H2O Takeaways: Democratizing AI, Unsupervised AI with NVDA DGX

Summary

We hosted the CEO of H2O in New York. H2O is one of the leaders in deep learning/AI, and in many ways the tip of the spear in democratizing AI across multiple industry verticals. There are ~14,000 companies now using the H2O platform including ~169 of the Fortune 500 companies across healthcare, insurance and retail. H2O just introduced its true unsupervised learning platform called Driverless AI, using the NVDA DGX-1 platform with Volta 100 GPUs, demonstrating 15-35x faster speed than CPUs and prior GPUs in linear modeling and gradient boosting. Key takeaways below.

Company	Symbol	Price (7/14)	Rating Prior	Rating Curr	PT
Advanced Micro Devices, Inc.	AMD	$13.92	–	Buy	$15.00
Intel Corporation	INTC	$34.68	–	Buy	$42.00
NVIDIA Corporation	NVDA	$164.95	–	Buy	$170.00

Source: Bloomberg and Mizuho Securities USA

Key Points

Democratizing AI across industries. We believe H2O is building a broad deep learning AI platform across industries (healthcare, retail, finance) serving 169 (up from 107 in Apr'17; Link-H2O April) of the top Fortune 500 companies and platforms (H2O Deepwater, Caffe, MXnet, Tensorflow) on industry leading hardware with DGX-1/Volta V100, while also providing a platform to analyze transactional datasets. H2O is also assimilating some of the industry-leading platforms and expertise with the data table (one of the most versatile ways of manipulating datasets) founder and deep learning Kaggle contest winners.

Moves into unsupervised learning with Driverless AI. On July 5, H2O announced general availability of its new unsupervised learning platform built on the NVDA DGX-1 platform with 8 Volta V100 GPUs (Link - DGX-1). The Driverless AI platform, as we show in Exhibit-1, can drive 15-35x performance versus Xeon CPU and prior GPUs. We believe given some of the enterprise concerns on porting data to the cloud, we believe on-premise hardware such as Driverless AI with DGX-1 is already seeing substantial traction.

New Driverless AI with NVDA DGX seeing solid traction as it provides visualization and interpretation while also enabling 35x performance on linear modeling and gradient boosting. The DGX-1 with the Driverless AI platform enables faster Experiments on multiple Caffe, GOOG models/ frameworks in the background, potentially using NVDA's containerized software to compare models/platforms to derive the fastest, most efficient training model with the highest predictability precision score and visual interpretation.

Reiterating our Buy rating on NVDA and $170 PT, ~50x our F19E (2018) as NVDA and its partners drive scalable DL performance across multiple industry verticals building a broader GPU moat and a smarter predictive and intelligent enterprise driven by DL/AI.

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Partners starting to ramp with NVDA's just-introduced DGX-1 platform. We believe key NVDA partners such as H2O are already starting to see significant enterprise interest and traction as they build vertical platforms with scalable hardware across industries such as Healthcare, retail, finance, insurance, telecom and advisory/accounting**. The Driverless AI platform allows model (Caffe, MXnet, Tensorflow, H2O, CuDNN) comparison while implementing and optimizing the fastest training model, along with visualization and interpretation and factor sensitivity for the customer.** The platform also allows cloud neutrality or the ability to deploy on Azure, AWS, Nimbix, and others.

**Exhibit 1: New Driverless AI running on NVDA DGX-1 with Volta**

Source: H2O, NVDA Blogs, Mizuho MSUSA LLC Research

NVDA's Volta V100 with its NVLink is driving increased bandwidth and performance for H2O. With the addition of a GPU implementation of data table and the NVDA's high bandwidth ultrafast NVLink, the Driverless AI platform can deliver significant speed-up on model training time, predictability precision scores and inference. While much of its current training and predicting models mostly use Forest and boosting tree methods for the alternate transactional data sets, we could envision Bayesian training models as the platform expands for more eclectic time series models. **In Exhibit-2 we look at the significant performance enhancement and speed-up at 15-35x versus current Xeon CPUs and Pascal GPUs on linear modelling and gradient boosting algorithms.**

