Americas Technology: Software

A deeper look at valuations and intrinsic value amidst rotation and rates

Despite a resilient demand environment and strong 4Q results, with the average company in our coverage beating 4Q consensus revenue by ~4%, outperformance in 2020 and elevated valuations coming into the year have left the sector vulnerable to headwinds, including rotation from growth to value and potentially higher rates ahead. Our broader software coverage is down ~18% on average since the 2/12 peak while SaaS EV/Sales multiples have compressed ~25% alongside a ~50bps rise in 10-year treasury yields. We sensitize our models for increases in the cost of equity and note a 100bps increase corresponded with a 14% impact to DCFs on average, which appears discounted in the 18% weakness noted above. However, we recognize the practicality of valuations often overshooting and undershooting intrinsic value during periods of uncertainty. That said, we continue to have a positive outlook for software and believe structural changes accelerated by the pandemic alongside secular tailwinds will likely drive durable growth for the foreseeable future. We believe greater durability of growth and cash generation at maturity is likely to offset the impact of higher rates over the long-term. We highlight ideas from this valuation analysis – MSFT, CRM, COUP, NOW, SPLK, SHOP, CRWD and PING.

Despite the recent correction, valuations across software remain elevated. Following ~25% multiple compression since the mid-February peak (Exhibit 9), valuations remain elevated relative to history. The average SaaS company is trading at ~10x EV/Sales (NTM) compared to a pre-COVID peak of ~8.5x (Exhibit 1). Despite a resilient demand environment for software (the average company in our coverage beat 4Q revenue expectations by ~4%), with 10-year treasury yields up ~120bps since their August 2020 trough investors remain concerned about the potential for further increases in interest rates and the corresponding impact on software assets. Alongside the potential for further increases in interest rates, strong outperformance in 2020 (the average name in our software coverage gaining +91% relative to the +44% return for the NASDAQ) and elevated valuations leave the sector vulnerable to rotation into value and pro cyclical recovery stocks as vaccines continue to be distributed.

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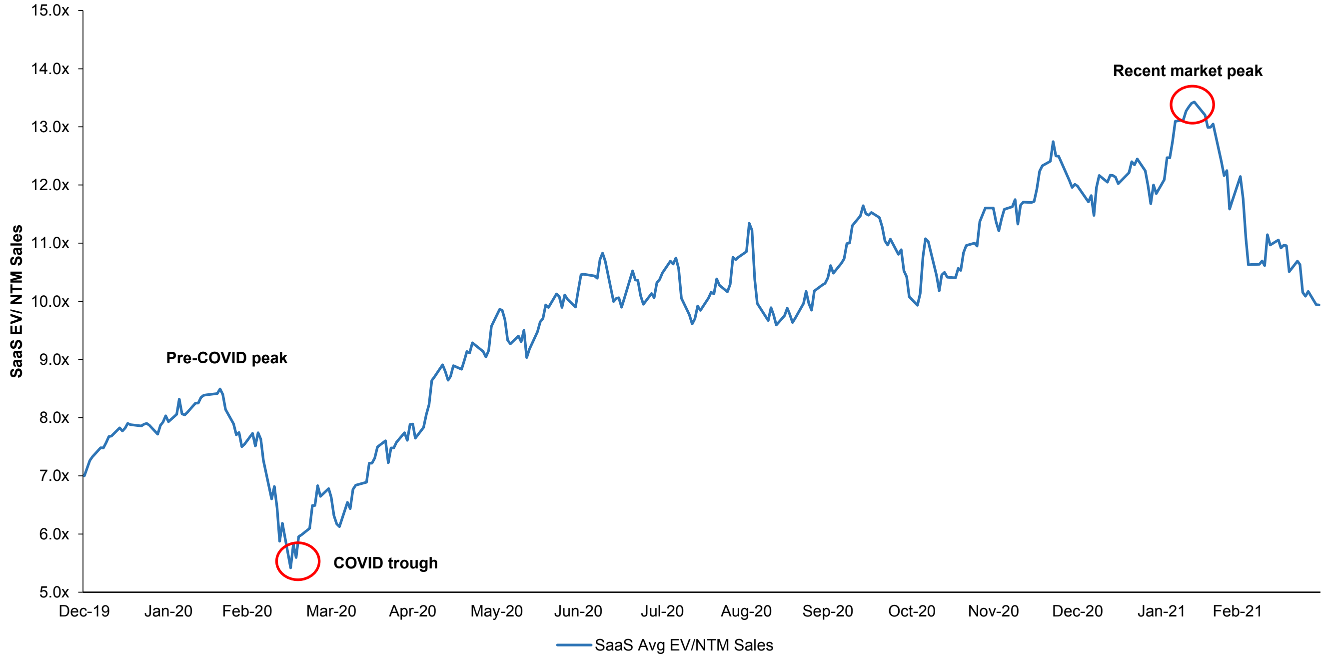
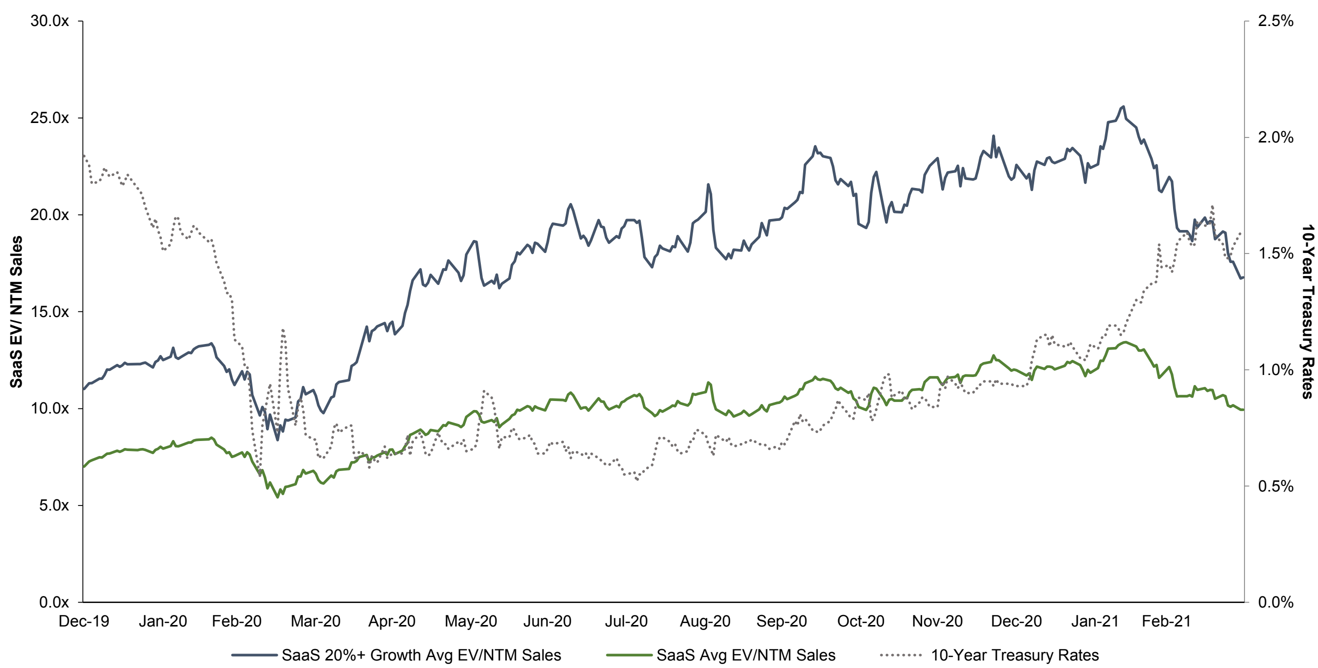
Exhibit 1: Software multiples remain above their pre-COVID peak
Average SaaS EV/NTM sales multiple



