17%	17%	16%	16%	15%	15%
NAND flash revenues			$28,873.0	$29,770.1	$30,807.0	$30,451.1	$35,313.3	$35,302.7	$37,963.6	$39,279.1	$40,787.4	$42,003.6	$42,955.7	$43,669.4	$44,168.5	$44,474.7

Source: BTIG, company filings.

Capacity Model "23% Case"

Capacity Model (in millions, unless otherwise stated)	FY11 A	FY12 A	FY13 A	FY14 A	FY15 A	FY16 E	FY17 E	FY18 E	FY19 E	FY20 E	FY21 E	FY22 E	FY23 E	FY24 E	FY25 E	FY26 E
23% Case																
Capacity (EB)																
HDD	355.1	393.7	454.5	527.5	536.6	597.4	701.4	831.2	996.5	1,184.9	1,406.4	1,665.8	1,968.8	2,321.2	2,729.4	3,199.9
Flash	20.3	32.7	45.5	64.0	91.5	118.6	186.4	269.7	368.6	507.8	692.7	937.0	1,258.7	1,680.9	2,233.2	2,953.7
Total	375.4	426.4	500.0	591.5	628.1	716.0	887.8	1,100.9	1,365.1	1,692.8	2,099.0	2,602.8	3,227.5	4,002.1	4,962.6	6,153.6
Growth																
HDD	19%	11%	15%	16%	2%	11%	17%	19%	20%	19%	19%	18%	18%	18%	18%	17%
Flash	90%	61%	39%	41%	43%	30%	57%	45%	37%	38%	36%	35%	34%	34%	33%	32%
Total	22%	14%	17%	18%	6%	14%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
Mix																
HDD	95%	92%	91%	89%	85%	83%	79%	76%	73%	70%	67%	64%	61%	58%	55%	52%
Flash	5%	8%	9%	11%	15%	17%	21%	25%	27%	30%	33%	36%	39%	42%	45%	48%
ASP per GB																
HDD	$0.094	$0.098	$0.075	$0.063	$0.052	$0.043	$0.036	$0.031	$0.026	$0.022	$0.019	$0.016	$0.014	$0.012	$0.011	$0.009
y/y % change	-18%	5%	-24%	-17%	-16%	-18%	-15%	-15%	-15%	-15%	-15%	-14%	-14%	-13%	-13%	-12%
Flash			$0.635	$0.465	$0.337	$0.250	$0.194	$0.141	$0.116	$0.092	$0.074	$0.059	$0.047	$0.038	$0.030	$0.024
y/y % change				-27%	-28%	-26%	-22%	-27%	-17%	-21%	-20%	-20%	-20%	-20%	-20%	-20%
Flash premium			8.5x	7.4x	6.4x	5.8x	5.3x	4.5x	4.4x	4.1x	3.9x	3.6x	3.3x	3.1x	2.8x	2.5x
HDD revenues	$33,356.3	$38,723.0	$34,116.1	$33,031.9	$28,079.7	$25,634.5	$25,581.6	$25,768.5	$26,260.6	$26,541.2	$26,775.6	$27,274.9	$27,883.8	$28,601.6	$29,427.6	$30,359.9
y/y % change					-15%	-9%	0%	1%	2%	1%	1%	2%	2%	3%	3%	3%
HDD revenues																
Seagate	197.5	177.1	168.2	165.2	122.7	9,741.1	9,976.8	10,178.6	10,504.3	10,749.2	10,978.0	11,319.1	11,711.2	12,155.7	12,653.9	13,206.5
Western Digital	9,234.6	15,173.5	14,680.7	14,455.8	12,372.2	10,766.5	10,488.5	10,629.5	10,898.2	11,081.0	11,245.7	11,455.5	11,711.2	12,012.7	12,359.6	12,751.1
Share																
Seagate	1%	0%	0%	1%	40%	38%	39%	40%	40%	41%	41%	42%	42%	43%	43%	44%
Western Digital	28%	39%	43%	44%	44%	42%	41%	41%	42%	42%	42%	42%	42%	42%	42%	42%
Toshiba						20%	20%	19%	19%	18%	17%	17%	16%	16%	15%	15%
NAND flash revenues			$28,873.0	$29,770.1	$30,807.0	$29,670.3	$36,157.3	$37,984.5	$42,924.5	$46,670.1	$50,926.4	$55,111.7	$59,226.7	$63,272.3	$67,249.4	$71,158.9

Source: BTIG, company filings.