Exhibit 2: H2O.ai with NVDA DGX-1 Platform Driving 15-35x Performance Boost versus CPUs and Prior GPUs
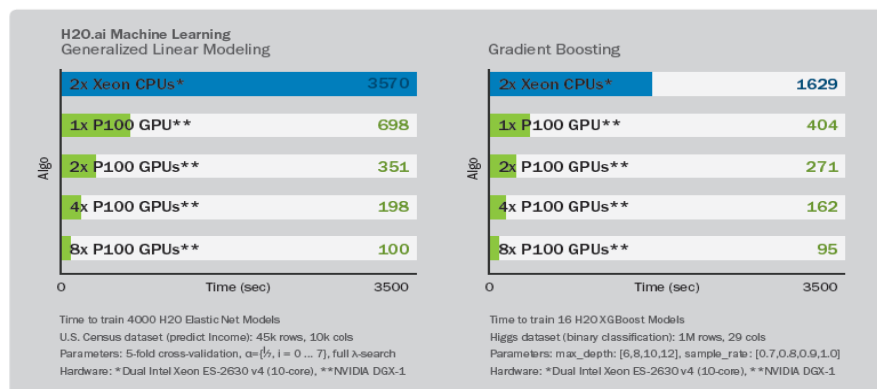
Source: H2O, NVDA Blogs, Mizuho MSUSA LLC Research

Volta V100 and DGX-1. At the GTC-2017 in May, NVDA announced multiple Data Center product launches with the Volta V100 and DGX-1/HGX-1. We believe partner launches such as Driverless AI on the DGX-1 platform should be validation for NVDAs traction. Volta V100 has 5,120 cores and is 12x faster than its prior Pascal GPUs for DL and 20x faster than INTC's next generation Skylake. NVDA also noted the Volta V100 would be 1.5-2x faster than Skylake in inferencing. The DGX-1/HGX-1 platforms have 8 Volta V100s and can replace 400 servers. ASPs on the DGX-1 range from $69K to $149K per system. NVDA noted FB, MSFT Azure and Amazon AWS are all building new platforms with the Volta V100 which could continue to drive substantial growth in DC. H2O is using the DGX-1 and we believe the DGX-1 could gain further traction at a number of AI based customers.

ADAS and deep learning in enterprise; big opportunities on the edge with almost a Billion+ devices. One of the most visible applications of deep learning and AI is autonomous driving and ADAS. **Longer-term, H2O sees deep learning and AI moving from enterprise to the billions of devices at the edge with handsets, remotes, home assistants, industrial/IoT and TV entertainment screens in our living room, all using deep learning to enable a smarter, faster, and predictive ecosystem.**

A look at peer valuations below.

Exhibit 3: Valuation Comparables as of July 14, 2017

Company	Ticker	Rating	Price Target	Price	Market Cap	FY18E Sales	FY18E EV/EBITDA	FY18E EV/Sales	FY18E P/Sales	FY18E EV/FCF	FY18E P/E
AMD	AMD	Buy	$15.00	$13.92	$13,155	$5,333	29.6x	2.5x	2.5x	48.0x	48.6x
Intel	INTC	Buy	$42.00	$34.68	$163,308	$61,673	6.5x	2.9x	2.6x	15.7x	11.7x
NVIDIA	NVDA	Buy	$170.00	$164.95	$98,145	$9,339	30.6x	10.6x	10.5x	42.7x	46.6x