Pricing as of 03/30/2021

Source: Company data, FactSet, Goldman Sachs Global Investment Research

Exhibit 2: Average SaaS EV/NTM sales multiple & 10-year treasury rates



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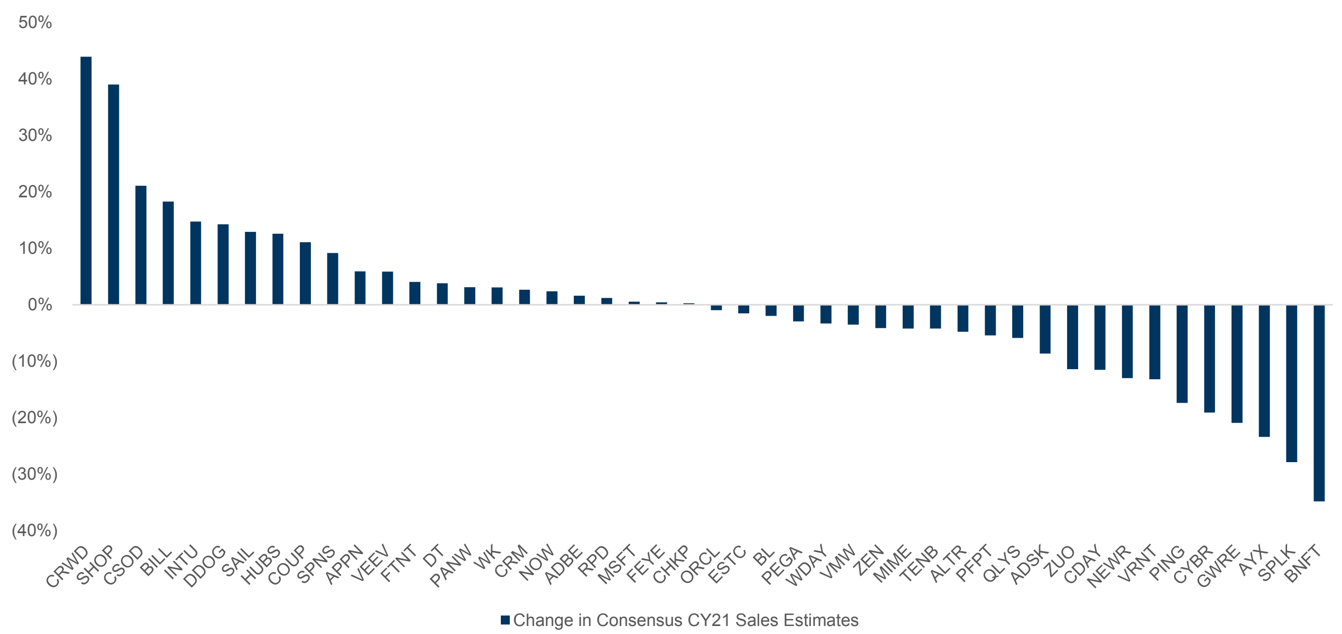
Source: Company data, FactSet

While multiples have compressed ~25%, in line with historical averages, we see ADBE, INTU, MSFT, CRM, NOW, WDAY, and SPLK valuations back at pre-COVID levels despite the broader sector at elevated multiples. In our view, it is helpful to provide historical context as to the magnitude and timing of the current correction relative to prior downturns (more below); however, we also note that despite the recent pullback valuations remain above their pre-COVID peak. On average, we note that CY21 consensus sales forecasts are roughly in line with pre-COVID estimates (Exhibit 3), while valuations have generally expanded. That said, within our broader software coverage, we highlight names where valuations have not re-rated meaningfully higher and the outlook for growth driven by accelerated digital transformation efforts is attractive (See the *Stocks in Focus* section for more detail on our high conviction ideas). Notably, ADBE, INTU, MSFT, CRM, NOW, WDAY, and SPLK are trading at comparable to more attractive valuations than their pre-pandemic peaks despite the 10-year treasury yield currently ~20bps higher.

Exhibit 3: CY21 consensus sales estimates relative to pre-COVID forecasts

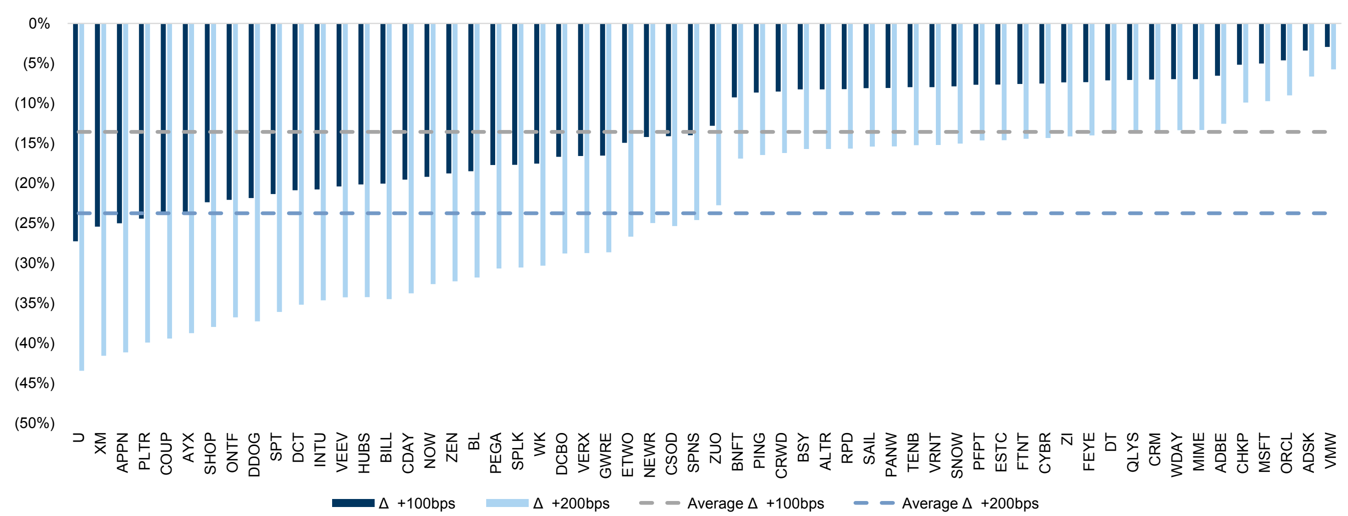


Source: FactSet, Goldman Sachs Global Investment Research

While demand has remained resilient, rising interest rates have the potential to drive continued volatility across software. To assess the potential impact from rising rates, for illustrative purposes, we analyzed the impact of a potential 100bps and 200bps rise in the cost of equity on the DCF component of our valuation across our US Software coverage universe. On average, these increases in the cost of equity imply a 14% and 24% decline, respectively, in the DCF components of our valuation analyses (Exhibit 4). While lower interest rates over the course of 2020 helped sustain higher multiples across our software coverage last year (Exhibit 2), we note that further increases in rates have the potential to drive near term volatility and could present a headwind to valuations across the sector alongside investor rotations to value and pro-cyclical recovery stocks.