Capacity Model "27% Case"

Capacity Model (in millions, unless otherwise stated)	FY11 A	FY12 A	FY13 A	FY14 A	FY15 A	FY16 E	FY17 E	FY18 E	FY19 E	FY20 E	FY21 E	FY22 E	FY23 E	FY24 E	FY25 E	FY26 E
27% Case "Management Scenario"																
Capacity (EB)																
HDD	355.1	393.7	454.5	527.5	536.6	597.4	724.0	885.7	1,096.1	1,345.4	1,648.3	2,015.4	2,458.7	2,992.4	3,632.1	4,395.6
Flash	20.3	32.7	45.5	64.0	91.5	118.6	192.5	287.4	405.4	576.6	811.8	1,133.6	1,572.0	2,166.9	2,971.8	4,057.4
Total	375.4	426.4	500.0	591.5	628.1	716.0	916.5	1,173.1	1,501.6	1,922.0	2,460.1	3,149.0	4,030.7	5,159.3	6,603.9	8,453.0
Growth																
HDD	19%	11%	15%	16%	2%	11%	21%	22%	24%	23%	23%	22%	22%	22%	21%	21%
Flash	90%	61%	39%	41%	43%	30%	62%	49%	41%	42%	41%	40%	39%	38%	37%	37%
Total	22%	14%	17%	18%	6%	14%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%
Mix																
HDD	95%	92%	91%	89%	85%	83%	79%	76%	73%	70%	67%	64%	61%	58%	55%	52%
Flash	5%	8%	9%	11%	15%	17%	21%	25%	27%	30%	33%	36%	39%	42%	45%	48%
ASP per GB																
HDD (Gartner)	$0.094	$0.098	$0.075	$0.063	$0.052	$0.042	$0.035	$0.029	$0.024	$0.020	$0.016	$0.014	$0.011	$0.010	$0.008	$0.007
y/y % change	-18%	5%	-24%	-17%	-16%	-19%	-18%	-16%	-18%	-17%	-17%	-16%	-16%	-15%	-15%	-14%
HDD	$0.094	$0.098	$0.075	$0.063	$0.052	$0.043	$0.036	$0.031	$0.026	$0.022	$0.019	$0.016	$0.014	$0.012	$0.011	$0.009
y/y % change	-18%	5%	-24%	-17%	-16%	-18%	-15%	-15%	-15%	-15%	-15%	-14%	-14%	-13%	-13%	-12%
Flash			$0.635	$0.465	$0.337	$0.250	$0.194	$0.141	$0.116	$0.092	$0.074	$0.059	$0.047	$0.038	$0.030	$0.024
y/y % change				-27%	-28%	-26%	-22%	-27%	-17%	-21%	-20%	-20%	-20%	-20%	-20%	-20%
Flash premium			8.5x	7.4x	6.4x	5.8x	5.3x	4.5x	4.4x	4.1x	3.9x	3.6x	3.3x	3.1x	2.8x	2.5x
HDD revenues	$33,356.3	$38,723.0	$34,116.1	$33,031.9	$28,079.7	$25,634.5	$26,406.9	$27,457.8	$28,884.9	$30,135.2	$31,382.0	$32,998.5	$34,823.3	$36,872.0	$39,160.6	$41,704.5
y/y % change					-15%	-9%	3%	4%	5%	4%	4%	5%	6%	6%	6%	6%
HDD revenues																
Seagate	2,745.0	4,706.5	3,563.7	3,414.3	2,432.6	9,741.1	9,976.8	10,178.6	10,504.3	10,749.2	10,978.0	11,319.1	11,711.2	12,155.7	12,653.9	13,206.5
Western Digital	(0.2)	2.7	0.0	(0.0)	(0.5)	10,766.5	10,488.5	10,629.5	10,898.2	11,081.0	11,245.7	11,455.5	11,711.2	12,012.7	12,359.6	12,751.1
Share																
Seagate	8%	12%	10%	10%	40%	38%	39%	40%	40%	41%	41%	42%	42%	43%	43%	44%
Western Digital	0%	0%	0%	0%	0%	42%	41%	41%	42%	42%	42%	42%	42%	42%	42%	42%
Toshiba						20%	20%	19%	19%	18%	17%	17%	16%	16%	15%	15%
NAND flash revenues			$28,873.0	$29,770.1	$30,807.0	$29,670.3	$37,323.7	$40,474.6	$47,213.9	$52,989.8	$59,687.7	$66,676.6	$73,966.6	$81,568.0	$89,491.8	$97,748.9

Source: BTIG, company filings.

