

# Software

Software Makes Everything Easier

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## Table of Contents

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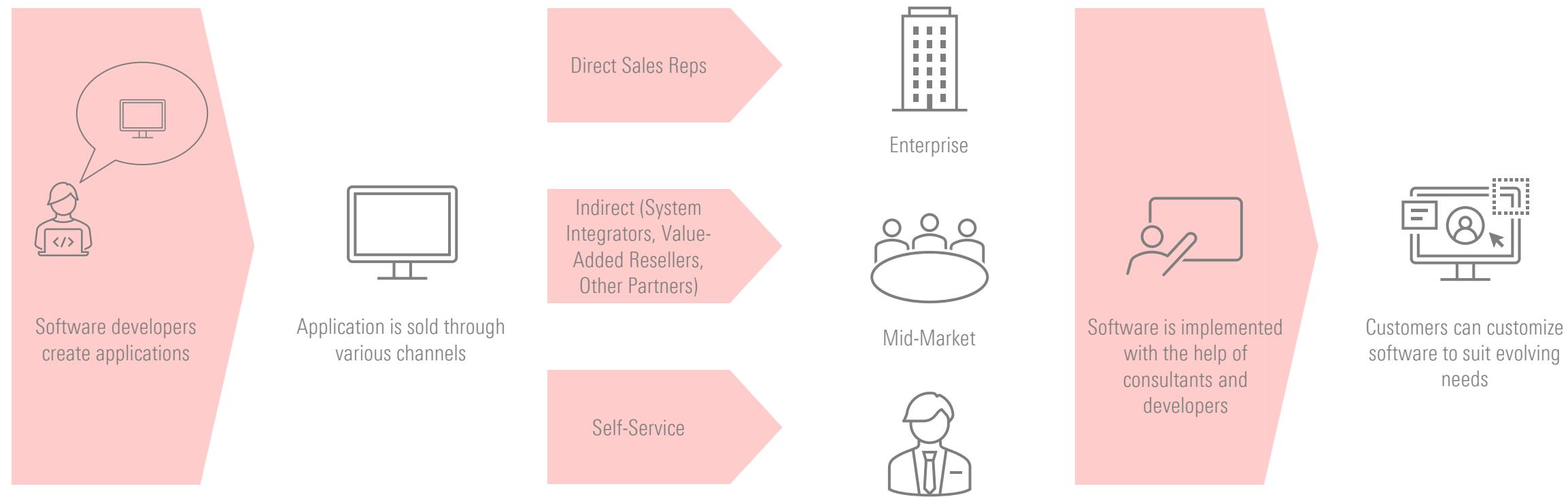
<b>Executive Summary</b>	3	<b>Industry Basics</b>	24
<b>Economic Moat</b> Customer Switching Costs Drive Software Moat Ratings	13	Software Firms Are Characterized by High Up-front Investments, Complex Installations Within Customers, and Long-term Relationships That Produce Attractive Returns Over Many Years	
		<b>Software Outlook</b>	42
		We See Total Software Revenue Growing in Excess of 10% Annually Through 2027	
		<b>ESG Snapshot</b>	47
		Human Capital and Data Privacy and Security Are the Most Significant ESG Risks, but We See Software Companies as Effectively Managing These Issues	

# Executive Summary

# Industry Map

The software industry comprises firms that employ software developers to write code to perform any number of business practices. Software is unique in that there are no raw materials. Software developers write millions of lines of code, combine them into an application, and sell them through various channels. For the most part, there is no packaging, as the software is typically delivered via the cloud.

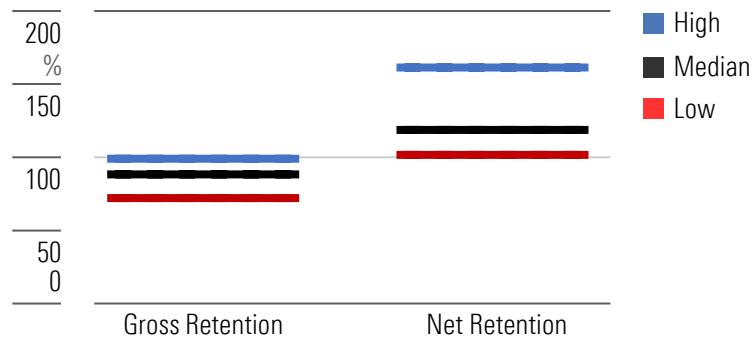
## The Software Industry Is Deceptively Simple, with the Complexity Buried in the Development and Implementation Phases



Source: Morningstar.

# Key Industry Themes

## Switching Costs Drive High Customer Retention



Source: Morningstar.

Software companies are often moatworthy businesses, largely driven by switching costs. It is costly and risky for customers to switch vendors. Direct evidence of this shows up in retention metrics. Gross account retention represents the percentage of clients who remain customers, while net dollar retention measures how much a cohort spends versus a previous period. For our coverage, gross account retention is typically around 93%, while net dollar retention is around 115%. For moat firms, customers tend to stick around for a decade or more (gross) and spend more over time (net).

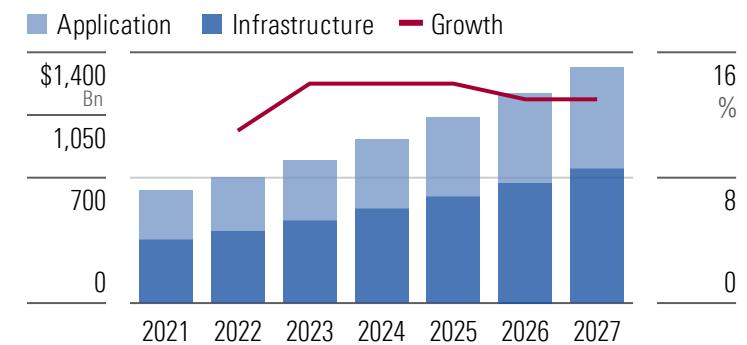
## High Upfront Investments Secure Very Sticky Revenue



Source: Morningstar. Data as of December 2023.

Software firms invest heavily in R&D to create differentiated applications and in a salesforce to secure customers. This spending is front-loaded, and software companies can be unprofitable from an accounting viewpoint during early, high-growth periods. However, strong customer retention for moat firms creates an annuity-like revenue stream that pays for these costs over time. Customer acquisition costs, or CAC, may be high in year 1, but when a customer sticks around for 10 or more years, the lifetime value of this customer, or LTV, is very high, often greater than three times the CAC.

## Growth Should Remain Attractive



Source: Gartner. Data as of June 29, 2023

We see total software revenue growing in excess of 10% annually through 2027. The acceleration of growth in 2021 and deceleration in 2022 were distorted by remote work investments during COVID-19 lockdowns. A more cautious demand environment for enterprise buyers in 2023 has created additional worries about software growth, but we see double-digit percentage growth for the foreseeable future. Overall, we believe increased automation, a focus on customer-centric software, and generative AI will drive growth. The software industry should continue to offer attractive revenue growth for investors.

# Industry Value Drivers

## Simplified Financial Statements: Microsoft (FY2022)

Pro Forma Income Statement (\$ millions)	FY2022	% of Sales
Revenue ①	198,270	
Cost of Goods Sold ②	62,650	32%
<b>Gross Profit</b>	<b>135,620</b>	
Research and Development ③	24,512	12%
Sales and Marketing ④	21,825	11%
General and Administrative	5,900	3%
<b>Operating Income</b>	<b>83,383</b>	42%
Other Income/(Expense)	333	
<b>Pretax Income</b>	<b>83,716</b>	
Income Tax Expense ⑤	10,978	13% tax rate
<b>Net Income</b>	<b>72,738</b>	
Adjustments to Derive Adjusted Net Income ⑥ ⑧	0	
<b>Adjusted Net Income</b>	<b>72,738</b>	
Discounted Cash Flow	FY2022	
<b>Operating Income</b>	<b>83,383</b>	
Amortization and Other ⑧	(17,045)	
<b>Earnings Before Interest</b>	<b>66,338</b>	
Depreciation ⑦	14,460	
(Capital Expenditure) ⑦	(23,886)	
(Net Investment In Working Capital and Other)	(2,379)	
(Net Acquisitions)/Sales ⑧	(22,038)	
<b>Net New Investment (NNI)</b>	<b>(33,843)</b>	
<b>Free Cash Flow to the Firm (FCFF)</b>	<b>32,495</b>	

Source: Morningstar, company reports. Data as of August 2023.