Source: Mizuho Securities Estimates, Company Reports, FactSet

Glossary

~ - approximately	e.MMC - Embedded managed NAND solution	IC - integrated circuits	NFC - near field communications	RF - radio frequency
1H/2H - first half/second half	EBITDA - earnings before interest, taxes, depreciation and amortization	IoT - internet of things	NLP - natural language processing	ROI - return on investment
2G/3G/4G - 2nd generation, third generation. 4th generation wireless	eMCP - embedded multi-chip module using DRAM and NAND	IP - intellectual property	nm - nanometer	RSP - Renesas Semiconductor products/Drivers
3G/4G - Third generation / Fourth generation	EMV - Europay, MasterCard and Visa, a payment consortium	ISM - Institute for Supply Management	NN - neural network	RSU - Restricted Stock Units
4G-LTE - Fourth generation, long term evolution	EOY - end of year	ITU - International Telecommunication Union	NOL - Net Operating Losses	SAS - serial attached SCSI (small computer system interface)
ADAS - Automotive driver assist systems	EPS - earnings per share	JPY - Japanese yen	NOR - a type of non-volatile storage memory	SAW - surface acoustic wave filters
AI - artificial intelligence	ET - envelope tracking	JV - joint venture	NPV - net present value	SDH - Synchronous Digital Hierarchy, mostly in Europe
ANN - artificial neural network	ETD - Emerging Technologies Division	K - Thousand	NVMe - Non-volatile Memory Express	SG&A - Sales, General and Administrative
APU - accelerated processing unit	EU - European Union	Kbps/Mbps - Kilobit per second/Megabit per second bandwidth	NYSE - New York Stock Exchange	SLAC - subscriber line audio-processing circuit
ARM - a family of instruction set architectures used for processors for computers, servers, etc.	EV - enterprise value	KGD - Known Good Die	ODM - original design manufacturer	SLIC - subscriber line interface circuit
ASIC - application specific integrated circuits	EvDO - Evolution Data Only	Kwpm - thousand wafer per month capacity	OEM - original equipment manufacturer	SMIC - Semiconductor Manufacturing International Corporation
ASP - average selling price	EVP - Executive Vice President	LIBOR - London Interbank Offered Rate	OFN - optical finger navigation	SoC - system on chip
ATM - Asynchronous Transfer mode	F - Fiscal	LQ - last quarter	OLT - Optical Line Termination or Terminal	SONET - Synchronous Optical Network, used in North America
B - Billion	FASB - Financial Accounting Standards Board	LSD - low single digits	OM - operating margin	SOX - Philadelphia semiconductor index
BAW - bulk acoustic wave filters	FBAR - film bulk acoustic resonator, a type of filter	LT - long term	ONU - Optical Network Unit	SRAM - static random access memory
BiDi - Bi Directional	FBAR/BAW -Film Bulk acoustic resonator/Bulk acoustic wave Filters	LTE - long term evolution, a 4th generation wireless protocol	Opex - operating expenses	SSD - solid state drive
BOM - bill of materials	FCF - free cash flow	LY - last year	P/B - price to book value ratio	TAM - total available market
bps - basis points	FDD LTE - Frequency Division Duplex Long Term Evolution	m - Meters	P/E - price to earnings	TD - time division
CA - carrier aggregation	FP - finger print	M - Million	P/S - price to sales	TDDI - touch display driver integration
CAGR - compound annual growth rate	FPGA - field programmable gate arrays	M&A - mergers and acquisitions	PA - power amplifier	TDD-LTE - Time Division Duplex Long Term Evolution
CAPEX - capital expenditures	FT - force touch	MB - megabyte	PAD - power amplifier duplexer, essentially 2 filters and a Power amplifier	TD-SCDMA - Time Division Synchronous
CDMA - code division multiple access	FTC - Federal Trade Commission	Mbps - megabit per second	PC - personal computer	TLC - triple level cell
CEO/CFO - Chief Executive/Chief Financial	FY - fiscal/full year	MCU - micro controller unit	PCIe - Peripheral Component Interconnect Express	Tx/Rx - Transmit / Receive
CES - consumer electronics show	GAAP - generally accepted accounting principles	MHz - megahertz	PMI - Purchasing Managers' Index	USB - universal serial bus
CF - cash flow	Gb/GB - gigabytes/Gigabit	MIIT - China Ministry of Industry and Information Technology	PMIC - Power Management Integrated Circuit	VCSEL - vertical-cavity surface-emitting laser
CFIUS - Committee on Foreign Investment in the United States	Gb/s - Gigabit per second	MIMO - multiple in, multiple out	PoE - Power over Ethernet	wpm - wafer per month
COO - Chief Operation Officer	GF - Global Foundries	ML - machine learning	PSD - Programmable systems division	x86 - Intel based processor architecture
CSP - chip scale packaging	GHz - gigahertz	MLC - multi level cell	PSoC - programmable system on a chip	XMC - Wuhan Xin Xin Semiconductor Manufacturing Corporation
CY - calendar year	GM - gross margin	MoE - merger of equals	PT - price target	y/y - year over year
D/E - debt to equity	GPU - graphics processing unit	MOFCOM - Ministry of Commerce People's Republic of China	Q - quarter	YE - year end
DCF - discounted cash flow	GSM - Global System for Mobile Communication	MSD - mid single digits	q/q - quarter over quarter	YTD - year to date
DL - deep learning	HDD - hard disk drive	MSM - multi station modems, QCOM's QCT chips	QCT - Qualcomm chip technologies	
DoD - Department of Defense	HSA - heterogeneous system architecture combining x86 and ARM	NAND - "not and," a type of memory	QTL - Qualcomm technology licensing	
DRAM - dynamic random access memory	HSD - high single digits	NB - notebook	R&D - research and development	
DT - desktop	I/O - input output operations	NDRC - National Development and Reform Commission in China	Rev - revenues	