Seagate Bit Growth Scenarios

Bit Growth Scenarios						
	F2019			F2020		
Growth (5 year CAGR)						
HDD	11%	14%	16%	13%	17%	20%
Flash	38%	42%	45%	36%	41%	45%
Total	15%	18%	20%	18%	22%	25%
Exabytes						
HDD	881	997	1,096	997	1,185	1,345
Flash	326	369	405	427	508	577
Total	1,207	1,365	1,502	1,425	1,693	1,922
Exabyte mix						
HDD	73%	73%	73%	70%	70%	70%
Flash	27%	27%	27%	30%	30%	30%
Exabyte ASP						
HDD	$0.026	$0.026	$0.026	$0.022	$0.022	$0.022
Flash	$0.116	$0.116	$0.116	$0.092	$0.092	$0.092
Exabyte ASP (5 year CAGR)						
HDD	(16%)	(16%)	(16%)	(16%)	(16%)	(16%)
Flash	(24%)	(24%)	(24%)	(23%)	(23%)	(23%)
STX HDD revenues	9,290	10,504	11,554	9,047	10,749	12,205
STX share	40%	40%	40%	41%	41%	41%
Non-HDD revenues	929	929	929	929	929	929
Total revenues	10,219	11,433	12,482	9,975	11,678	13,133
Gross profit	2,963	3,316	3,620	3,042	3,562	4,006
Gross margin	29.0%	29.0%	29.0%	30.5%	30.5%	30.5%
Opex	1,625	1,658	1,685	1,541	1,693	1,773
as % of revenue	16%	15%	14%	15%	15%	14%
Operating income	1,338	1,658	1,935	1,502	1,868	2,233
Operating margin	14.4%	15.8%	16.7%	16.6%	17.4%	18.3%
Other income	(196)	(196)	(196)	(196)	(196)	(196)
Pretax income	1,142	1,462	1,739	1,306	1,672	2,037
Taxes	70	90	107	80	103	125
Tax rate	6%	6%	6%	6%	6%	6%
Net income	1,072	1,372	1,632	1,226	1,569	1,911
EPS	**$3.82**	**$4.89**	**$5.82**	**$4.46**	**$5.71**	**$6.96**
Shares	280	280	280	275	275	275
Forward P/E multiple	10.0x	10.0x	10.0x	10.0x	10.0x	10.0x
2018 price	$38.21	$48.91	$58.18	$44.61	$57.13	$69.57
Today's price	$35.38	$45.29	$53.87	$38.25	$48.98	$59.65
Upside	-7%	19%	42%	1%	29%	57%

Source: BTIG, company filings.

Seagate Technology Revenue Detail

Seagate Revenue Build					Sep-16	Dec-16	Mar-17	Jun-17		Sep-17	Dec-17	Mar-18	Jun-18		
(in millions, unless otherwise stated)	FY13 A	FY14 A	FY15 A	FY16 A	1Q17 A	2Q17 A	3Q17 E	4Q17 E	FY17 E	1Q18 E	2Q18 E	3Q18 E	4Q18 E	FY18 E	FY19 E
Seagate revenues															
Units	225.8	219.8	211.3	169.0	38.9	39.9	36.1	37.5	152.4	37.0	37.9	34.3	35.8	145.0	134.8
q/q % change					*6%*	*3%*	*(10%)*	*4%*		*(2%)*	*3%*	*(10%)*	*5%*		
y/y % change	*1%*	*(3%)*	*(4%)*	*(20%)*	*(17%)*	*(13%)*	*(8%)*	*2%*	*(10%)*	*(5%)*	*(5%)*	*(5%)*	*(5%)*	*(5%)*	*(7%)*
ASP	$62.74	$61.18	$60.89	$60.76	$66.56	$67.14	$68.95	$68.05	$67.47	$69.88	$70.49	$72.40	$72.13	$71.19	$71.92
q/q % change					*(0%)*	*1%*	*3%*	*(1%)*		*3%*	*1%*	*3%*	*(0%)*		
y/y % change	*(5%)*	*(2%)*	*(0%)*	*(0%)*	*15%*	*13%*	*14%*	*2%*	*11%*	*5%*	*5%*	*5%*	*6%*	*6%*	*3%*
HDD revenues	$14,167	$13,446	$12,867	$10,269	$2,589	$2,652	$2,487	$2,554	$10,282	$2,583	$2,672	$2,480	$2,584	$10,319	$9,693
% of revenue	99%	98%	94%	92%	93%	92%	92%	92%	92%	92%	91%	91%	92%	92%	91%
q/q % change					*5%*	*2%*	*(6%)*	*3%*		*1%*	*3%*	*(7%)*	*4%*		
y/y % change	*(4%)*	*(5%)*	*(4%)*	*(20%)*	*(5%)*	*(3%)*	*5%*	*4%*	*0%*	*(0%)*	*1%*	*(0%)*	*1%*	*0%*	*(6%)*
Systems and flash	$184	$278	$871	$891	$208	$242	$228	$209	$887	$225	$261	$240	$219	$945	$983
% of revenue	1%	2%	6%		7%	8%	8%	8%		8%	9%	9%	8%		
q/q % change					*5%*	*16%*	*(6%)*	*(9%)*		*8%*	*16%*	*(8%)*	*(9%)*		
y/y % change	*NM*	*51%*	*214%*	*2%*	*(0%)*	*(7%)*	*2%*	*5%*	*(0%)*	*8%*	*8%*	*5%*	*5%*	*7%*	*4%*
Total revenue	**$14,351**	**$13,724**	**$13,738**	**$11,160**	**$2,797**	**$2,894**	**$2,715**	**$2,763**	**$11,169**	**$2,807**	**$2,933**	**$2,720**	**$2,804**	**$11,265**	**$10,676**
q/q % change					*5%*	*3%*	*(6%)*	*2%*		*2%*	*4%*	*(7%)*	*3%*		
y/y % change	*(4%)*	*(4%)*	*0%*	*(19%)*	*(4%)*	*(3%)*	*5%*	*4%*	*0%*	*0%*	*1%*	*0%*	*1%*	*1%*	*(5%)*

Source: BTIG, company filings.