(1) **Revenue:** Software firms sell end-users the right to use their applications. Software is overwhelmingly delivered on a subscription basis, which generally includes receiving cash upfront for a year's worth of usage (or a quarter's) and then recognizing the revenue ratably over the designated period.

(2) **Cost of Goods Sold:** This is typically less material and less important compared with the same expense line for a manufacturing company. This expense mainly represents hosting costs for maintaining and staffing proprietary data centers or outsourcing these functions to cloud providers.

(3) **Research and Development:** Software companies must invest heavily in product development to attract and retain customers.

(4) **Sales and Marketing:** This is typically the largest expense item for software companies, as once sold, revenue becomes an annuity-like stream based on high renewal rates. Therefore, there is an emphasis on expanding the client base. Here, Microsoft is more mature and has below-average sales and marketing costs.

(5) **Tax Rate:** The effective tax rate can be lower than the statutory tax rate because of R&D efforts and locating IP in favorable tax jurisdictions.

(6) **Adjustments to Derive Adjusted Net Income:** Most software firms exclude amortizing intangibles and stock-based compensation (SBC) to reach adjusted net income. SBC is used to attract and retain engineers and is typically a material non-cash cost. Microsoft is a rare software company that reports GAAP earnings.

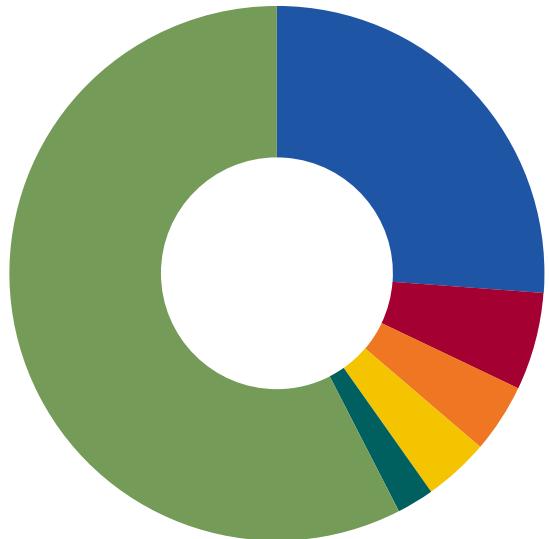
(7) **Capital Expenditures:** Software firms are typically light on capital intensity.

(8) **Acquisitions:** Many companies make acquisitions to supplement R&D efforts. Acquisitions give rise to noncash amortization of intangible assets.

# Market Share and Concentration

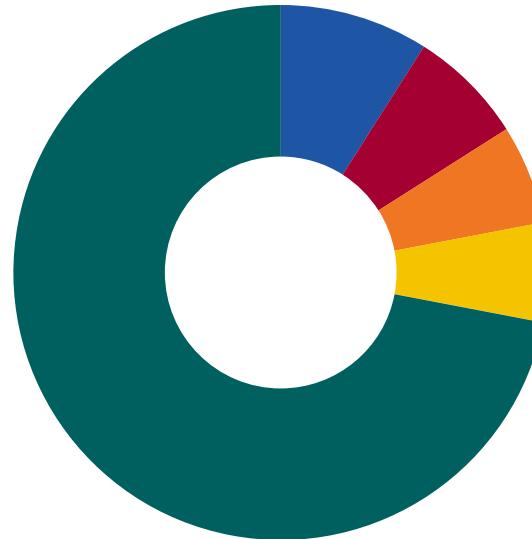
The top five companies in the software industry controlled 42% of total industry sales in 2022. Microsoft had the highest share at 26% and clearly dwarfs its industry peers. Following Microsoft are Oracle, SAP, Salesforce, and Adobe. Overall, the industry is highly diversified, with the number of software firms representing more than 9% of the total companies within the Morningstar US Market Extended Index, which includes more than 2,200 firms. Low barriers to entry characterize the software industry, so new business formation is high.

## Key Industry Players and Revenue Market Share



Source: Morningstar and PitchBook, Data as of Dec. 31, 2022. Total revenue is included for each firm.

## Software Firms Represent the Largest Portion of the Morningstar Extended Index



Source: Morningstar. Data as of Dec. 31, 2023.

## EXECUTIVE SUMMARY

# Coverage List and Ratings

Morningstar covers more than 70 companies in the software industry, which we present by market capitalization, from largest to smallest. We find software companies to be moatworthy in general, with uncertainty ratings mostly falling between medium and very high. While the group is not monolithic, the stocks tend to trade directionally together.

## Morningstar Software Coverage

Company (Ticker)	Industry	Market Cap (Billions)	Moat Rating	Uncertainty Rating	Last Close	Fair Value Estimate	Star Rating	P/FVE	P/E	Price/FCF	Yield	1-Year Return
Microsoft (MSFT)	Software - Infrastructure	2757 USD	Wide	Medium	374.23	370.00	★★★	1.00	33.3x	30.6x	0.8%	+52.4%
Oracle (ORCL)	Software - Infrastructure	309 USD	Narrow	Medium	113.61	83.00	★	1.39	20.5x	31.5x	1.4%	+43.8%
Adobe (ADBE)	Software - Infrastructure	277 USD	Wide	High	610.01	510.00	★★	1.23	33.9x	21.1x	0.0%	+83.4%
Salesforce (CRM)	Software - Application	241 USD	Wide	High	250.81	265.00	★★★	0.95	30.6x	24.6x	0.0%	+92.7%
SAP (ETR: SAP)	Software - Application	172 EUR	Narrow	Medium	158.37	119.00	★★	1.24	28.3x	28.6x	1.4%	+49.8%
Intuit (INTU)	Software - Application	160 USD	Wide	Medium	573.90	500.00	★★	1.17	35.0x	26.1x	0.6%	+42.4%
ServiceNow (NOW)	Software - Application	141 USD	Wide	High	699.08	640.00	★★★	1.10	66.9x	38.6x	0.0%	+76.4%
Automatic Data Processing (ADP)	Staffing & Employment Services	95 USD	Wide	Medium	229.27	240.00	★★★	0.97	25.1x	23.2x	2.4%	-9.4%
Shopify (SHOP)	Software - Application	92 USD	Narrow	Very High	72.52	60.00	★★★	1.21	104.7x	-82.9x	0.0%	+87.7%
Synopsys (SNPS)	Software - Infrastructure	81 USD	Narrow	High	535.93	480.00	★★★	1.16	39.9x	34.5x	0.0%	+62.1%
Fiserv (FL)	Information Technology Services	79 USD	Narrow	Medium	132.36	145.00	★★★★	0.92	17.7x	18.7x	0.0%	+30.5%
Cadence Design Systems (CDNS)	Software - Application	71 USD	Narrow	High	259.93	209.00	★★	1.29	50.9x	38.9x	0.0%	+58.4%
Workday (WDAY)	Software - Application	72 USD	Wide	High	273.41	245.00	★★★	1.13	47.6x	29.5x	0.0%	+61.5%
Dassault Systemes (PAR: DSY)	Software - Application	58 EUR	Wide	Medium	47.18	37.00	★★	1.20	36.5x	30.5x	0.5%	+29.8%
Snowflake (SNOW)	Software - Application	62 USD	None	Very High	190.67	231.00	★★★	0.84	240.4x	108.0x	0.0%	+33.5%
Atlassian (TEAM)	Software - Application	48 USD	Narrow	Very High	192.36	215.00	★★★	0.92	80.3x	38.2x	0.0%	+41.7%
Autodesk (ADSK)	Software - Application	48 USD	Wide	Medium	224.01	247.00	★★★★	0.92	29.9x	23.0x	0.0%	+13.9%