Price Target Calculation and Key Risks

Advanced Micro Devices, Inc.

Price Target: We have AMD at Buy with a $15 PT, based on 2.9x our F18E P/S. We believe AMD is well positioned to execute in the gaming, VR, and AI markets with multiple new product releases and high demand in each of these segments.

Risks: AMD competes in a cyclical, technologically intensive industry and sells to a concentrated customer base. Its ability to meet its own or our financial expectations and achieve future growth is subject to a number of risk factors, including, but are not limited to, the following:

• Demand for AMDs products is variable and could differ from expectations;

• Gross margin percentage could vary significantly;

• Competition and pricing pressure from other low-cost OEMs, ODMs and suppliers;

• AMD relies on third party manufacturing;

• Unexpected changes in legal and regulatory requirements, tariffs and exchange rates, political and economic stability, staffing and management issues, and potentially adverse tax consequences for its international operations;

• Potential loss of intellectual property, Commercialization of competing technologies;

• Litigation Risks;

• Adverse effects of potential possible future patent or other litigation

Intel Corporation

Our 12-month price target of $42 is based on ~14.2x our 2018E non-GAAP EPS estimate of $2.95. In addition to competitive risks from a broad array of semiconductor and OEMs, macroeconomic risks and new product execution risks could impede the realization of our target price. INTC could see further LT upside from machine learning, deep learning, and AI. INTC has traded between a 10-16x forward P/E over the last five years.

Risks. We believe the risks to INTC are from a maturing PC market and limited traction in wireless and difficult comparables in tablets. Where we could be wrong is if INTC gets a significant foundry deal or makes a significant handset acquisition.

NVIDIA Corporation

Price Target: While NVDA's valuations are steep, we believe current street estimates are conservative, reflect licensing slowdown, so that improving PCs, gaming trends, VR, and datacenter position for upside to estimates. NVDA is also well positioned for the up and coming machine learning, deep learning, and AI markets. Our NVDA F17/F18(Jan) rev/EPS at $8.2B/$3.11 and $8.8B/$3.40 respectively. We have NVDA with a Buy-$170PT, ~50.0x F19E P/E, at the higher end of its historical valuations.