Seagate Technology Income Statement

Seagate Income Statement					Sep-16	Dec-16	Mar-17	Jun-17		Sep-17	Dec-17	Mar-18	Jun-18		
(in millions, unless otherwise stated)	FY13 A	FY14 A	FY15 A	FY16 A	1Q17 A	2Q17 A	3Q17 E	4Q17 E	FY17 E	1Q18 E	2Q18 E	3Q18 E	4Q18 E	FY18 E	FY19 E
Total Revenue (non-GAAP)	$14,351.0	$13,724.0	$13,738.0	$11,156.0	$2,797.0	$2,893.0	$2,715.2	$2,763.1	$11,168.3	$2,807.2	$2,933.4	$2,720.4	$2,803.8	$11,264.7	$10,676.2
Total cost of revenues	10,329.0	9,816.0	9,876.0	8,414.0	1,971.0	1,974.0	1,900.6	1,934.2	7,779.8	1,993.1	2,082.7	1,931.5	1,990.7	7,997.9	7,580.1
Gross profit (non-GAAP)	4,022.0	3,908.0	3,862.0	2,742.0	826.0	919.0	814.6	828.9	3,388.5	814.1	850.7	788.9	813.1	3,266.8	3,096.1
Non-GAAP Operating Expenses															
Product development	1,113.0	1,220.0	1,337.0	1,221.0	315.0	303.0	300.0	298.0	1,216.0	293.0	290.0	287.0	284.0	1,154.0	1,086.0
Marketing and administrative	637.0	724.0	826.0	609.0	156.0	154.0	150.0	148.0	608.0	146.0	152.5	141.5	145.8	585.8	533.8
Total Non-GAAP Operating Expenses	1,750.0	1,944.0	2,163.0	1,830.0	471.0	458.0	450.0	446.0	1,824.0	439.0	442.5	428.5	429.8	1,739.8	1,619.8
Non-GAAP Operating Income	**2,272**	**1,964**	**1,699**	**912**	**355**	**461**	**365**	**383**	**1,564**	**375**	**408**	**360**	**383**	**1,527**	**1,476**
Other income (expense), net	(197.0)	(175.0)	(158.0)	(195.0)	(49.0)	(34.0)	(34.0)	(34.0)	(151.0)	(34.0)	(34.0)	(34.0)	(34.0)	(136.0)	(136.0)
Non-GAAP Earnings Bef.Taxes	2,075.0	1,789.0	1,541.0	717.0	306.0	427.0	330.6	348.9	1,413.5	341.1	374.1	326.5	349.3	1,391.0	1,340.3
Provision for Income Taxes	47.0	38.0	26.0	26.0	6.0	13.0	15.0	15.0	49.0	15.0	15.0	15.0	15.0	60.0	60.0
Non-GAAP Tax Rate	2%	2%	2%	4%	2%	3%	5%	4%	3%	4%	4%	5%	4%	4%	4%
GAAP Net Income	1,838.0	1,570.0	1,746.0	691.0	167.0	297.0	313.6	331.9	1,364.5	324.1	357.1	309.5	332.3	1,331.0	1,280.3
Non-GAAP EPS	$4.79	$4.52	$5.22	$0.82	$0.55	$1.00	$1.06	$1.12	$3.73	$1.10	$1.22	$1.06	$1.14	$4.53	$4.42
GAAP Net Income (1)	2,028.0	1,751.0	1,515.0	691.0	299.0	412.0	313.6	331.9	1,364.5	324.1	357.1	309.5	332.3	1,331.0	1,280.3
Non-GAAP EPS	**$5.29**	**$5.04**	**$4.55**	**$2.26**	**$0.99**	**$1.38**	**$1.06**	**$1.12**	**$4.56**	**$1.10**	**$1.22**	**$1.06**	**$1.14**	**$4.53**	**$4.42**
Avg. Diluted Shares Outstanding	382.0	347.3	331.5	301.8	301.0	298.0	296.7	295.4	297.8	294.1	292.9	291.7	290.5	292.3	287.6
Income Statement Metrics															