Source: Morningstar, PitchBook. Data as of December 2023

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Paychex (PAYX)	Staffing & Employment Services	45 USD	Wide	High	124.02	120.00	★★★	1.04	26.4x	24.6x	2.9%	+6.1%
Palantir Technologies (PLTR)	Software - Infrastructure	37 USD	Narrow	Very High	17.77	13.00	★★	1.37	72.1x	69.3x	0.0%	+149.6%
Fidelity National Information Services (FIS)	Information Technology Services	35 USD	Narrow	Medium	58.94	76.00	★★★★	0.77	9.7x	13.0x	3.5%	-11.9%
Block (SQ)	Software - Infrastructure	42 USD	Narrow	Very High	69.17	83.00	★★★	0.83	35.7x	87.3x	0.0%	+9.2%
Datadog (DDOG)	Software - Application	38 USD	Narrow	Very High	113.83	115.00	★★★	1.00	75.9x	63.7x	0.0%	+53.8%
Ansys (ANSS)	Software - Application	25 USD	Wide	Medium	287.20	262.00	★★★	1.11	33.5x	37.5x	0.0%	+17.3%
MongoDB (MDB)	Software - Infrastructure	28 USD	None	High	381.79	403.00	★★★	0.98	131.3x	729.0x	0.0%	+96.4%
Fair Isaac (FICO)	Software - Application	28 USD	Wide	High	1134.39	810.00	★★	1.41	48.1x	27.9x	0.0%	+81.5%
HubSpot (HUBS)	Software - Application	25 USD	Narrow	Very High	502.04	505.00	★★★	0.99	88.4x	66.1x	0.0%	+71.5%
Broadridge Financial Solutions (BR)	Information Technology Services	23 USD	Narrow	Low	191.36	190.00	★★★	1.01	24.8x	23.0x	1.7%	+34.2%
VeriSign (VRSN)	Software - Infrastructure	22 USD	Wide	Medium	212.97	210.00	★★★	1.02	29.6x	26.8x	0.0%	+7.9%
PTC (PTC)	Software - Application	19 USD	Narrow	Medium	166.61	138.00	★★	1.22	34.2x	25.1x	0.0%	+36.8%
Tyler Technologies (TYL)	Software - Application	17 USD	Wide	Medium	403.07	475.00	★★★★	0.85	51.9x	36.7x	0.0%	+26.6%
Check Point Software Technologies (CHKP)	Software - Infrastructure	17 USD	Narrow	Medium	145.72	150.00	★★★	0.98	17.5x	14.8x	0.0%	+11.0%
Akamai Technologies (AKAM)	Software - Infrastructure	17 USD	None	Medium	114.41	95.00	★★	1.21	18.8x	17.2x	0.0%	+27.2%
Bentley Systems (BSY)	Software - Application	15 USD	Narrow	Medium	50.59	42.00	★★	1.20	57.4x	36.9x	0.4%	+29.0%

Source: Morningstar, PitchBook. Data as of December 2023

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Company (Ticker)	Industry	Market Cap (Billions)	Moat Rating	Uncertainty Rating	Last Close	Fair Value Estimate	Star Rating	P/FVE	P/E	Price/FCF	Yield	1-Year Return
Dynatrace (DT)	Software - Application	16 USD	Narrow	Very High	54.13	44.00	★★★	1.24	48.7x	32.9x	0.0%	+44.5%
WiseTech Global (ASX: WTC)	Software - Application	22 AUD	Narrow	High	44.06	95.00	★★★★	0.74	85.7x	-3602.1x	0.2%	+24.2%
SS&C Technologies (SSNC)	Software - Application	14 USD	Narrow	Medium	57.11	75.00	★★★★	0.77	12.4x	14.1x	1.7%	+14.8%
Sage Group (LON: SGE)	Software - Application	12 GBP	Narrow	Medium	14.50	880.00	★★	1.35	31.9x	21.8x	1.6%	+52.7%
Manhattan Associates (MANH)	Software - Application	14 USD	Narrow	High	221.74	172.00	★★	1.29	63.0x	45.2x	0.0%	+84.2%
GoDaddy (GDDY)	Software - Infrastructure	15 USD	None	High	104.31	94.00	★★★	1.12	38.3x	11.5x	0.0%	+38.2%
Gen Digital (GEN)	Software - Infrastructure	14 USD	None	High	22.15	21.00	★★★	1.06	11.2x	24.1x	2.3%	-0.6%
Aspen Technology (AZPN)	Software - Application	12 USD	Wide	High	198.99	195.00	★★★	1.03	30.2x	48.9x	0.0%	-11.3%
Xero (ASX: XRO)	Software - Application	16 NZD	Narrow	High	68.79	78.00	★★	1.39	100.9x	263.4x	0.0%	+47.2%
Ceridian HCM (CDAY)	Software - Application	10 USD	Narrow	High	67.17	86.00	★★★★	0.79	50.8x	130.5x	0.0%	+2.1%
Jack Henry & Associates (JKHY)	Information Technology Services	12 USD	Wide	Medium	164.69	174.00	★★★	0.94	32.8x	59.4x	1.3%	-9.8%
NICE (Israel) (NAS: NICE)	Software - Application	12 USD	Narrow	Medium	203.20	265.00	★★★★	0.76	23.4x	28.0x	0.0%	+2.2%
Paylocity (PCTY)	Software - Application	9 USD	Narrow	High	152.35	215.00	★★★★	0.72	25.1x	48.2x	0.0%	-25.6%
Twilio (TWLO)	Internet Content & Information	12 USD	Narrow	Very High	70.61	64.00	★★★	1.11	32.7x	-32.0x	0.0%	+54.2%
Paycom Software (PAYC)	Software - Application	11 USD	Narrow	High	186.57	295.00	★★★★	0.64	24.5x	73.3x	0.8%	-41.1%
Toast (TOST)	Software - Infrastructure	8 USD	Narrow	Very High	15.35	19.20	★★★★	0.81	166.1x	-52.7x	0.0%	-19.0%

Source: Morningstar, PitchBook. Data as of December 2023

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Company (Ticker)	Industry	Market Cap (Billions)	Moat Rating	Uncertainty Rating	Last Close	Fair Value Estimate	Star Rating	P/FVE	P/E	Price/FCF	Yield	1-Year Return
Dropbox (DBX)	Software - Infrastructure	9 USD	None	High	27.59	24.00	★★	1.16	14.0x	10.4x	0.0%	+22.6%
Nemetschek Group (ETR: NEM)	Software - Application	9 EUR	Narrow	High	83.01	54.00	★★	1.45	59.1x	26.3x	0.6%	+66.0%
DocuSign (DOCU)	Software - Application	10 USD	Narrow	Very High	49.73	74.00	★★★★	0.73	18.7x	21.0x	0.0%	+13.7%
Guidewire Software (GWRE)	Software - Application	8 USD	Wide	High	97.89	94.00	★★★	1.02	120.9x	265.2x	0.0%	+56.1%
Elasticsearch (ESTC)	Software - Application	11 USD	Narrow	Very High	115.81	85.00	★★	1.38	112.9x	288.6x	0.0%	+113.8%
Descartes Systems Group (DSGX)	Software - Application	7 USD	Narrow	High	82.96	76.00	★★★	1.10	62.1x	33.6x	0.0%	+24.9%
Smartsheet (SMAR)	Software - Application	6 USD	Narrow	Very High	44.16	53.00	★★★	0.85	80.1x	671.3x	0.0%	+19.8%
Five9 (FIVN)	Software - Infrastructure	6 USD	None	Very High	80.39	59.00	★★	1.34	41.8x	144.9x	0.0%	+21.7%
Squarespace (SQSP)	Software - Infrastructure	4 USD	None	Very High	27.78	26.00	★★★	1.08	39.8x	19.0x	0.0%	+38.4%
Blackbaud (BLKB)	Software - Application	5 USD	Narrow	High	85.86	70.00	★★	1.24	22.2x	20.9x	0.0%	+49.9%
Pegasystems (PEGA)	Software - Application	4 USD	None	Very High	52.43	52.00	★★★	0.99	30.8x	-191.8x	0.2%	+46.4%
Box (BOX)	Software - Infrastructure	3 USD	None	High	23.99	24.00	★★★	1.01	16.9x	15.9x	0.0%	-15.3%
Altium (ASX: ALU)	Software - Application	6 USD	Narrow	High	29.91	47.50	★★★	0.98	71.2x	82.7x	1.2%	+23.2%
Paycor HCM (PYCR)	Software - Application	4 USD	None	Very High	21.25	26.00	★★★	0.81	46.5x	-1972.3x	0.0%	-20.4%
TechnologyOne (ASX: TNE)	Software - Application	5 AUD	Wide	Medium	9.72	14.00	★★★	1.07	41.0x	40.6x	1.1%	+6.2%
Appian (APPN)	Software - Infrastructure	3 USD	None	Very High	36.54	37.00	★★★	0.99	-33.4x	-23.1x	0.0%	-3.7%