However, rising rates and stronger macro are supportive of software growth prospects. That said, higher rates resulting from a more robust macroeconomic environment may coincide with continued improvements in the overall demand environment and therefore more robust growth across software. We believe the fundamental outlook for software remains attractive and that the durability and sustainability of secular growth of software assets is difficult to capture and often underappreciated, with sustainable long-term growth having the potential to partially offset near-term headwinds; we believe long-term fundamentals will ultimately drive performance.

Exhibit 4: Our illustrative analysis suggests, a potential 1% and 2% increase in the cost of equity could have a 14% and 24% average decline in our DCF analyses

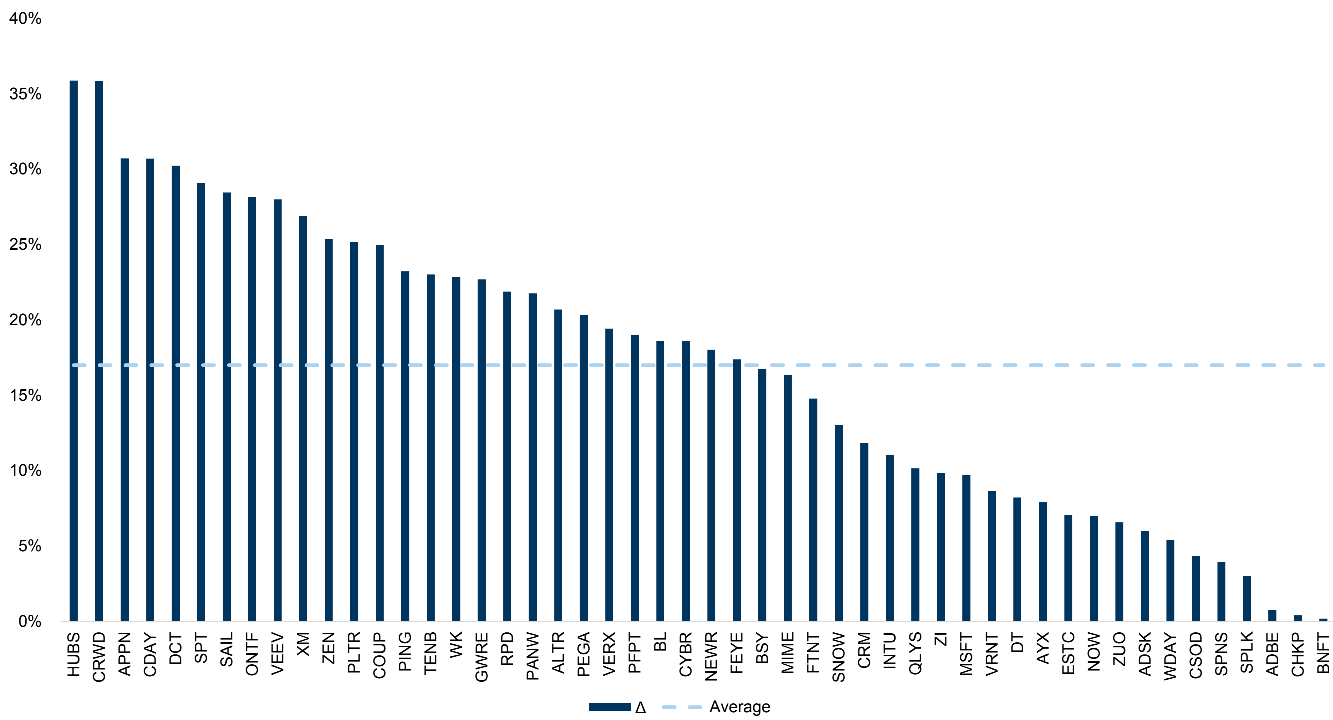


ZS and SCWX not shown as price target methodology does not contain a DCF component

Source: Company data, FactSet, Goldman Sachs Global Investment Research

Durable secular tailwinds propelling growth are often underappreciated and can help offset near-term headwinds. While software has been propelled by strong secular growth drivers, we believe the pandemic has accelerated digital transformation efforts across verticals with behavioral and structural changes catalyzed by COVID-19 likely to sustain growth in software for the foreseeable future. Strong secular tailwinds alongside durable recurring revenue business models common across software should drive long-term sustainable growth, which is often underestimated by investors. Compounding revenue outperformance over time alongside strong operating leverage often leads to software companies becoming profitable earlier than expected; with cash flows realized earlier than expected by consensus, DCFs may overstate potential sensitivity to rising discount rates. Similarly, with the Cloud's ~25bps share of global GDP (see our initiation for more detail) we see the potential for a few decades of growth ahead within the $1tn+ cloud TAM. This has the potential to drive elevated levels of growth beyond many DCF forecast horizons. To illustrate, we assess the impact to our DCFs across our software coverage by extending each forecast horizon by 2 years. On average, this corresponded with a ~17% increase in the DCF component of our valuation (Exhibit 5).

Exhibit 5: Extending our DCFs by 2 years resulted in a ~17% higher present value on average



Source: Company data, FactSet, Goldman Sachs Global Investment Research

With Strong secular tailwinds and a large $1tn+ we see a multi-decade runway for continued growth across software. A fundamental reason the software sector is an attractive investment opportunity is the large and expanding TAM, with our bottom-up TAM analysis (Exhibit 6) pointing to a $1tn+ cloud TAM. For software companies that are well positioned and can consistently execute, this can result in compelling multi-year high-growth highly-profitable business models. To that end, in our recent initiation, we outline an 8-factor framework for investing in Software consisting of a blend of both quantitative and qualitative factors. While, based on our experience, every software company is unique, with its own DNA and tendencies, in the GS Framework for Investing in Software, we have identified what we believe are 8 key factors, highlighted in Exhibit 7 below.