Risks. NVDA competes in a cyclical, technologically intensive industry and sells to a concentrated customer base. Its ability to meet its own or our financial expectations and achieve future growth is subject to a number of risk factors, including, but are not limited to, the following:

•Demand for NVDA's products is variable and could differ from expectations;

•Gross margin percentage could vary significantly;

•Competition and pricing pressure from other low-cost OEMs, ODMs, and suppliers;

•NVDA relies on third party manufacturing;

•NVDA has a very high valuation, and investors are risk averse having seen significant resets in equities trading at high valuations such as AMBA and MBLY. We believe where NVDA differs is a significantly diversified revenue base, low customer concentration and conservative estimates. Also its expected catalysts are near-term, compared to longer-term growth objectives that have technology and regulatory risks.

•Unexpected changes in legal and regulatory requirements, tariffs and exchange rates, political and economic stability, staffing and management issues, and potential adverse tax consequences;

•Seasonal fluctuations associated with consumer products and the PC market;

•Potential loss of intellectual property, commercialization of competing technologies;

•Adverse effects of potential possible future patent or other litigation;

•NVDA receives a significant amount of revenue from a limited number of customers

Companies Mentioned (prices as of 7/14)

Broadcom Limited (AVGO- Buy $250.29)   QUALCOMM Incorporated (QCOM- Buy $56.81)

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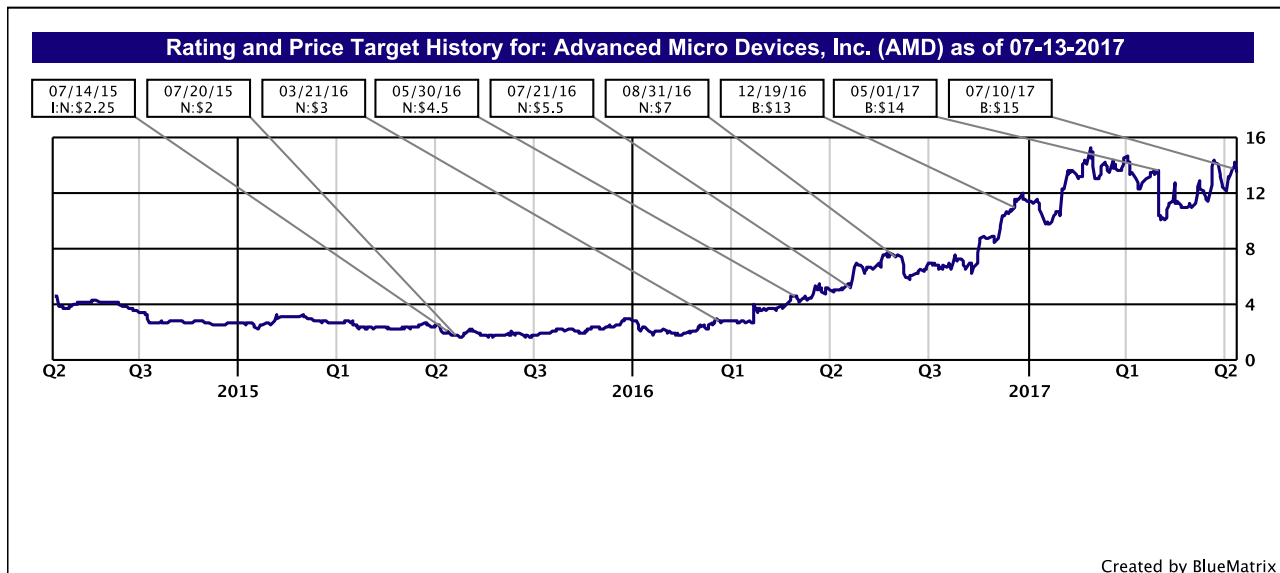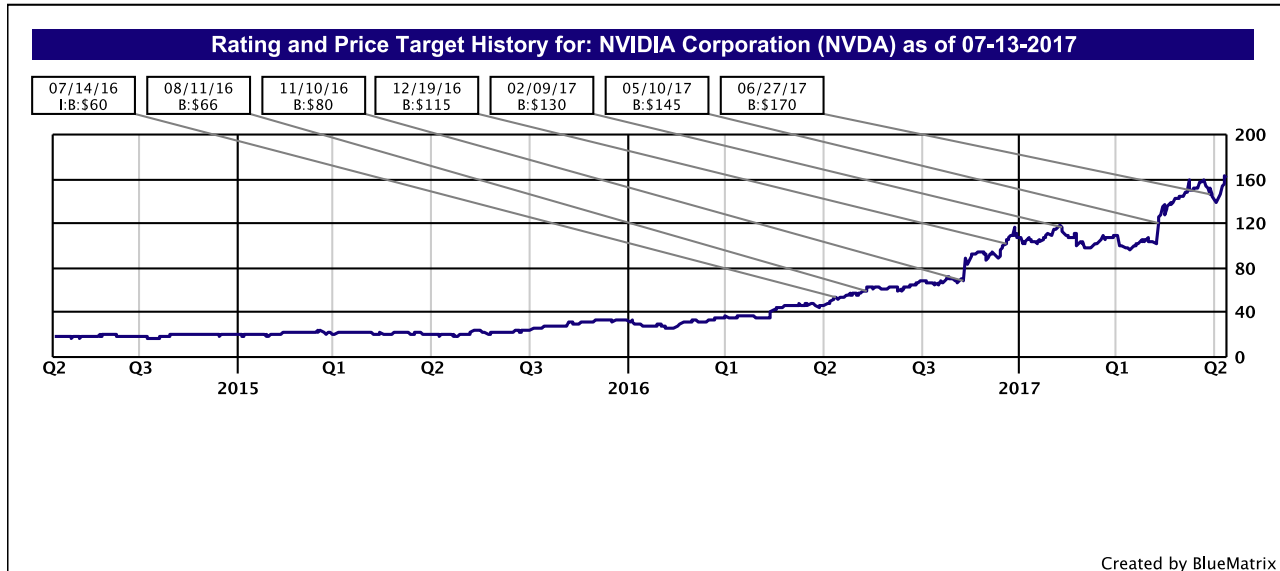|	
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Neutral:	Stocks for which the anticipated share price appreciation is within 10% of the share price.
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NR:	No Rating - not covered, and therefore not assigned a rating.