Source: Morningstar, PitchBook. Data as of December 2023

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Appian (APPN)	Software - Infrastructure	3 USD	None	Very High	36.54	37.00	★★★	0.99	-33.4x	-23.1x	0.0%	-3.7%
Blackberry (TSE: BB)	Software - Infrastructure	3 USD	None	Very High	4.11	6.60	★★★	0.84	-352.3x	-12.3x	0.0%	-5.9%
Fastly (FSLY)	Software - Application	2 USD	None	Very High	17.27	20.00	★★★	0.86	-83.2x	-9.2x	0.0%	+73.6%
Envestnet (ENV)	Software - Application	2 USD	Narrow	High	42.57	48.00	★★★	0.88	21.2x	-157.5x	0.0%	-30.8%
Megaport (ASX: MP1)	Software - Infrastructure	2 AUD	None	Very High	6.67	17.00	★★★★	0.59	101.2x	-44.9x	0.0%	+59.7%
Objective Corporation (ASX: OCL)	Software - Application	1 AUD	Narrow	High	7.72	5.50	★	2.15	33.7x	73.0x	1.1%	-17.9%
Iress (ASX: IRE)	Software - Application	2 AUD	Narrow	High	5.33	9.60	★★★★	0.83	31.1x	20.7x	3.7%	-14.3%
FINEOS Corporation (ASX: FCL)	Software - Infrastructure	1 EUR	Wide	Very High	1.11	3.10	★★★★	0.50	-48.5x	-34.6x	0.0%	+9.0%
Tyro Payments (ASX: TYR)	Software - Infrastructure	1 AUD	None	Very High	0.67	2.00	★★★★★	0.51	58.3x	-53.9x	0.0%	-30.8%
EML Payments (ASX: EML)	Software - Infrastructure	0 AUD	None	Very High	0.56	0.80	★★★	1.03	14.0x	-62.5x	0.0%	+29.3%
<b>Overall Median</b>								<b>1.02</b>	<b>34.1x</b>	<b>26.6x</b>	<b>0.0%</b>	<b>+29.2%</b>

Source: Morningstar, PitchBook. Data as of December 2023

# Economic Moat

Switching costs create valuable revenue streams and drive software moats.

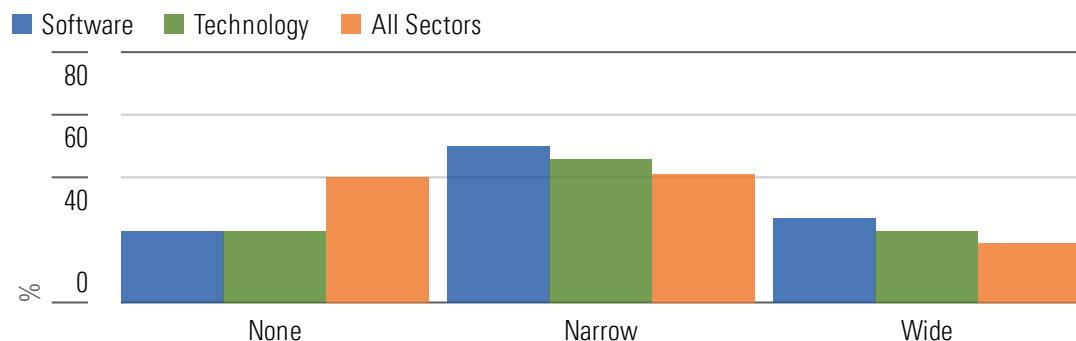
## Summary of Moat Ratings and Sources

Software firms within our coverage overwhelmingly have moats, with a majority garnering narrow moats and many earning wide moats. Large software companies tend to have bigger and more diversified product portfolios, which increases the likelihood of having a wide moat. Wide-moat firms typically enjoy a position of strength or dominance in their markets, while narrow-moat firms may serve a narrow niche. Further, having differentiated software that can serve the needs of more complex enterprise clients is also often a key ingredient for a moaty firm.

Larger customers have more complex needs, creating more opportunities to create value with a software offering. End customers rarely make purchasing decisions based solely on price but on how an application may solve a business problem and drive increased value.

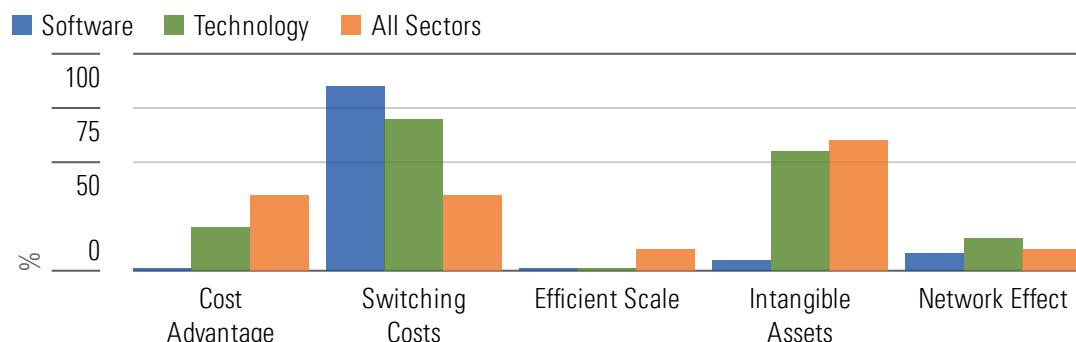
Moats in the software industry are largely driven by switching costs, with occasional support from network effects or even intangible assets. In no case does a software company within our coverage have a moat that is NOT derived from switching costs. Once an application is installed, employees become proficient in it, and the client builds business processes around it and even integrates it with other applications within the organization. Changing software applications, then, is more complicated than swapping vendors. It could involve significant time and expense to retrain employees, reimagine entire business processes, rebuild connections between applications, and possibly hire an outside consultant to complete any implementation. This process can be disruptive, expensive, and even compromise customer data.