% of revenue:															
Gross profit	**28.0%**	**28.5%**	**28.1%**	**24.6%**	**29.5%**	**31.8%**	**30.0%**	**30.0%**	**30.3%**	**29.0%**	**29.0%**	**29.0%**	**29.0%**	**29.0%**	**29.0%**
Product development	7.8%	8.9%	9.7%	10.9%	11.3%	10.5%	11.0%	10.8%	10.9%	10.4%	9.9%	10.5%	10.1%	10.2%	10.2%
Marketing and administrative	4.4%	5.3%	6.0%	5.5%	5.6%	5.3%	5.5%	5.4%	5.4%	5.2%	5.2%	5.2%	5.2%	5.2%	5.0%
Operating expenses	12.2%	14.2%	15.7%	16.4%	16.8%	15.8%	16.6%	16.1%	16.3%	15.6%	15.1%	15.7%	15.3%	15.4%	15.2%
Operating income	**15.8%**	**14.3%**	**12.4%**	**8.2%**	**12.7%**	**15.9%**	**13.4%**	**13.9%**	**14.0%**	**13.4%**	**13.9%**	**13.3%**	**13.7%**	**13.6%**	**13.8%**
Net Income	14.1%	12.8%	11.0%	6.2%	10.7%	14.2%	11.5%	12.0%	12.2%	11.5%	12.2%	11.4%	11.9%	11.8%	12.0%
y/y % change:															
Revenue	*(4%)*	*(4%)*	*0%*	*(19%)*	*(4%)*	*(3%)*	*5%*	*4%*	*0%*	*0%*	*1%*	*0%*	*1%*	*1%*	*(5%)*
Gross profit	*(15%)*	*(3%)*	*(1%)*	*(29%)*	*17%*	*20%*	*39%*	*21%*	*24%*	*(1%)*	*(7%)*	*(3%)*	*(2%)*	*(4%)*	*(5%)*
Product development	*11%*	*10%*	*10%*	*(9%)*	*(2%)*	*1%*	*1%*	*(1%)*	*(0%)*	*(7%)*	*(4%)*	*(4%)*	*(5%)*	*(5%)*	*(6%)*
Marketing and administrative	*31%*	*14%*	*14%*	*(26%)*	*(12%)*	*3%*	*6%*	*6%*	*(0%)*	*(6%)*	*(1%)*	*(6%)*	*(1%)*	*(4%)*	*(9%)*
Operating expenses	*18%*	*11%*	*11%*	*(15%)*	*(6%)*	*2%*	*3%*	*1%*	*(0%)*	*(7%)*	*(3%)*	*(5%)*	*(4%)*	*(5%)*	*(7%)*
Operating income	*(30%)*	*(14%)*	*(13%)*	*(46%)*	*71%*	*48%*	*143%*	*58%*	*72%*	*6%*	*(11%)*	*(1%)*	*0%*	*(2%)*	*(3%)*
Net income	*(32%)*	*(14%)*	*(13%)*	*(54%)*	*81%*	*67%*	*375%*	*60%*	*97%*	*8%*	*(13%)*	*(1%)*	*0%*	*(2%)*	*(4%)*
EPS	*(21%)*	*(5%)*	*(10%)*	*(50%)*	*85%*	*69%*	*377%*	*63%*	*101%*	*11%*	*(12%)*	*0%*	*2%*	*(1%)*	*(2%)*
q/q % change:															
Revenue	-	-	-	-	*5%*	*3%*	*(6%)*	*2%*	-	*2%*	*4%*	*(7%)*	*3%*	-	-
Gross profit	-	-	-	-	*21%*	*11%*	*(11%)*	*2%*	-	*(2%)*	*4%*	*(7%)*	*3%*	-	-
Product development	-	-	-	-	*4%*	*(4%)*	*(1%)*	*(1%)*	-	*(2%)*	*(1%)*	*(1%)*	*(1%)*	-	-
Marketing and administrative	-	-	-	-	*11%*	*(1%)*	*(3%)*	*(1%)*	-	*(1%)*	*4%*	*(7%)*	*3%*	-	-
Operating expenses	-	-	-	-	*7%*	*(3%)*	*(2%)*	*(1%)*	-	*(2%)*	*1%*	*(3%)*	*0%*	-	-
Operating income	-	-	-	-	*47%*	*30%*	*(21%)*	*5%*	-	*(2%)*	*9%*	*(12%)*	*6%*	-	-
Net income	-	-	-	-	*44%*	*38%*	*(24%)*	*6%*	-	*(2%)*	*10%*	*(13%)*	*7%*	-	-
EPS	-	-	-	-	*44%*	*39%*	*(24%)*	*6%*	-	*(2%)*	*11%*	*(13%)*	*8%*	-	-