Exhibit 6: GS bottom-up software TAM build

	TAM available ($bn)	Cloud TAM 2020E ($bn)	% cloud	TAM 2025 ($bn)	% cloud	CAGR (20-25)	Metric	ASP/mo
TOTAL SAAS	**823**	**149**	**18%**	**412**	**50%**	**23%**		
Front Office	**230**	**49**	**21%**	**145**	**63%**	**24%**		
Enterprise content management	48	17	35%	38	80%	18%	80 # of creative employees (mn)	50
Sales	39	10	26%	23	60%	18%	34 # of employees (mn)	96
Marketing	48	7	15%	26	55%	30%	2 # of companies 10+ workers (r	2,000
eCommerce	30	4	13%	24	80%	43%	1,500 GMV $ bn	2%
Go-to-market intelligence	36	2	6%	11	30%	40%	18 # of employees (mn)	171
Service	29	9	31%	22	75%	19%	20 # of employees (mn)	121
Back Office	**95**	**21**	**22%**	**52**	**55%**	**20%**		
HCM incl payroll	33	11	33%	21	65%	14%	550 # of employees (mn)	5
Finance	35	4	11%	16	45%	32%	12 # of employees (mn)	245
Travel and Expense	7	3	45%	5	70%	9%	220 # of travelling employees (mn)	2.5
Supply chain/manufacturing	20	3	15%	10	50%	27%	5 # of employees (mn)	328
Business Intelligence	22	3	14%	13	60%	35%	55 # of employees (mn)	34
Communications/collaboration	**376**	**58**	**15%**	**134**	**36%**	**18%**		
Unified Communications (UCaaS)	96	7	7%	29	30%	33%	400 # of PBX employees (mn)	20
Call center (CCaaS)	27	3	11%	11	40%	29%	15 # of PBX employees (mn)	150
Communications platforms (CPaaS)	72	4	6%	18	25%	35%	2 # of companies 10+ workers (r	3,000
Office productivity	53	30	57%	42	80%	7%	550 # of employees (mn)	8
Online storage	19	6	31%	12	60%	14%	550 # of employees (mn)	3
Project management	40	3	8%	14	35%	36%	550 # of employees (mn)	6
Desktop as a Service	69	5	7%	8	12%	11%	550 # of employees (mn)	11
IT Operations/Management & DevOps	**100**	**18**	**17%**	**69**	**69%**	**31%**		
Apps performance (APM)/infrastructure	20	4	17%	16	80%	36%	60 # of servers (mn)	28
IT Service Management (ITSM)	34	7	21%	24	70%	27%	40 # of non-devs IT employees (n	70
Security Info Event Management (SIEM)	23	3	13%	12	55%	33%	236 # of large companies ('000)	8,000
DevOps	24	4	17%	17	70%	33%	236 # of large companies ('000)	8,333
TOTAL PAAS	**138**	**27**	**20%**	**82**	**60%**	**25%**		
Database as a Service (DBaaS)	42	10	24%	23	55%	18%	6 # of database servers (mn)	584
Integration Platform as a Service (iPaaS)	40	5	13%	14	35%	23%	236 # of large companies ('000)	14,000
Application Platform as a Service (aPaaS)	57	12	21%	45	80%	30%	236 # of large companies ('000)	20,000
TOTAL IAAS	**211**	**58**	**28%**	**133**	**63%**	**18%**		
Compute	124	32	26%	81	65%	20%	60 # of servers (mn)	173
Storage	86	26	30%	52	60%	15%	60 # of servers (mn)	120
GRAND TOTAL	**1,172**	**234**	**20%**	**627**	**54%**	**22%**		
% SaaS mix	**70%**	**64%**		**66%**				
% PaaS	**12%**	**12%**		**13%**				
% IaaS	**18%**	**25%**		**21%**				

Source: Company data, US Census Bureau, IDC, Gartner, Goldman Sachs Global Investment Research

Exhibit 7: GS Framework for Investing in Software

GS FRAMEWORK FOR INVESTING IN SOFTWARE

8 KEY FACTORS	TANGIBLE	INTANGIBLE
TAM	Top-down sizing Bottom-up sizing	Is pricing sustainable? Is it a feature or a real market?
SECULAR THEMES	Customers spending more on DX, UCaaS, CPaaS, CCaaS AI and IoT initial use cases	Is it a pull-forward of demand or a permanent shift? Is it a feature or a real secular trend?
ENTRY/EXIT POINTS	Technical analysis Sector historical valuation parameters	When to buy? Rotation or short-term mis-execution? When to sell? Valuation ahead of fundamentals?
LT FRAMEWORK RETURN	Long-term revenue/margins scenarios Compounded return outcomes based on long-term scenarios	Which scenario is more likely? What are possible risk-reward scenarios?
UNIT ECONOMICS	Lifetime value (LTV) calculation Customer acquisition cost (CAC) calculation; LTV/CAC	How does competition impact customer lifetime? How does upsell and cross-sell impact CAC and cost to serve?
PLATFORM/ BEST OF BREED	Diversified revenue mix Best of breed gaining market share	Are there actual synergies between the revenue streams? Can the best of breed "cross the chasm"?
COMPETITIVE MOAT	Revenue per R&D dollar Size of install base	Are there disruptive technologies? Why is the install base demanding bigger price discounts?
ESG	Carbon neutral = data center usage + carbon offsets Company becoming a large platform	What are the social impacts of AI products? What are the regulatory or security breach risks?

Source: Goldman Sachs Global Investment Research

Based on our maintenance vs. growth analysis, MSFT, CRM, and SPLK screen as attractive with limited growth optionality embedded at current levels. As companies across our coverage invest for growth, profit potential and valuation support from existing business is often understated. While the recent ~25% multiple compression is in line with average historical corrections, valuations across software remain elevated. We triangulate current valuations across our software coverage against the intrinsic value of software companies' current maintenance base versus the 'growth' optionality embedded in current price. As companies continue to invest ahead of large market opportunities, profitability of the existing installed base is often understated, particularly as software companies invest heavily to acquire new customers. To help frame potential downside protection, we evaluate the FCF generation potential of these assets under a no growth scenario, where companies optimize for current FCF generation as opposed to growth. We perform an illustrative scenario analysis across our US software coverage universe to identify the theoretical value of each company under a no growth scenario and conversely the implied value from investors' expectations for future growth. In our zero growth methodology we use a standardized 4% WACC and assume that companies limit S&M spend to replacing churn, with no net new spending on growth. We also make assumptions regarding R&D and G&A intensity under a no growth scenario, with limited investments in new product developments, hiring, etc. As detailed in Exhibit 8, we calculate on average 78% of the current value of our software coverage is supported by our theoretical no growth scenario or maintenance. Conversely, ~22% of valuations on average are supported by future growth expectations. Although, we note that this metric varies widely across our coverage. Within our large cap coverage, we note that MSFT, CRM, and SPLK screen attractive with 15%, 8% and -2% of current valuations likely attributable to growth expectations, suggesting valuation support at current levels.

Exhibit 8: Triangulating valuations against intrinsic value software companies' current maintenance base vs. growth optionality