### The Majority of Our Software Coverage Enjoys a Wide or Narrow Moat



Source: Morningstar. Data as of November 2023

### Switching Costs and Network Effects Buttress Software Economic Moats

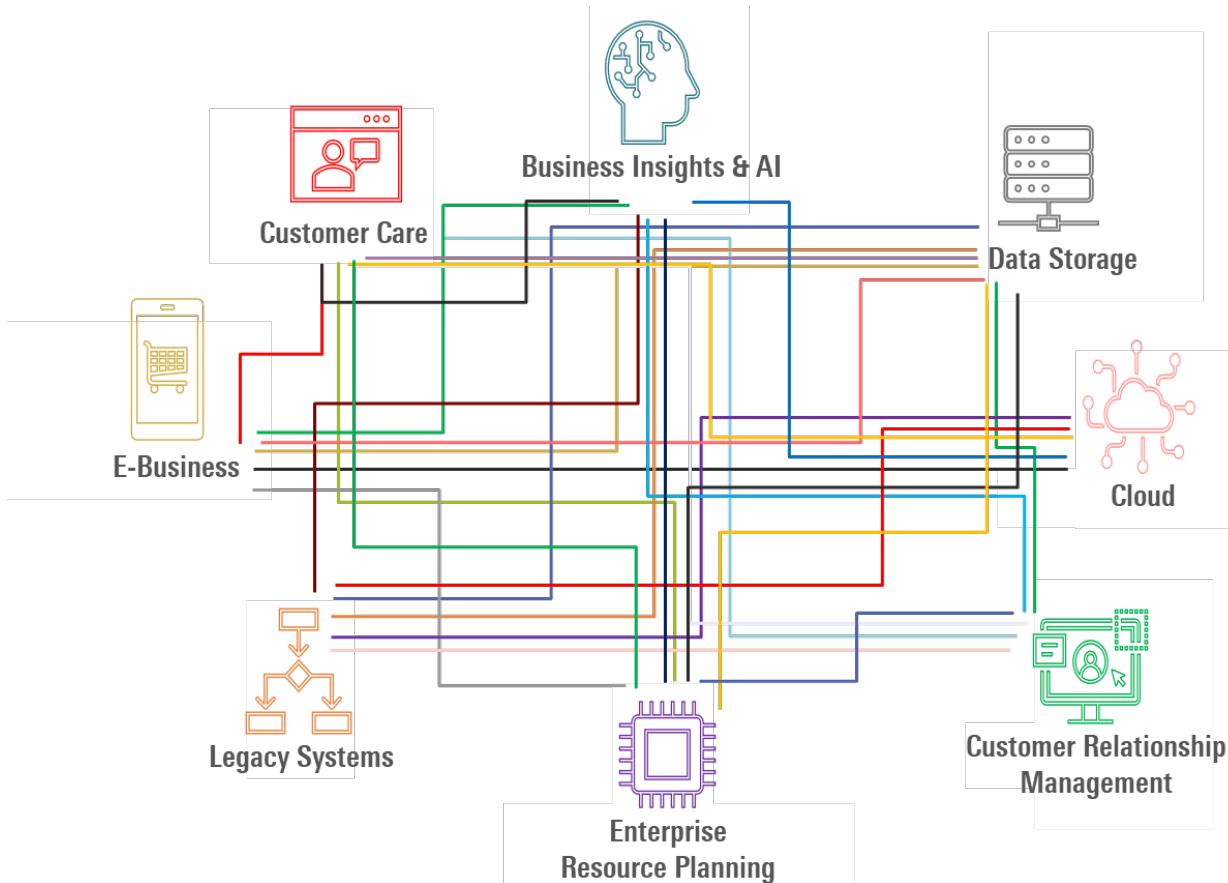


Source: Morningstar. Data as of November 2023

# It's All About Switching Costs

The complexities involved in an enterprise's IT fabric are difficult to overstate. A 2023 study by MuleSoft and Deloitte showed that companies now use an average of 976 applications, including externally purchased and internally developed instances. Consider the high-level integration of a CRM system, which must integrate with the marketing system, e-commerce, inventory management, warehouse management, accounts receivable, email, customer service, telephone, database, data warehouse, and analytics. Every use case is different, which would require different sets of application integrations. Once that CRM system is in place and connected to other software elements, it becomes extremely difficult to change, as that process could give rise to significant risk of data loss, operational disruption, and negative impacts on employee productivity as they learn new systems. Changing applications also often involves the added expense of paying a system integrator to execute the implementation. These factors underpin high customer switching costs.

## Software Connections Are Complex



Source: Morningstar

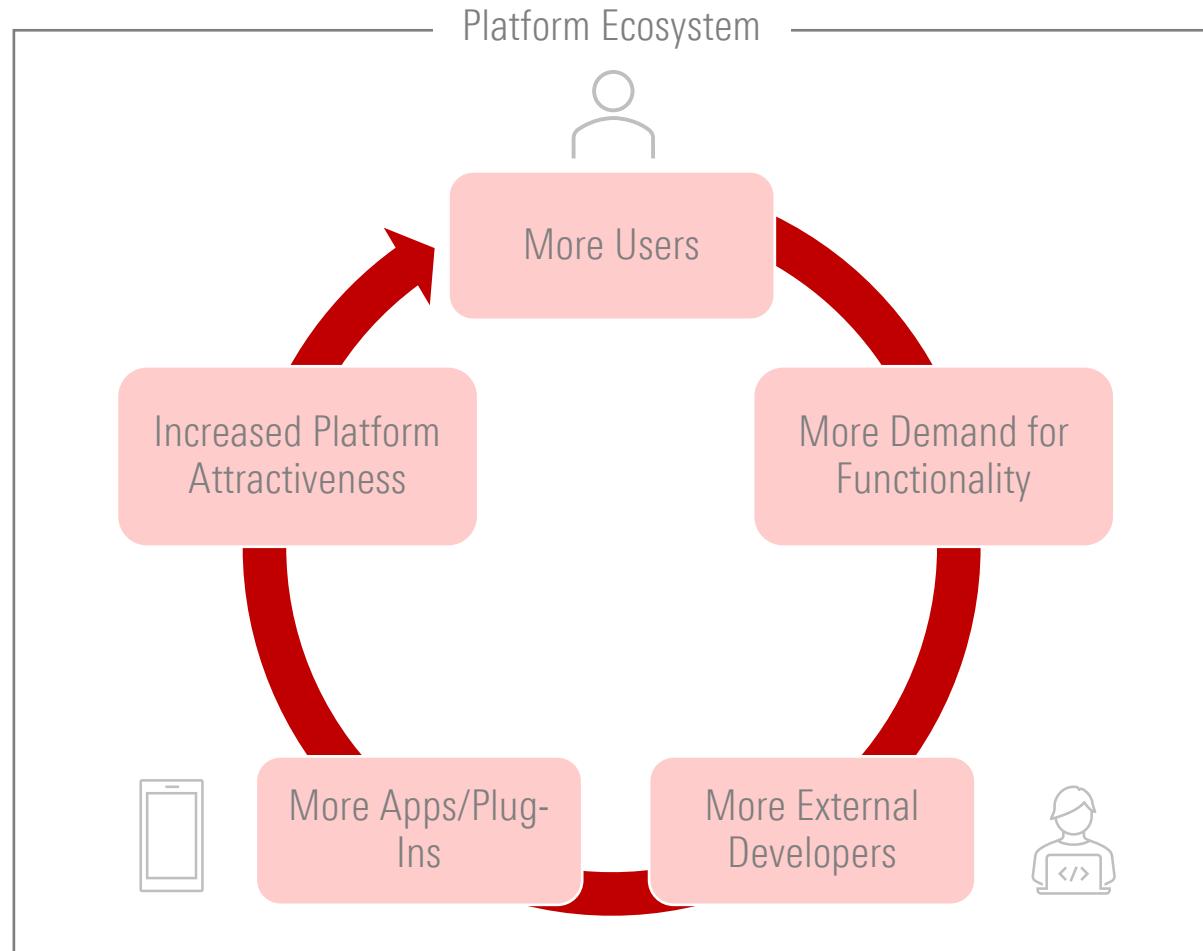
## Network Effect Can Be Powerful, but It Is More Often a Secondary Moat Source

Network effects are not uncommon within the software industry, although we see them typically as a secondary moat source supporting switching costs. Network effects occur when the value of the platform increases with the number of platform participants.

We regularly see ecosystems develop around software companies that have a developer platform and the presence of an app store, where plug-ins or supportive applications can be sold. More users make the platform more attractive to developers, whose products are more likely to be used by many users. More developers and apps and plug-ins make the platform more attractive for the users, as functionality across the platform increases. This creates a virtuous cycle, as more users attract more developers, and vice versa.

Two prime examples of this are Salesforce and Microsoft. Salesforce popularized its app store and has numerous third-party developers building on its platform, for example using Salesforce Lightning. Microsoft has attracted millions of developers into its ecosystem given its broad reach, creating additional functionality for users. For example, the numerous third-party Excel add-ins.

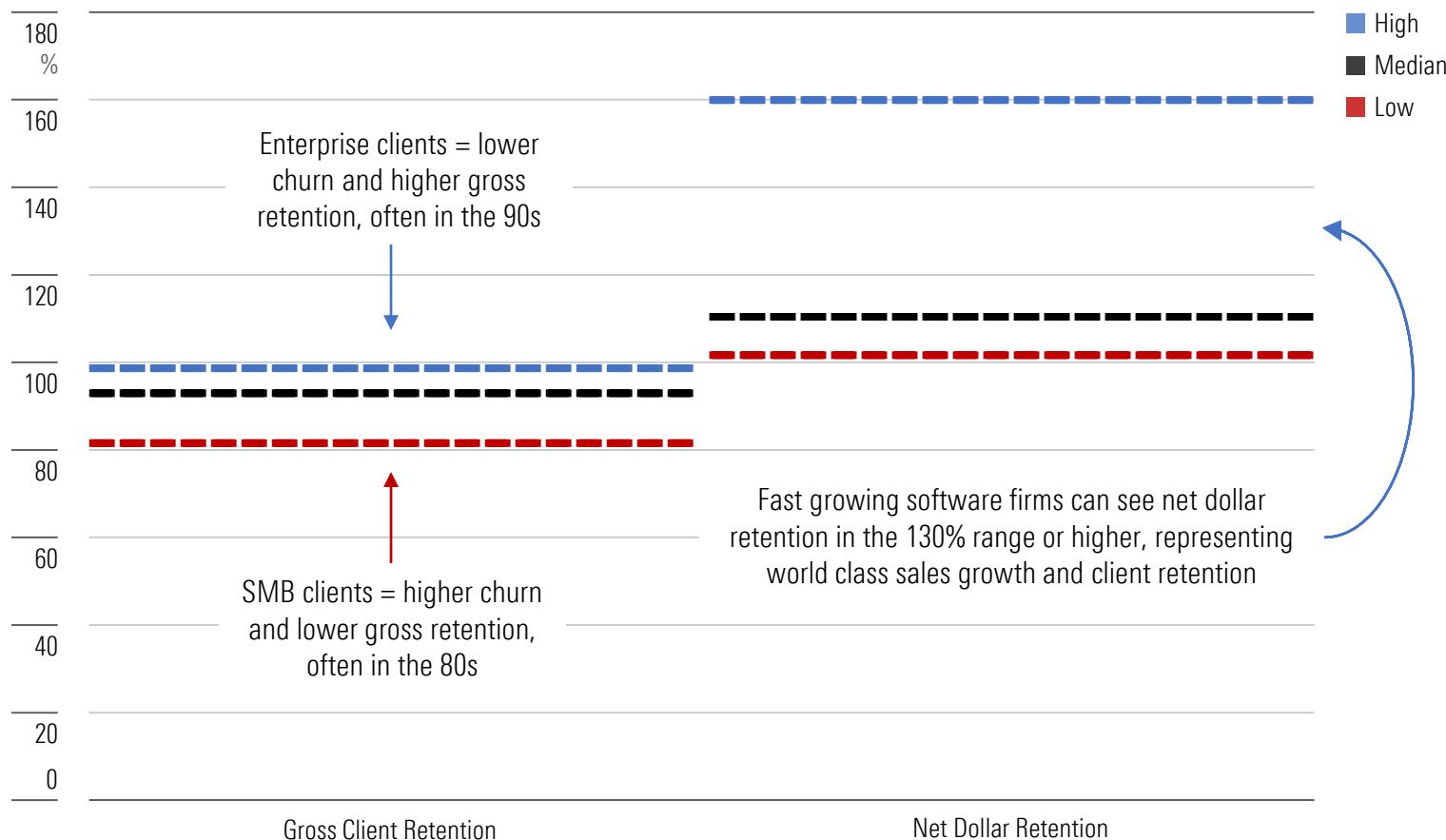
### Network Effects Are Not Uncommon in Software