Source: BTIG, company filings.

Seagate Technology Balance Sheet

Seagate Balance Sheet					Sep-16	Dec-16	Mar-17	Jun-17		Sep-17	Dec-17	Mar-18	Jun-18		
(in millions, unless otherwise stated)	FY13 A	FY14 A	FY15 A	FY16 A	1Q17 A	2Q17 A	3Q17 E	4Q17 E	FY17 E	1Q18 E	2Q18 E	3Q18 E	4Q18 E	FY18 E	FY19 E
Assets															
Cash and cash equivalents	1,708.0	2,634.0	2,479.0	1,125.0	1,489.0	1,716.0	1,577.7	1,795.6	1,795.6	2,029.4	2,280.1	2,422.1	2,627.8	2,627.8	3,303.0
Restricted cash	101.0	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-
Short-term investmennts	480.0	20.0	6.0	6.0	5.0	-	-	-	-	-	-	-	-	-	-
Accounts receivables	1,670.0	1,729.0	1,735.0	1,318.0	1,307.0	1,211.0	1,267.1	1,289.5	1,289.5	1,310.0	1,368.9	1,269.5	1,308.4	1,308.4	1,263.7
Inventories	854.0	985.0	993.0	868.0	914.0	1,008.0	844.7	859.6	859.6	885.8	925.6	858.4	884.8	884.8	854.5
Prepaid and other current assets	599.0	405.0	355.0	216.0	213.0	205.0	202.8	206.4	206.4	209.7	219.1	203.2	209.5	209.5	202.3
Total current assets	**5,412.0**	**5,777.0**	**5,568.0**	**3,533.0**	**3,928.0**	**4,140.0**	**3,892.4**	**4,151.1**	**4,151.1**	**4,434.9**	**4,793.8**	**4,753.3**	**5,030.5**	**5,030.5**	**5,623.4**
Property and equipment, net	2,269.0	2,136.0	2,278.0	2,160.0	2,093.0	2,012.0	1,930.5	1,847.7	1,847.7	1,763.4	1,675.4	1,593.8	1,509.7	1,509.7	1,189.4
Goodwill	405.0	537.0	874.0	1,237.0	1,237.0	1,237.0	1,237.0	1,237.0	1,237.0	1,237.0	1,237.0	1,237.0	1,237.0	1,237.0	1,237.0
Intangible assets	456.0	359.0	370.0	448.0	406.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0
Deferred income taxes	476.0	499.0	496.0	616.0	615.0	614.0	614.0	614.0	614.0	614.0	614.0	614.0	614.0	614.0	614.0
Other assets	225.0	184.0	259.0	258.0	216.0	194.0	217.2	221.1	221.1	224.6	234.7	217.6	224.3	224.3	216.6
Total assets	**$9,243**	**$9,492**	**$9,845**	**$8,252**	**$8,495**	**$8,561**	**$8,255**	**$8,435**	**$8,435**	**$8,638**	**$8,919**	**$8,780**	**$8,979**	**$8,979**	**$9,244**
Liabilities and stockholders' equity															
Accounts payable	1,690.0	1,549.0	1,540.0	1,517.0	1,568.0	1,631.0	1,478.3	1,504.4	1,504.4	1,550.2	1,619.9	1,502.3	1,548.3	1,548.3	1,495.4
Accrued liabilities/employee comp	918.0	296.0	256.0	184.0	216.0	254.0	191.7	205.5	205.5	230.8	272.2	205.7	222.5	222.5	214.9
Accrued warranty		148.0	135.0	104.0	111.0	114.0	114.0	114.0	114.0	114.0	114.0	114.0	114.0	114.0	114.0
Accrued expenses		405.0	412.0	444.0	713.0	682.0	434.4	442.1	442.1	449.1	469.3	435.3	448.6	448.6	433.3
Total current liabilities	**2,611.0**	**2,398.0**	**2,343.0**	**2,249.0**	**2,608.0**	**2,681.0**	**2,218.4**	**2,265.9**	**2,265.9**	**2,344.1**	**2,475.4**	**2,257.2**	**2,333.4**	**2,333.4**	**2,257.5**