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(As of 7/14)	% of coverage	IB service past 12 mo
Buy (Buy)	43.24%	52.68%
Hold (Neutral)	50.97%	33.33%
Sell (Underperform)	5.79%	46.67%

For disclosure purposes only (NYSE and FINRA ratings distribution requirements), our Buy, Neutral and Underperform ratings are displayed as Buy, Hold and Sell, respectively.
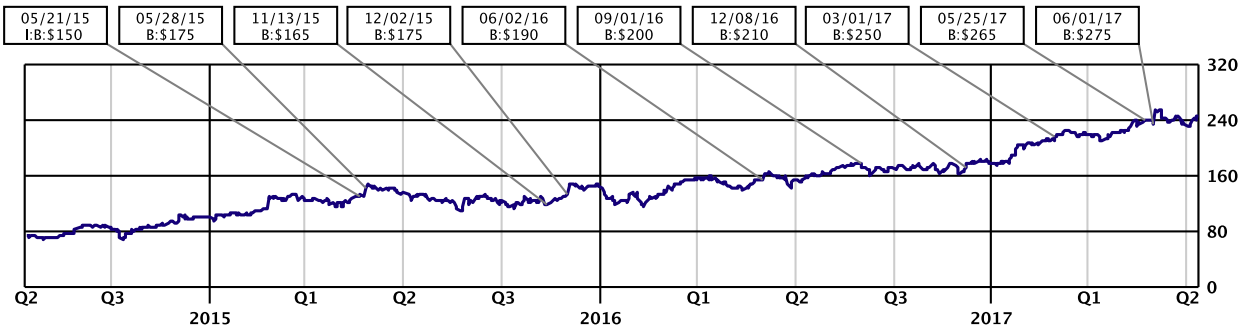
Rating and Price Target History for: NVIDIA Corporation (NVDA) as of 07-13-2017