Source: Morningstar

# Customer Retention Metrics Are Direct Evidence of Switching Cost-Driven Moats

## Typical Ranges for Retention Are 85%-99% for Gross and 105% to 125% for Net



Source: Morningstar and company reports. Data as of Aug. 21, 2023.

**Gross account retention:** The percentage of clients that remain customers. For example, if there are 10 clients within a cohort, and 1 year later, only 9 of those 10 remain, that would represent gross account retention of 90%.

**Net dollar retention:** How much a cohort spends versus a previous period. For example, using the same cohort above, if we assume each client was spending \$1 million annually at the start, and the nine remaining clients all increased their spending to \$2 million annually, this represents net dollar retention of 180%  $(\$10m \text{ original} - \$1m \text{ in churn} + \$9m \text{ in upsell}) / (\$10m \text{ original})$ .

**Importance of Retention:** An average gross retention level of approximately 93% suggests a customer lifetime of approximately 15 years. Therefore, software companies can build out highly valuable, recurring revenue streams. Add in upsells, cross-sells, and price hikes (net dollar retention), and this valuable recurring revenue can grow rapidly and create attractive returns.

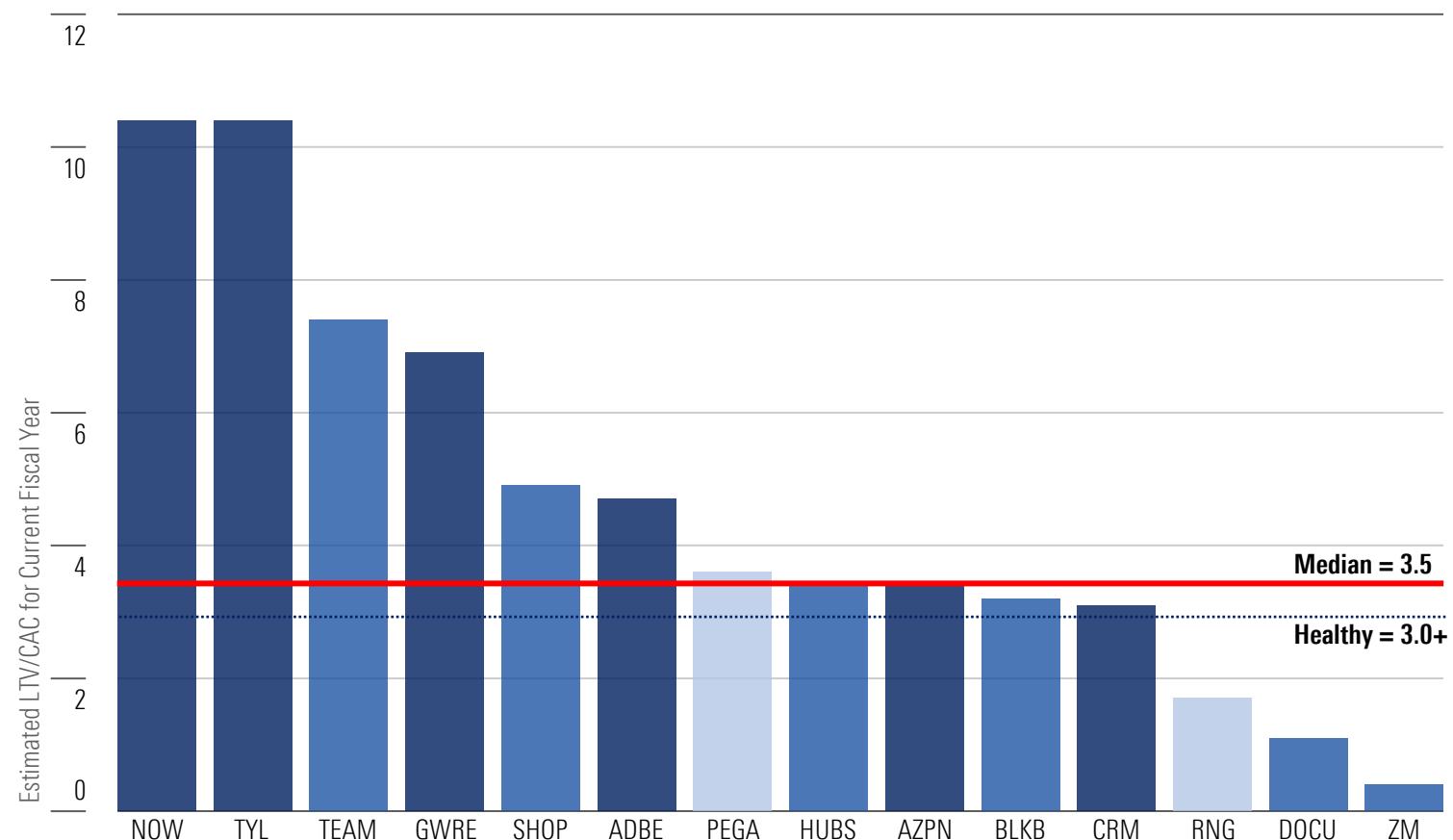
# While It Is Costly to Acquire a New Customer, the Lifetime Value of That Customer Can Vastly Exceed the Costs

Creating software and selling software entails upfront costs, mainly paying engineers to create the software and paying a salesforce a mix of salaries and commissions for selling the software. Given the long-term nature of client relationships, particularly when account retention rates can exceed 90%, it would be shortsighted only to consider the revenue generated during the initial sale, which often covers the initial one to three years of revenue. In software, it is important to consider the lifetime value of customers, meaning the revenue they will generate across their full lifetime, not just the initial contract, and compare this with customer acquisition costs. The calculations for this type of analysis are complex and require estimates, so they have limitations, but understanding the unit economics a firm can achieve does highlight which are likely to generate higher and more durable returns.

Within our coverage, we typically see healthy LTV-CAC ratios of 3.0 or higher, meaning the software vendor earns three times the cost of acquiring their customers over the duration of the relationship. This means the software firm creates economic value for each new client it captures.

## LTV to CAC Ratios of 3 or Higher Are Generally Considered Healthy

Dark bars show wide moats; medium shading shows narrow moats and the lightest shading shows no moats.