			12-Month				**Zero Growth**		
	Rating	Current Price	Price Target	Upside/ Downside	Revenue ($bn) at 0% Growth	Zero Growth Revenue Multiple	Theoretical Value/Share	Maintenance	Growth
CRWD	Buy	$174	$246	42%	$0.87	3.1x	$17	7%	93%
SNOW	Neutral	$223	$270	21%	$0.59	9.0x	$28	7%	93%
BILL	Neutral	$138	$152	10%	$0.18	7.3x	$22	11%	89%
SHOP	Buy	$1,040	$1,680	62%	$2.93	7.0x	$178	16%	84%
ZUO	Sell	$14	$12	-16%	$0.31	1.0x	$3	16%	84%
ZS	Neutral	$166	$232	40%	$0.54	8.9x	$37	20%	80%
PLTR	Buy	$22	$34	56%	$1.09	10.0x	$5	21%	79%
HUBS	Buy	$424	$636	50%	$0.88	5.1x	$88	21%	79%
DDOG	Buy	$77	$140	82%	$0.60	9.3x	$16	22%	78%
CDAY	Neutral	$82	$99	21%	$0.84	3.6x	$16	23%	77%
XM	Neutral	$34	$47	39%	$0.76	6.1x	$8	23%	77%
SPT	Buy	$51	$94	83%	$0.13	5.3x	$15	26%	74%
APPN	Neutral	$127	$180	42%	$0.30	8.1x	$34	26%	74%
COUP*	Buy	$242	$413	71%	$0.54	10.2x	$56	28%	72%
DCT	Neutral	$42	$49	16%	$0.22	8.0x	$16	34%	66%
ZI	Buy	$50	$65	31%	$0.48	14.8x	$16	35%	65%
VEEV	Neutral	$250	$337	35%	$1.47	10.9x	$102	40%	60%
ALTR	Neutral	$61	$65	6%	$0.47	4.7x	$27	43%	57%
ZEN	Buy	$127	$195	53%	$1.03	8.2x	$62	51%	49%
BSY	Neutral	$45	$48	8%	$0.80	9.4x	$24	54%	46%
NOW	Buy	$485	$695	43%	$4.52	11.6x	$267	54%	46%
BL	Neutral	$104	$137	32%	$0.35	10.7x	$61	59%	41%
GWRE	Buy	$102	$140	37%	$0.76	6.9x	$60	59%	41%
DT	Buy	$47	$65	39%	$0.66	12.3x	$28	60%	40%
WK	Neutral	$83	$101	22%	$0.35	7.6x	$50	60%	40%
ESTC	Neutral	$106	$165	56%	$0.55	10.7x	$71	66%	34%
ONTF	Buy	$46	$88	93%	$0.16	10.6x	$31	67%	33%
PEGA	Buy	$113	$182	62%	$1.02	6.9x	$76	68%	32%
SAIL	Buy	$48	$69	43%	$0.37	8.7x	$34	69%	31%
ADSK	Sell	$271	$260	-4%	$3.79	10.9x	$186	69%	31%
WDAY	Buy	$243	$300	23%	$4.32	9.7x	$173	70%	30%
ADBE	Buy	$469	$580	24%	$12.87	12.4x	$332	71%	29%
AYX	Buy	$80	$161	102%	$0.50	9.4x	$59	76%	24%
NEWR	Sell	$58	$59	1%	$0.65	5.0x	$46	79%	21%
RPD	Buy	$75	$106	42%	$0.41	7.6x	$59	80%	20%
INTU	Neutral	$375	$450	20%	$7.72	11.3x	$320	85%	15%
MSFT*	Buy	$235	$315	34%	$153.28	9.6x	$202	85%	15%
VERX	Neutral	$22	$28	25%	$0.37	7.7x	$20	89%	11%
FTNT	Buy	$184	$179	-3%	$2.59	9.9x	$166	90%	10%
TENB	Buy	$36	$57	57%	$0.44	8.0x	$33	90%	10%
CRM*	Buy	$211	$315	49%	$21.25	8.3x	$194	92%	8%
QLYS	Sell	$106	$97	-8%	$0.36	9.8x	$99	93%	7%
PING	Buy	$22	$34	55%	$0.24	7.7x	$22	102%	-2%
SPLK	Buy	$135	$215	59%	$2.23	10.6x	$137	102%	-2%
CYBR	Neutral	$127	$176	38%	$0.46	10.2x	$135	107%	-7%
PANW	Buy	$320	$460	44%	$3.78	8.9x	$347	109%	-9%
PFPT	Neutral	$128	$139	9%	$1.05	9.5x	$167	134%	-34%
SPNS	Neutral	$31	$38	22%	$0.38	6.1x	$43	139%	-39%
BNFT	Neutral	$14	$13	-4%	$0.27	3.2x	$22	152%	-52%
MIME	Neutral	$40	$49	23%	$0.48	7.9x	$60	155%	-55%
CSOD	Neutral	$43	$58	35%	$0.74	8.8x	$77	160%	-60%
ORCL	Sell	$71	$60	-16%	$39.70	10.1x	$123	163%	-63%
FEYE	Buy	$19	$26	34%	$0.94	7.8x	$32	170%	-70%
VMW	Neutral	$155	$150	-3%	$11.77	10.3x	$286	185%	-85%
SCWX	Sell	$13	$14	4%	$0.56	2.9x	$23	185%	-85%
CHKP	Neutral	$116	$130	12%	$2.06	11.5x	$200	196%	-96%
VRNT	Buy	$45	$60	35%	$0.83	8.5x	$94	204%	-104%
Average						**8.4x**		**78%**	**22%**

*On the regional Conviction List. Priced as of 3/30/2021.

Source: Company data, FactSet, Goldman Sachs Global Investment Research

As highlighted in our initiation report, significant market corrections are often driven by external macroeconomic shocks. These corrections offer opportunities to build long positions, in retrospect investors realize that companies with large expanding TAMs, strong sales execution and good management teams, outperform in the long run. A look at the brief history of pullbacks (Exhibit 9) in the technology sector reveal that corrections in tech valuations today tend to be shorter in duration, albeit sharper. The average multiple compression in the last 21 corrections has been -27% which is in line with the -27% peak to trough compression in 2021. In contrast, 2002 multiples compressed from peak to trough valuation by -50% over ~9 months and the Global Financial Crisis in 2008 triggered a sharp -60% multiple compression over ~6 months. SaaS momentum has supported high valuations in the recent years, as more software companies pivot toward subscription-based recurring business models, along with increased cloud penetration and secular trends including Digital Transformation. In fact, in the years 2012, 2013, 2017 and 2019, multiples for GS covered Software companies expanded despite external shocks such as the 2012 Sovereign Debt Crisis in Europe, Greece currency instability in early 2014 and more recently the trade dispute with China in 2018/2019.

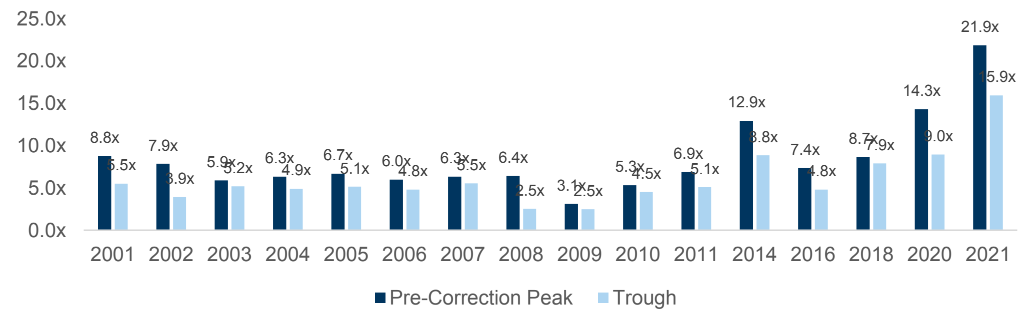
Exhibit 9: Across the broader coverage group multiples have on average compressed ~-27% in 21 years

Peak Date	Pre-Correction Peak	Trough Date	Trough	Correction Duration (Months)	EV/ Sales Multiple Compression
7/17/2001	8.8x	9/27/2001	5.5x	2.4	-37%
1/9/2002	7.9x	10/7/2002	3.9x	9.0	-50%
1/14/2003	5.9x	3/11/2003	5.2x	1.9	-12%
1/20/2004	6.3x	8/12/2004	4.9x	6.8	-22%
1/3/2005	6.7x	4/28/2005	5.1x	3.8	-23%
4/27/2006	6.0x	7/13/2006	4.8x	2.6	-19%
2/21/2007	6.3x	3/13/2007	5.5x	0.7	-13%
6/5/2008	6.4x	11/20/2008	2.5x	5.6	-60%
1/6/2009	3.1x	3/9/2009	2.5x	2.1	-20%
4/26/2010	5.3x	6/30/2010	4.5x	2.2	-15%
7/7/2011	6.9x	8/19/2011	5.1x	1.4	-26%
3/5/2014	12.9x	4/11/2014	8.8x	1.2	-32%
1/4/2016	7.4x	2/9/2016	4.8x	1.2	-35%
1/26/2018	8.7x	2/8/2018	7.9x	0.4	-9%
2/19/2020	14.3x	3/16/2020	9.0x	0.9	-37%
2/12/2021	21.9x	3/8/2021	15.9x	0.8	-27%
Average	**8.4x**		**6.0x**		**-27%**

Analysis is based on a list of ~70 covered companies across GS software teams.

Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 10: In recent years, pullbacks tended to be shorter in duration with sharper EV/TTM Sales multiple compressions



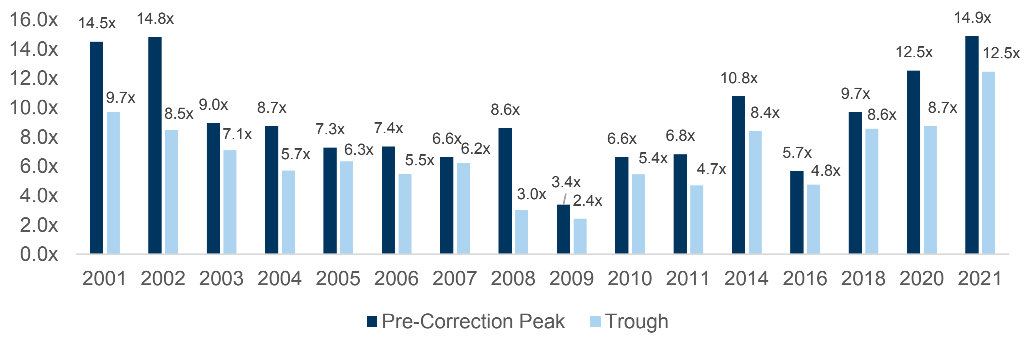
Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 11: Average correction in multiples of Large Cap stocks (~-26%) is lower than that of Mid & Small Caps

Peak Date	Pre-Correction Peak	Trough Date	Trough	Correction Duration (Months)	EV/ Sales Multiple Compression
7/17/2001	14.5x	9/27/2001	9.7x	2.4	-33%
1/9/2002	14.8x	10/7/2002	8.5x	9.0	-43%
1/14/2003	9.0x	3/11/2003	7.1x	1.9	-21%
1/20/2004	8.7x	8/12/2004	5.7x	6.8	-35%
1/3/2005	7.3x	4/28/2005	6.3x	3.8	-13%
4/27/2006	7.4x	7/13/2006	5.5x	2.6	-25%
2/21/2007	6.6x	3/13/2007	6.2x	0.7	-6%
6/5/2008	8.6x	11/20/2008	3.0x	5.6	-65%
1/6/2009	3.4x	3/9/2009	2.4x	2.1	-28%
4/26/2010	6.6x	6/30/2010	5.4x	2.2	-18%
7/7/2011	6.8x	8/19/2011	4.7x	1.4	-31%
3/5/2014	10.8x	4/11/2014	8.4x	1.2	-22%
1/4/2016	5.7x	2/9/2016	4.8x	1.2	-16%
1/26/2018	9.7x	2/8/2018	8.6x	0.4	-12%
2/19/2020	12.5x	3/16/2020	8.7x	0.9	-30%
2/12/2021	14.9x	3/8/2021	12.5x	0.8	-16%
Average	**9.2x**		**6.7x**		**-26%**

Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 12: Peak to trough EV/Sales compression of Large Cap software stocks



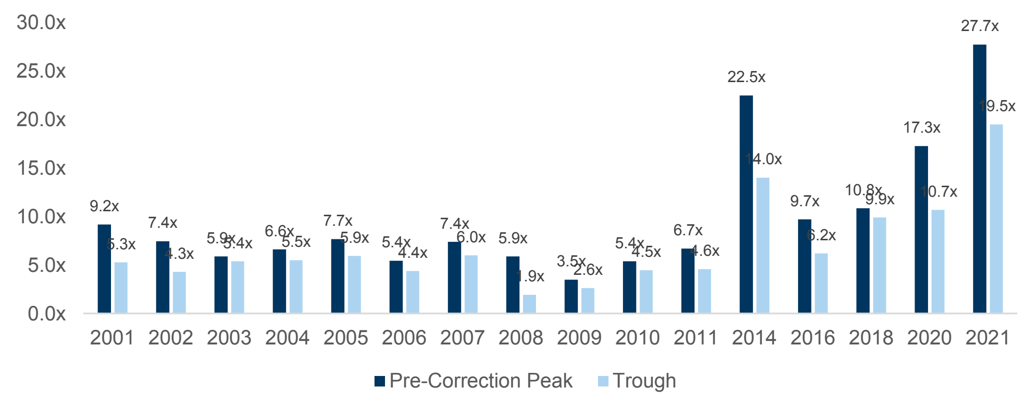
Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 13: Average historic correction in multiples of Mid Cap stocks is ~-29%

Peak Date	Pre-Correction Peak	Trough Date	Trough	Correction Duration (Months)	EV/ Sales Multiple Compression
7/17/2001	9.2x	9/27/2001	5.3x	2.4	-43%
1/9/2002	7.4x	10/7/2002	4.3x	9.0	-42%
1/14/2003	5.9x	3/11/2003	5.4x	1.9	-9%
1/20/2004	6.6x	8/12/2004	5.5x	6.8	-17%
1/3/2005	7.7x	4/28/2005	5.9x	3.8	-23%
4/27/2006	5.4x	7/13/2006	4.4x	2.6	-19%
2/21/2007	7.4x	3/13/2007	6.0x	0.7	-19%
6/5/2008	5.9x	11/20/2008	1.9x	5.6	-67%
1/6/2009	3.5x	3/9/2009	2.6x	2.1	-25%
4/26/2010	5.4x	6/30/2010	4.5x	2.2	-17%
7/7/2011	6.7x	8/19/2011	4.6x	1.4	-32%
3/5/2014	22.5x	4/11/2014	14.0x	1.2	-38%
1/4/2016	9.7x	2/9/2016	6.2x	1.2	-36%
1/26/2018	10.8x	2/8/2018	9.9x	0.4	-9%
2/19/2020	17.3x	3/16/2020	10.7x	0.9	-38%
2/12/2021	27.7x	3/8/2021	19.5x	0.8	-30%
Average	**9.9x**		**6.9x**		**-29%**

Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 14: Peak to trough EV/Sales compression of Mid Cap software stocks



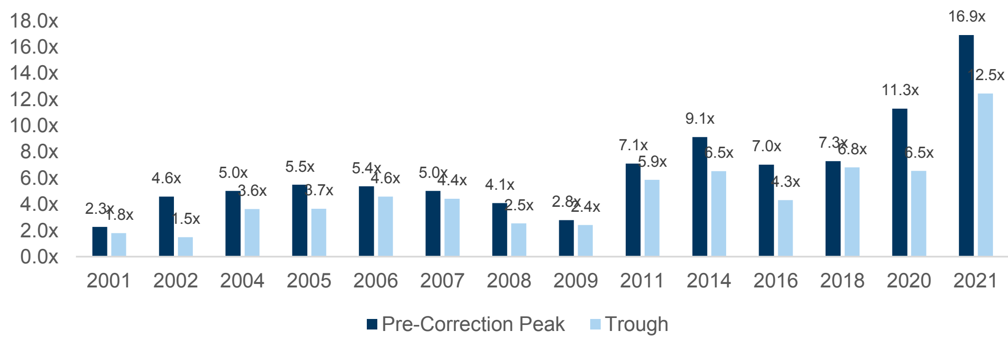
Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 15: Average historic correction in multiples of Small Cap stocks is ~-28%