Accrued warranty		125.0	113.0	102.0	105.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0
Accrued income taxes		90.0	33.0	14.0	11.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Other long-term liabilities	352.0	127.0	183.0	164.0	155.0	143.0	190.1	193.4	193.4	196.5	205.3	190.4	196.3	196.3	162.5
Long-term debt	2,774.0	3,920.0	4,155.0	4,130.0	4,092.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0
Total liabilities	**5,737.0**	**6,660.0**	**6,827.0**	**6,659.0**	**6,971.0**	**7,038.0**	**6,622.5**	**6,673.3**	**6,673.3**	**6,754.6**	**6,894.8**	**6,661.6**	**6,743.7**	**6,743.7**	**6,634.0**
Total stockholders' equity	3,506.0	2,832.0	3,018.0	1,593.0	1,524.0	1,523.0	1,632.6	1,761.5	1,761.5	1,883.3	2,024.1	2,118.1	2,235.8	2,235.8	2,610.5
Total liabilities and stockholders' equity	**$9,243**	**$9,492**	**$9,845**	**$8,252**	**$8,495**	**$8,561**	**$8,255**	**$8,435**	**$8,435**	**$8,638**	**$8,919**	**$8,780**	**$8,979**	**$8,979**	**$9,244**
% Change Y/Y															
Cash and cash equivalents	*0%*	*54%*	*(6%)*	*(55%)*	*(22%)*	*36%*	*32%*	*60%*	*60%*	*36%*	*33%*	*54%*	*46%*	*46%*	*26%*
Short-term investments	*17%*	*(96%)*	*(70%)*	*0%*	*(17%)*	*(100%)*	*(100%)*	*(100%)*	*(100%)*	*(100%)*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*
Total cash and equivalents	*4%*	*16%*	*(7%)*	*(54%)*	*(22%)*	*36%*	*32%*	*59%*	*59%*	*36%*	*33%*	*54%*	*46%*	*46%*	*26%*
Receivables	*(28%)*	*4%*	*0%*	*(24%)*	*(14%)*	*(13%)*	*1%*	*(2%)*	*(2%)*	*0%*	*13%*	*0%*	*1%*	*1%*	*(3%)*
Balance Sheet Summary															
Current ratio															
Cash	2,289.0	2,658.0	2,485.0	1,131.0	1,494.0	1,716.0	1,577.7	1,795.6	1,795.6	2,029.4	2,280.1	2,422.1	2,627.8	2,627.8	3,303.0
Debt	2,777.0	3,920.0	4,155.0	4,130.0	4,092.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0	4,093.0
Net cash	(488.0)	(1,262.0)	(1,670.0)	(2,999.0)	(2,598.0)	(2,377.0)	(2,515.3)	(2,297.4)	(2,297.4)	(2,063.6)	(1,812.9)	(1,670.9)	(1,465.2)	(1,465.2)	(790.0)
Cash per share	$5.99	$7.65	$7.50	$3.75	$4.96	$5.76	$5.32	$6.08	$6.03	$6.90	$7.78	$8.30	$9.05	$8.99	$11.49
Net cash per share	($1.28)	($3.63)	($5.04)	($9.94)	($8.63)	($7.98)	($8.48)	($7.78)	($7.72)	($7.02)	($6.19)	($5.73)	($5.04)	($5.01)	($2.75)
Book value per share	$9.18	$8.16	$9.10	$5.28	$5.06	$5.11	$5.50	$5.96	$5.92	$6.40	$6.91	$7.26	$7.70	$7.65	$9.08
ROE (LTM)	58%	55%	52%	30%	49%	62%	102%	100%	81%	81%	73%	123%	117%	67%	53%
ROA (LTM)	21%	19%	16%	8%	10%	12%	19%	20%	16%	16%	15%	27%	27%	15%	14%
Total debt to capitalization	44%	58%	58%	72%	73%	73%	71%	70%	70%	68%	67%	66%	65%	65%	61%