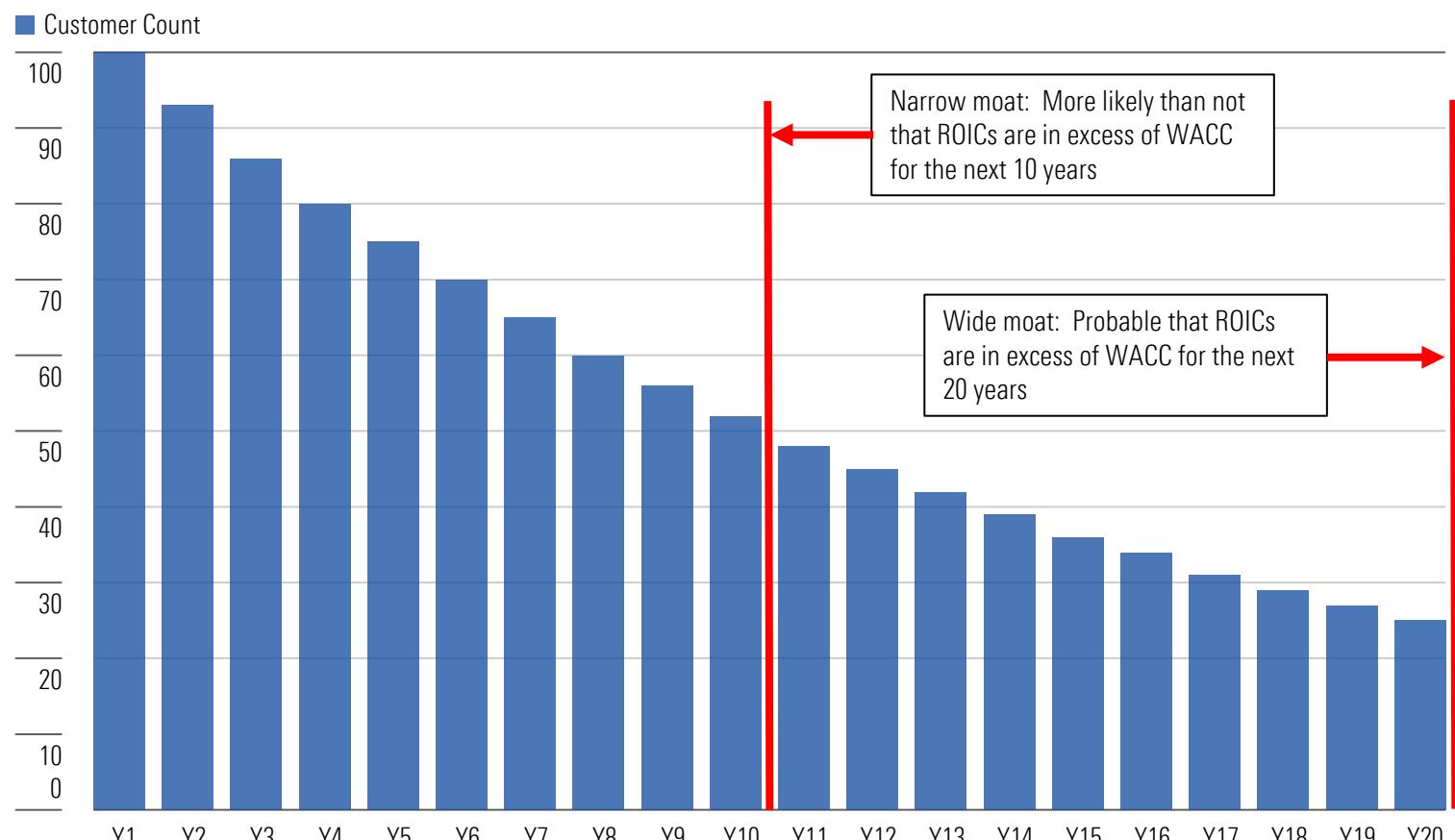
Source: Morningstar estimates for selected companies. Data as of December 2023

# Retaining Customers Is Key for Generating Economic Value and Moats as a Software Firm

Customer retention is a key variable for customer LTV. The longer a company can retain that customer, the higher that customer's LTV. To the right, we show customer decay for a software firm with a 93% annual gross client retention ratio. It becomes obvious that the client base and its economic value last for over 10 and even 20 years for moaty software firms.

Wide-moat companies often enjoy gross retention ratios of 95% or more. In a simplified example for illustrative purposes only, we assume that the CAC is 120% of the annual contract value to land a new customer. Then the CAC drops to one-fifth of that for the year two contract renewal and beyond. We also assume price hikes of 5% annually and a discount rate of 9%. Under these assumptions, a gross retention rate of 95% yields an LTV/CAC ratio of over 7x, 90% is 4.2x, 80% is 2x, and 70% falls below 1x. This illustrates just how important client retention is and demonstrates the power of the recurring revenue stream. This also underscores that high ROICs over the course of time become somewhat formulaic and predictable for moatier firms.

## Retaining Customers for 10 to 20 Plus Years Creates High Economic Value and Supports Moats

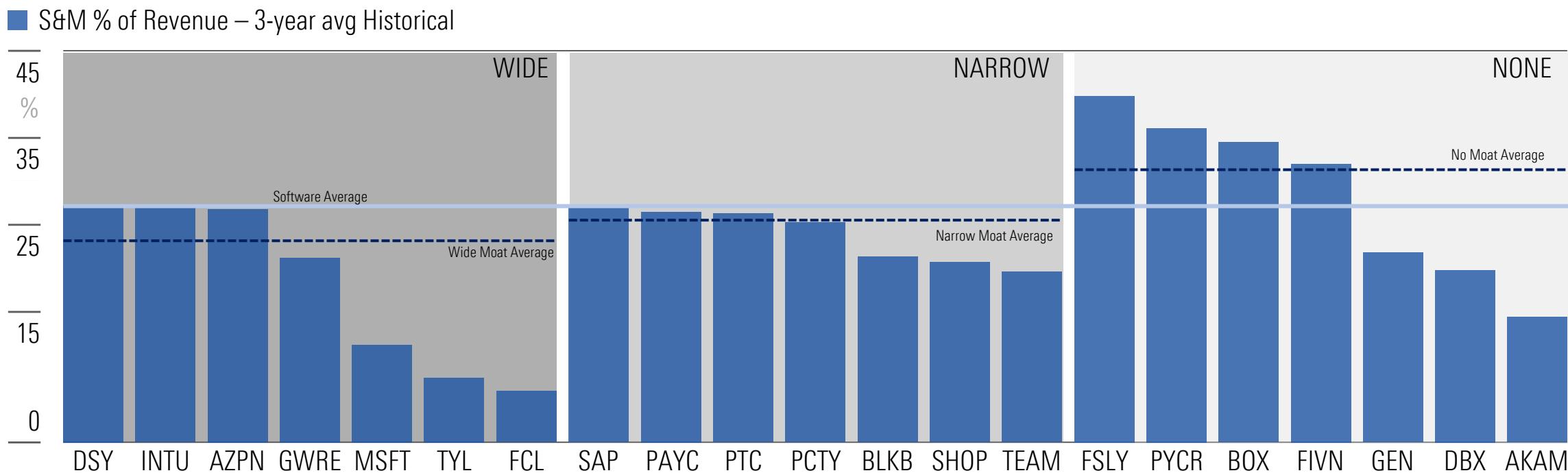


Source: Morningstar

## S&M Investments Are Necessary to Win Clients That Will Likely Remain on Board for a Decade or More

Software firms spend heavily on sales and marketing, typically the single largest expense line for companies under our coverage. Spending a lot to acquire a client makes sense if the switching costs are high and the client sticks with a given application for years. Sales commissions for a new deal are typically around 10% of the annual contract value, while the renewal commission is approximately 2% of ACV, and marketing costs are ongoing. Relative S&M costs typically decline as a firm matures due to slowing growth and a larger established revenue base. Wide-moat firms, which skew toward more established companies, will often have lower relative S&M spending compared with no-moat firms.