Peak Date	Pre-Correction Peak	Trough Date	Trough	Correction Duration (Months)	EV/ Sales Multiple Compression
7/17/2001	2.3x	9/27/2001	1.8x	2.4	-21%
1/9/2002	4.6x	10/7/2002	1.5x	9.0	-68%
1/20/2004	5.0x	8/12/2004	3.6x	6.8	-27%
1/3/2005	5.5x	4/28/2005	3.7x	3.8	-33%
4/27/2006	5.4x	7/13/2006	4.6x	2.6	-15%
2/21/2007	5.0x	3/13/2007	4.4x	0.7	-12%
6/5/2008	4.1x	11/20/2008	2.5x	5.6	-38%
1/6/2009	2.8x	3/9/2009	2.4x	2.1	-13%
7/7/2011	7.1x	8/19/2011	5.9x	1.4	-17%
3/5/2014	9.1x	4/11/2014	6.5x	1.2	-29%
1/4/2016	7.0x	2/9/2016	4.3x	1.2	-38%
1/26/2018	7.3x	2/8/2018	6.8x	0.4	-7%
2/19/2020	11.3x	3/16/2020	6.5x	0.9	-42%
2/12/2021	16.9x	3/8/2021	12.5x	0.8	-26%
Average	**6.7x**		**4.8x**		**-28%**

Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 16: Peak to trough EV/Sales compression of Small Cap software stocks



Source: FactSet, Goldman Sachs Global Investment Research

Stocks in Focus

As noted above, we believe accelerated digitization across industries alongside structural and behavioral changes catalyzed by the COVID-19 pandemic will drive sustainable growth in software for the foreseeable future. With a large and expanding $1tn+ Cloud TAM, we see ample runway for growth over the next several decades. While elevated valuations and the potential for rising further increases in interest rates may drive near-term volatility in software assets, we believe long-term fundamentals will ultimately drive performance. We highlight our high conviction names below:

- **Salesforce**: Salesforce remains poised to be one of the most strategic application software companies in the $1tn+ TAM cloud industry, in our view. With a broad and expanding platform that spans sales, service, ecommerce, marketing, BI/analytics, artificial intelligence, custom applications, integration, and collaboration, we view Salesforce as well positioned to capitalize on accelerated digital transformation spending, as enterprises across verticals grapple to form a holistic view of their customers across an increasingly complex customer journey involving multiple touchpoints and channels. We believe the core business can sustain growth in the high-teens organically, while its completed acquisitions continue to augment the core. We see runway for continued margin expansion organically and believe many investors, while apprehensive about a $20bn+ business operating at sub 20% operating margins, do not fully appreciate the earnings' capacity of the business at maturity. With the stock trading at a sizeable discount to the group and the lowest EV/Sales multiple of all the large-cap software names under coverage, we continue to see risk/reward as attractive at current levels. See our adding COUP, CRM, and MSFT to the Conviction List note for more detail.

  Our 12-month price target of $315 is based on an equal blend of DCF, EV/FCF, and EV/sales. Our DCF assumes a perpetuity growth rate of ~1%, our Q5-Q8 EV/FCF assumes 48x, and our Q5-Q8 EV/sales analysis assumes 10x Q5-Q8 sales. Key risks to our thesis include: sales execution, macroeconomic slowdown, unsustainable pace of acquisitions, slower than expected operating margin expansion or higher than expected expense growth, and adverse changes in the IT spending environment.

- **ServiceNow:** ServiceNow's low-code workflow platform built using a common data model on unified architecture with out of the box APIs that facilitate integration with critical applications, allows for rapid application development. Custom applications based on the workflow platform replace human-intensive processes such as vaccine registrations, core banking transactions, program enrollment, risk management, etc. where packaged applications either don't exist or are cumbersome. The workflow-based platform also allows for relatively quick implementations in a matter of weeks across the enterprise. In addition to serving its core ITSM and ITOM markets with a packaged application, management is positioning the core workflow engine as a key application to automate several white space opportunities in the CRM and HCM markets. The easy integration of NOW's workflow-based applications with traditional relational database-oriented applications such as CRM, HCM and ERP makes for complete coverage of business processes end to end. The pandemic is driving the need for workflow-based applications such as network monitoring, vaccine registrations, return to work, safety screening, etc., which is playing to NOW's strengths. AI capabilities augment NOW's core workflow strengths to help create new applications and add predictive capabilities to existing ones. Finally, a network of strong SI partnerships should help scale NOW's global footprint longer-term as it works its way towards $15 billion in revenues.

  Our 12-month price target of S695 is derived from an equal weighting of a DCF (~3% perpetuity growth rate), 64x Q5-Q8 EV/FCF, and 21x Q5-Q8 EV/Sales. Key risks include COVID-19 related negative impacts on delayed sales cycles, slower new deal flow from impacted verticals and higher expense growth limiting margin expansion.

- **Splunk:** Splunk's core value proposition is its ability to ingest, collect, index, and search data irrespective of size, source, and format. The fundamental technology, schema-on-the-fly or schema-on-read, is unique vs. peers, and provides customers with flexibility to leverage the massive amounts of log and metadata created across cloud services and endpoints. This, coupled with Splunk's interoperability and scalability powers the company's various use cases across Security, Analytics, IT Operations, Observability and Monitoring. Given the increasing dynamism and complexity of IT environments, we believe the market represents the inevitable consolidation of pure-play tools across Security and Analytics (SIEM), IT Operations, APM, Infrastructure Monitoring, and AIOps into a unified solution. Currently, the market looks competitive on the surface with multiple vendors all approaching the market through differing lenses: Splunk (Log and Security), Elastic (Search and Log), Dynatrace (APM), AppDynamics (APM), Datadog (Infrastructure Monitoring). We believe the winner will bring an integrated cloud infrastructure portfolio that covers these point solutions and eliminate integration burdens and buying inefficiencies for customers. While in the long term as the market continues to evolve, we expect Splunk to assert itself as a strong contender, in the near term, we believe the market is very large and underpenetrated, giving room for multiple companies including Elastic and Datadog to benefit.

Our 12-month price target of $215 is based on a three-pronged valuation framework based on a 35% weight to a DCF, 35% weight to a target EV/Sales multiple, and a 30% weight to an M&A target multiple. Our DCF assumes a 7.5% discount rate, and a 2.5% perpetual growth rate. We use a 9x Q5-Q8 EV/Sales multiple. For our M&A framework, we apply a 13x Q5-Q8 revenue multiple. Our M&A target multiple is largely in-line with precedent transactions in the Infrastructure and Analytics markets. Risks to the downside include: 1) prolonged and worse than expected COVID-19 impact causing slower net new business, deal delays, and longer sales cycles, 2) increased competition from IT Operation incumbents including Elastic, Dynatrace, Datadog, New Relic and AppDynamics, and 3) higher expense growth limiting margin expansion.