Source: BTIG, company filings.

Seagate Technology Cash Flow Statement

Seagate Cash Flow Statement					Sep-16	Dec-16	Mar-17	Jun-17		Sep-17	Dec-17	Mar-18	Jun-18		
(in millions, unless otherwise stated)	FY13 A	FY14 A	FY15 A	FY16 A	1Q17 A	2Q17 A	3Q17 E	4Q17 E	FY17 E	1Q18 E	2Q18 E	3Q18 E	4Q18 E	FY18 E	FY19 E
Cash flows from operations:															
Net income	1,838.0	1,570.0	1,742.0	248.0	167.0	297.0	313.6	331.9	1,109.5	324.1	357.1	309.5	332.3	1,323.0	1,272.3
Depreciation and amortization	873.0	879.0	841.0	815.0	200.0	191.0	190.1	193.4	774.5	196.5	205.3	190.4	196.3	788.5	747.3
Stock-based compensation	76.0	118.0	137.0	120.0	40.0	33.0	33.0	33.0	139.0	33.0	33.0	33.0	33.0	132.0	132.0
Deferred Taxes	(70.0)	(67.0)	-	(2.0)	1.0	2.0		-	3.0	-	-	-	-	-	-
Other	56.0	59.0	78.0	35.0	(7.0)	34.0	-	-	27.0	-	-	-	-	-	-
Intangible amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Changes in assets and liabilities:															
Accounts receivable	661.0	4.0	(2.0)	464.0	12.0	98.0	(56.1)	(22.4)	31.5	(20.5)	(58.9)	99.4	(38.9)	(19.0)	44.7
Inventories	102.0	(20.0)	29.0	145.0	(46.0)	(94.0)	163.3	(14.9)	8.4	(26.2)	(39.8)	67.2	(26.3)	(25.1)	30.3
Accounts payable	(538.0)	(190.0)	(58.0)	(24.0)	101.0	69.0	(152.7)	26.1	43.4	45.8	69.7	(117.6)	46.1	43.9	(53.0)
Accrued employee compensation		(55.0)	(40.0)	(78.0)	32.0	38.0	(62.3)	13.7	21.5	25.4	41.4	(66.5)	16.8	17.0	(7.6)
Other	49.0	260.0	(80.0)	(43.0)	92.0	(13.0)	(221.6)	3.6	(139.0)	3.3	9.5	(16.0)	6.3	3.1	(34.3)
Cash flows from operations	**$3,047**	**$2,558**	**$2,647**	**$1,680**	**$592**	**$655**	**$207**	**$565**	**$2,019**	**$581**	**$617**	**$499**	**$565**	**$2,263**	**$2,132**
Cash flows from investing:															
Capital expenditures	(786.0)	(559.0)	(747.0)	(587.0)	(140.0)	(96.0)	(108.6)	(110.5)	(455.1)	(112.3)	(117.3)	(108.8)	(112.2)	(450.6)	(427.0)
Purchase of investments	(351.0)	(88.0)	(5.0)	-	-	-	-	-	-	-	-	-	-	-	-
Proceeds of investments	363.0	569.0	23.0	1.0	1.0	5.0	-	-	6.0	-	-	-	-	-	-
Cash used in acquisition	(36.0)	(285.0)	(453.0)	(634.0)	-	-	-	-	-	-	-	-	-	-	-
Other	(15.0)	41.0	(105.0)	9.0	-	(4.0)	-	-	(4.0)	-	-	-	-	-	-
Cash flows from investing	**($825)**	**($322)**	**($1,287)**	**($1,211)**	**($139)**	**($95)**	**($109)**	**($111)**	**($453)**	**($112)**	**($117)**	**($109)**	**($112)**	**($451)**	**($427)**
Cash flows from financing:															
Loan proceeds	986.0	1,781.0	1,196.0	-	-	-	-	-	-	-	-	-	-	-	-
Loan payments	(1,224.0)	(725.0)	(1,026.0)	(22.0)	-	-	-	-	-	-	-	-	-	-	-
Issuance of common stock, options	259.0	107.0	98.0	79.0	12.0	35.0	-	-	47.0	-	-	-	-	-	-
Repurchase common	(1,654.0)	(1,912.0)	(1,087.0)	(1,090.0)	(101.0)	(147.0)	(50.0)	(50.0)	(348.0)	(50.0)	(50.0)	(50.0)	(50.0)	(200.0)	(200.0)
Preferred stock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	(71.0)	(5.0)	(12.0)	(60.0)	-	(24.0)	-	-	(24.0)	-	-	-	-	-	-
Dividends	(518.0)	(557.0)	(664.0)	(727.0)	-	(188.0)	(186.9)	(186.1)	(561.0)	(185.3)	(199.3)	(198.5)	(197.6)	(780.7)	(829.6)
Cash flows from financing:	**($2,222)**	**($1,311)**	**($1,495)**	**($1,820)**	**($89)**	**($324)**	**($237)**	**($236)**	**($886)**	**($235)**	**($249)**	**($248)**	**($248)**	**($981)**	**($1,030)**
Forex		1.0	(20.0)	(3.0)	-	(12.0)	-	-	(12.0)	-	-	-	-	-	-
Net decrease in cash and cash equivalents	**-**	**$926**	**($155)**	**($1,354)**	**$364**	**$224**	**($138)**	**$218**	**$668**	**$234**	**$251**	**$142**	**$206**	**$832**	**$675**
Free cash flow:															
Cash flow from operations	3,047.0	2,558.0	2,647.0	1,680.0	592.0	655.0	207.2	564.5	2,018.7	581.4	617.3	499.3	565.5	2,263.5	2,131.8
Free cash flow	**$2,261**	**$1,999**	**$1,900**	**$1,093**	**$452**	**$559**	**$99**	**$454**	**$1,564**	**$469**	**$500**	**$390**	**$453**	**$1,813**	**$1,705**
as % of revenue	16%	15%	14%	10%	16%	19%	4%	16%	14%	17%	17%	14%	16%	16%	16%
q/q % growth					*267%*	*24%*	*(82%)*	*360%*		*3%*	*7%*	*(22%)*	*16%*		
y/y % growth	*(14%)*	*(12%)*	*(5%)*	*(42%)*	*(27%)*	*128%*	*(10%)*	*269%*	*43%*	*4%*	*(11%)*	*296%*	*(0%)*	*16%*	*(6%)*
FCF per share	$5.92	$5.76	$5.73	$3.62	$1.50	$1.88	$0.33	$1.54	$5.25	$1.59	$1.71	$1.34	$1.56	$6.20	$5.93
Non-GAAP EPS	$5.29	$5.04	$4.55	$2.26	$0.99	$1.38	$1.06	$1.12	$4.56	$1.10	$1.22	$1.06	$1.14	$4.53	$4.42

Source: BTIG, company filings.

BTIG Covered Companies Mentioned in this Report

SEAGATE TECHNOLOGY PLC (STX, Buy, $55.00 PT; Current Price: $45.30; Analyst: Edward.Parker)

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ADOBE SYSTEMS, INC. (ADBE, Buy, $151.00 PT; Current Price: $129.59; Analyst: Abhinav.Kapur)

SALESFORCE.COM, INC. (CRM, Buy, $100.00 PT; Current Price: $82.31; Analyst: Joel.Fishbein)

APPLE, INC. (AAPL, Buy, $165.00 PT; Current Price: $143.70; Analyst: Walter.Piecyk)

FACEBOOK, INC. (FB, Buy, $175.00 PT; Current Price: $142.28; Analyst: Richard.Greenfield)

NETFLIX, INC. (NFLX, Buy, $170.00 PT; Current Price: $146.92; Analyst: Richard.Greenfield)

Appendix: Analyst Certification and Other Important Disclosures

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