07/14/16 I:B:$60	08/11/16 B:$66	11/10/16 B:$80	12/19/16 B:$115	02/09/17 B:$130	05/10/17 B:$145	06/27/17 B:$170

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Rating and Price Target History for: Advanced Micro Devices, Inc. (AMD) as of 07-13-2017

07/14/15 I:N:$2.25	07/20/15 N:$2	03/21/16 N:$3	05/30/16 N:$4.5	07/21/16 N:$5.5	08/31/16 N:$7	12/19/16 B:$13	05/01/17 B:$14	07/10/17 B:$15

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Rating and Price Target History for: Intel Corporation (INTC) as of 07-13-2017

| 04/21/15 RS:$0 | 07/14/15 I:N:$32 | 09/21/15 N:$31 | 01/11/16 B:$37 | 04/06/16 B:$36 | 07/20/16 B:$38 | 09/19/16 B:$42 |

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Rating and Price Target History for: Broadcom Limited (AVGO) as of 07-13-2017

| 05/21/15 I:B:$150 | 05/28/15 B:$175 | 11/13/15 B:$165 | 12/02/15 B:$175 | 06/02/16 B:$190 | 09/01/16 B:$200 | 12/08/16 B:$210 | 03/01/17 B:$250 | 05/25/17 B:$265 | 06/01/17 B:$275 |

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Rating and Price Target History for: QUALCOMM Incorporated (QCOM) as of 07-13-2017

| 10/07/14 D:RS:$84 | 04/21/15 RS:$0 | 07/14/15 I:N:$68 | 11/04/15 N:$64 | 01/13/16 N:$51 | 02/11/16 N:$47 | 04/11/16 N:$49 | 04/20/16 N:$50 | 07/20/16 N:$56 | 09/05/16 N:$59 | 09/29/16 B:$75 |

| 04/19/17 B:$68 | 05/01/17 B:$65 |
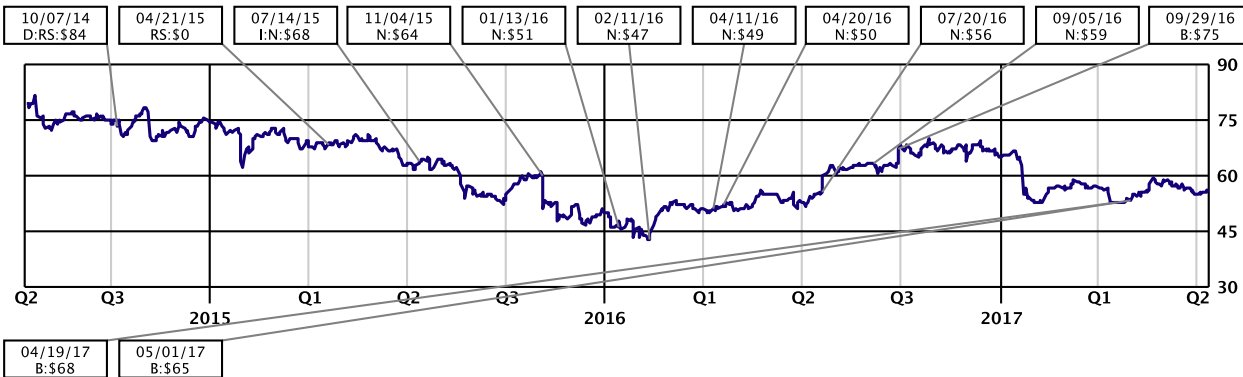
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