- **Microsoft:** With a strong presence across all layers of the cloud stack, including applications, platforms, and infrastructure, Microsoft is well positioned to capitalize on a number of long-term secular trends, including public cloud and SaaS adoption, digital transformation, AI/ML, BI/analytics, and DevOps (amongst others). We see a pathway for sustained double-digit topline growth alongside continued margin expansion, particularly as the Commercial Cloud business continues to grow as a percentage of the overall mix. We continue to see upside to Azure growth, particularly as the company begins to lap negative consumption impact from highly affected verticals during the pandemic (i.e., travel, transportation, and hospitality) in the June quarter. Longer-term, as public cloud adoption continues, we believe the installed base of Windows Servers (25-30mn GSe) alone represents an $80-$90bn opportunity for Azure, and note Azure continues to gain market share, with growth coming from both new workloads and data center migrations. We continue to see sustainable double-digit top line growth for Microsoft for several years to come alongside margin expansion and are modeling revenue and earnings to grow at an 14% and 21% CAGR from FY20 through FY23 respectively. See our adding COUP, CRM, and MSFT to the Conviction List note for more detail.

  Our price target of $315 is derived from an equal weighting of a DCF (~2% perpetuity growth rate), 35x Q5-Q8 EV/FCF, and 35x Q5-Q8 P/E. Key risks include slower-than-anticipated public cloud adoption, an overall slowdown in IT spending, a slower pace of margin expansion and an adverse change in the competitive landscape.

- **Coupa:** COUP is very much levered to the improving pace of digital transformations – specifically those taking place in the ERP suite, a category that our checks suggest is increasingly being prioritized as companies move through their wish list of system migrations. While a full ERP migration can be expensive and time-intensive, an initial deployment of Coupa comes at a much lower cost with quick time to value, given the benefit of cost savings in procurement, among other areas. As part of our broader framework for investing in software, we look for companies with 1) large addressable markets, 2) high barriers to entry and therefore long-term sustainable growth, 3) ability to innovate and find new pockets of growth, and 4) efficient growth. Coupa indexes particularly well in these areas. We expect Coupa to execute well in the coming quarters, not only due to an organic acceleration in demand on easier comps from the pandemic, but also the inorganic contribution of revenue from the recent acquisitions for Bellin Group and Llamasoft. For FY22, we are modeling revenue growth of +26% y/y and an acceleration to 30% y/y growth in FY23 from a further recovery in demand. With shares trading at 22.5x our CY22E revenue of $888mn relative to 23.5x at median for high-growth peers, and the potential for COUP to sustain 30%+ growth for the next 3 years, we see an attractive risk/reward at current levels**.**

We maintain our 12-month $413 price target. Our price target is based on a 50%/50% blend of a target EV/Sales multiple and 10-year DCF. We use an EV/SNTM Sales multiple of 38x (unchanged). Our 10-year DCF assumes a sales CAGR of 26% (unchanged), long-term operating margins of 34% (unchanged), a discount rate of 8% (unchanged), and a terminal multiple of ~25x EV/FCF (unchanged). Key downside risks include: competes directly with legacy suite vendors that are better capitalized and enjoy greater brand recognition, could be more sensitive to macro headwinds vs. our expectations, multiple re-rating down driven by a combination of top-line deceleration, execution mis-steps, deteriorating unit economics, and investor rotation out of high-multiple stocks.

- **Shopify:** In the last year, Shopify's business has benefited enormously from the broader shift higher in e-commerce penetration. After revenue growth accelerated to 86% in 2020 from 47% growth in 2019), we still expect Shopify to put up healthy 37% growth in 2021, as GMV growth sustains double digits despite much more challenging comps and Shopify starts to see more traction with newer merchant solutions products that should be additive to take rate. Bigger picture, we think we're still in the early stages of the global e-commerce shift and the democratization of online retail - in large part made possible by Shopify, which has dramatically simplified the process for individuals looking to create an online store. With a TAM in excess of $200bn globally, we see ample opportunity for Shopify to keep up an elevated pace (>30%) of revenue growth in the coming years. As a result, we believe the stock should trade above high-growth peers, and see an attractive entry point at current levels.

  Our 12-month price target of $1,680 is based on a 50%/50% weighting of EV/Sales and DCF. We use an EV/SNTM Sales multiple of 40.0x. Our 20-year DCF assumes sales CAGR of 24%, long-term operating margins of 24%, a discount rate of 7%, and a terminal multiple of 18x EV/FCF. Key risks include: lower-than expected growth of Plus merchants, lower-than-expected adoption of newer merchant solutions, macro risk, and multiple compression risk.

- **Crowdstrike:** While the company continues to invest for growth (which we view positively), our DCF model implies approximately 85% of CRWD's enterprise value is attributable to its terminal value. Due to reliance on terminal value, we believe the stock has disproportionately sold off, likely on recent investor concern over rising interest rates. CRWD remains the fastest growth company within our Security Software coverage universe with a disruptive platform and best in class unit economics. We believe, not only can the company take substantial share in meaningful core Endpoint markets, but it can also penetrate adjacent markets while delivering operating margins well in excess of its peers by the time the company reaches maturity. This translates into potential for better long-term growth and profitability than implied by current valuation levels. Near term, consensus (FactSet) numbers are relatively in-line with guidance, but we believe guidance is conservative with growth of 50% y/y implied by the midpoint, compared to 82% y/y growth delivered last year. The stock has pulled back to its 1-year historical average NTM EV/Sales multiple (31x), is approaching its 3-year average (27x). We continue to see the potential for meaningful upward estimate revisions, offering potential for upside driven by fundamental performance, in spite of changes to market multiples.

Our 12-month price target of $246 is derived from an equal weighted DCF analysis and EV/Sales multiple. Our DCF value of $230 is derived using a perpetual growth rate of 4.5% and 8.9% WACC. Relative valuation of $262 is based on a 34.8x EV/Sales multiple over Q5-Q8 estimates. Our multiple reflects an EV/Sales/Growth multiple of 0.85x, in line with the average for hyper-growth security software peers. Key risks: Elevated valuation with potential for multiple contraction should growth stocks fall out of favor, organic and inorganic execution, reliance on third party infrastructure, and competition in the Endpoint market.

- **Ping Identity:** Although the company continues to face headwinds associated with its model transition, we see PING well positioned to deliver better growth and profitability ahead. In this report, our analysis implies that current valuation levels do not appropriately value growth for PING's platform (Exhibit 8). However, our channel checks indicate that customer buying patterns are improving, the company's SaaS platform recently reached feature parity relative to its perpetual platform, and we expect traction will likely accelerate after having delivered strong SaaS & Support growth in the most recent quarter. In our view, the stock is at attractive valuation levels with multiples at a discount to historical levels. As of 3/26, PING was trading at 6.9x EV/NTM Sales, well below 1-yr and 3-year averages of 8.6x and 8.1x, respectively.

  Our 12-month price target of $34 is derived from a blended target of a 10-year DCF and EV/Sales multiple. Our EV/Sales driven valuation of $31 is based on an 8.5x EV/Sales multiple on our Q5-Q8 sales. DCF driven valuation of $37 is based on a DCF model incorporating an unchanged 3.0% terminal growth rate and a WACC of 9.1%. We used the average beta of our Security Software coverage with growth in the teens to approximate PING's beta. Key risks: Greater than anticipated competition and enterprise IT spending.

Disclosure Appendix

Reg AC

We, Kash Rangan, Christopher D. Merwin, CFA and Brian Essex, CFA, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

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