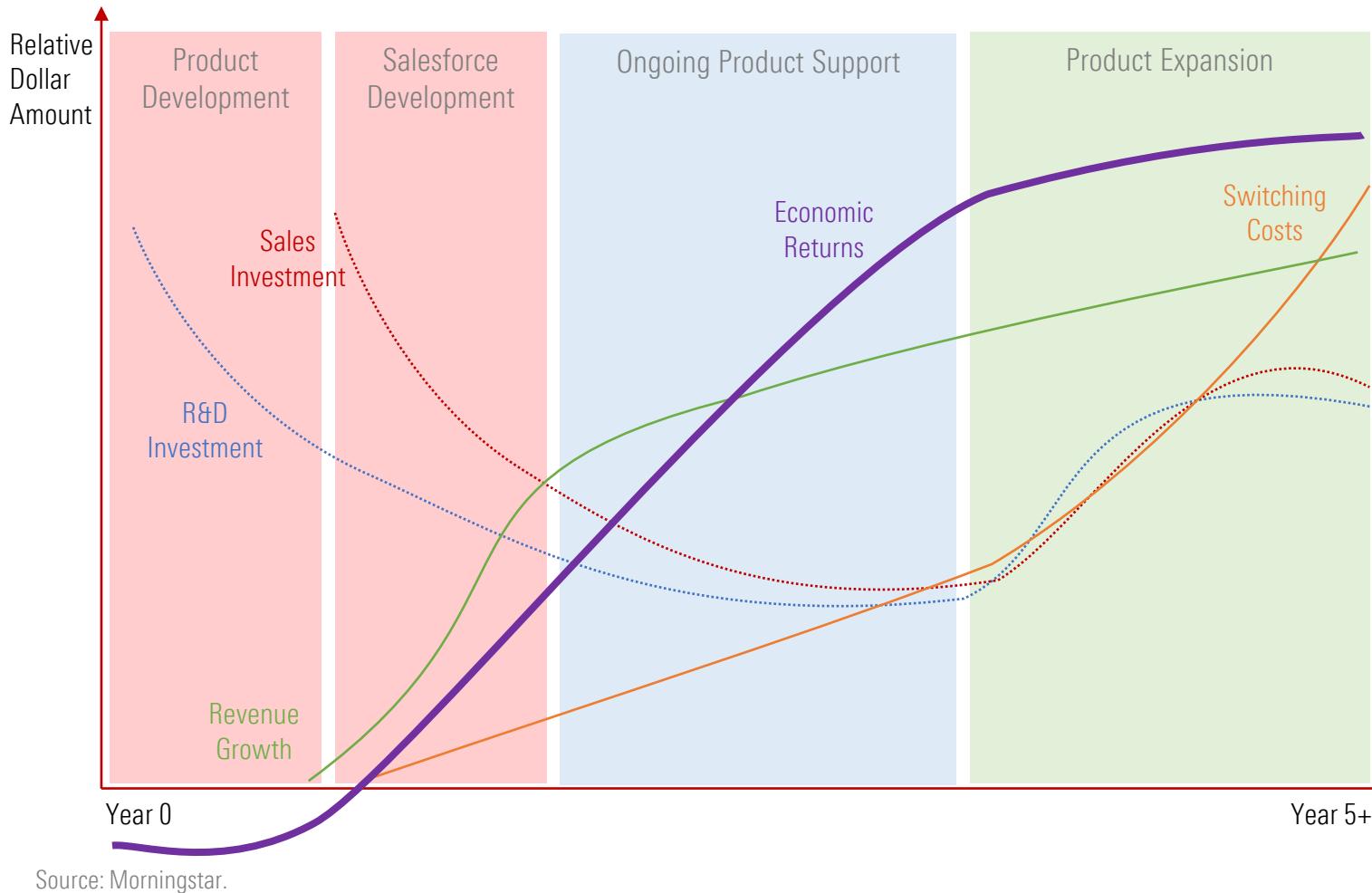
### Software Companies Spend an Average of 26% of Revenue on S&M Efforts; as a Firm Matures, These Efforts Can Scale Meaningfully and Widen Moats



Source: Morningstar data for selected companies. Data as of December 2023

# A Full Picture of Software Moat Economics: Hefty Initial Investment Creates Switching Costs and Attractive Economic Returns Over Time

## As the Customer Base Scales, We See Relative Costs Decrease and Moat Sources Strengthen



## Product innovation requires investment...

- Heavy upfront investment is required to develop the software and hire and train salesforce to sell it
- The firm reinvests to continue product development
- Research and sales expenses increase with product expansion

## ...However, returns increase over time

- Over time, returns on the initial investments scale as new customers are added and expense growth slows
- Switching costs increase as firms develop additional functionality and sell newly developed solutions to existing customers
- Potential for a network effect as more customers are added to a platform and the ecosystem expands
- Once basic infrastructure is built and initial CAC is passed, margins naturally expand.

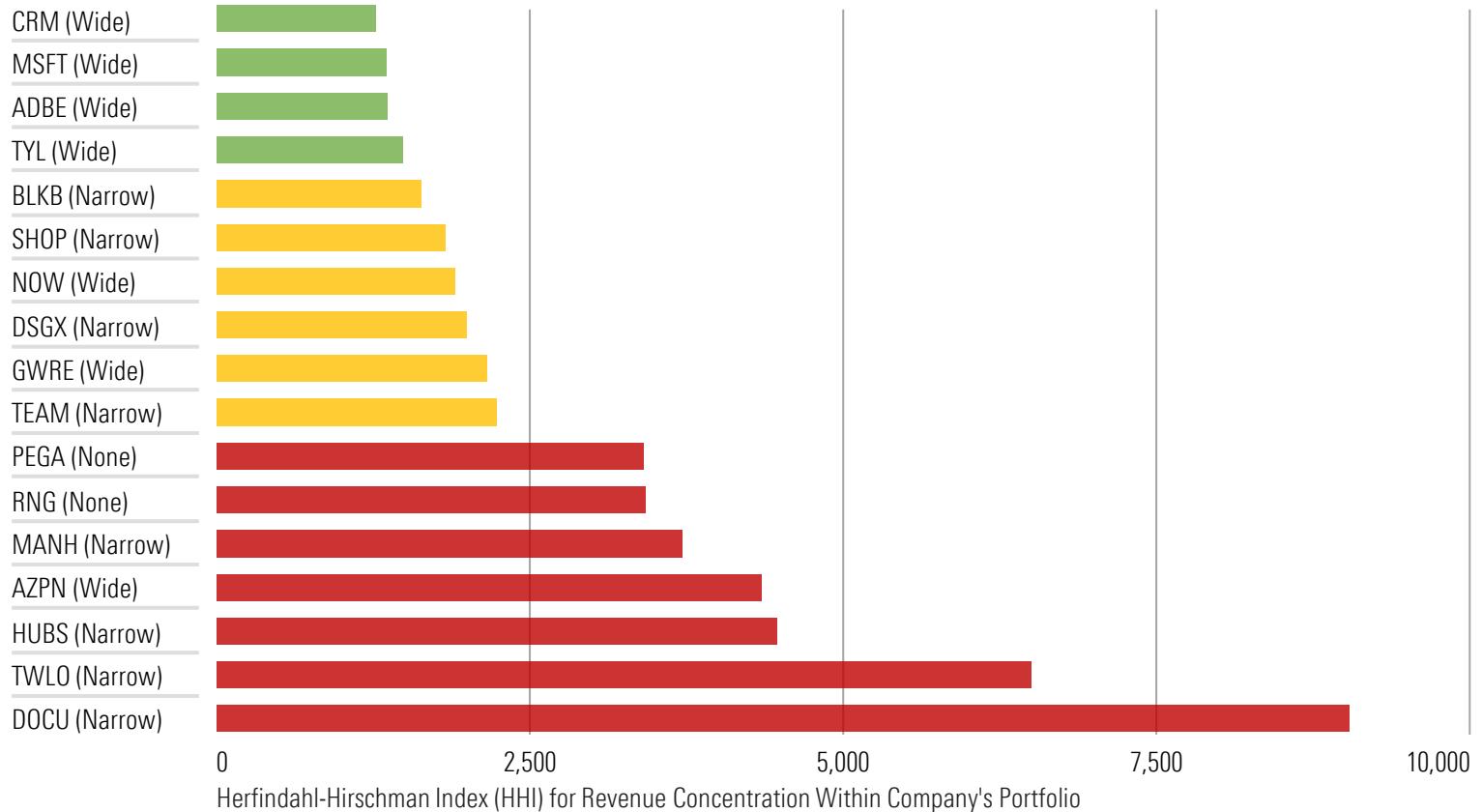
# Companies with Broader Portfolios and Better Revenue Diversification Tend to Have Wider Moats

Moats in software are influenced by the breadth of a vendor's portfolio and the returns generated by it. It is cheaper and faster for a vendor to expand a relationship with an existing customer by selling an additional solution than it is to identify a new customer and cultivate a relationship until a sale is consummated. Thus, customer acquisition costs decline as the portfolio expands, which drives higher margins and increases returns. Said another way, software portfolios with the greatest diversification tend to render wider moats. In contrast, software companies that rely on just a handful of solutions tend to have narrow or even no moats.

Selling additional solutions to a customer also has the added benefit of increasing switching costs. For example, a customer can change Salesforce's CRM solution to a different vendor more easily. However, if that same customer implements Salesforce's sales, service, and marketing clouds, it markedly increases the complexity involved and materially expands its reliance on Salesforce, rendering a vendor change much more challenging.

The breadth and depth of a product portfolio isn't the only factor in software moats, but it is an important one.

## Wide Moat Companies Tend to Have Broad Product Portfolios With More Diverse Revenue Streams

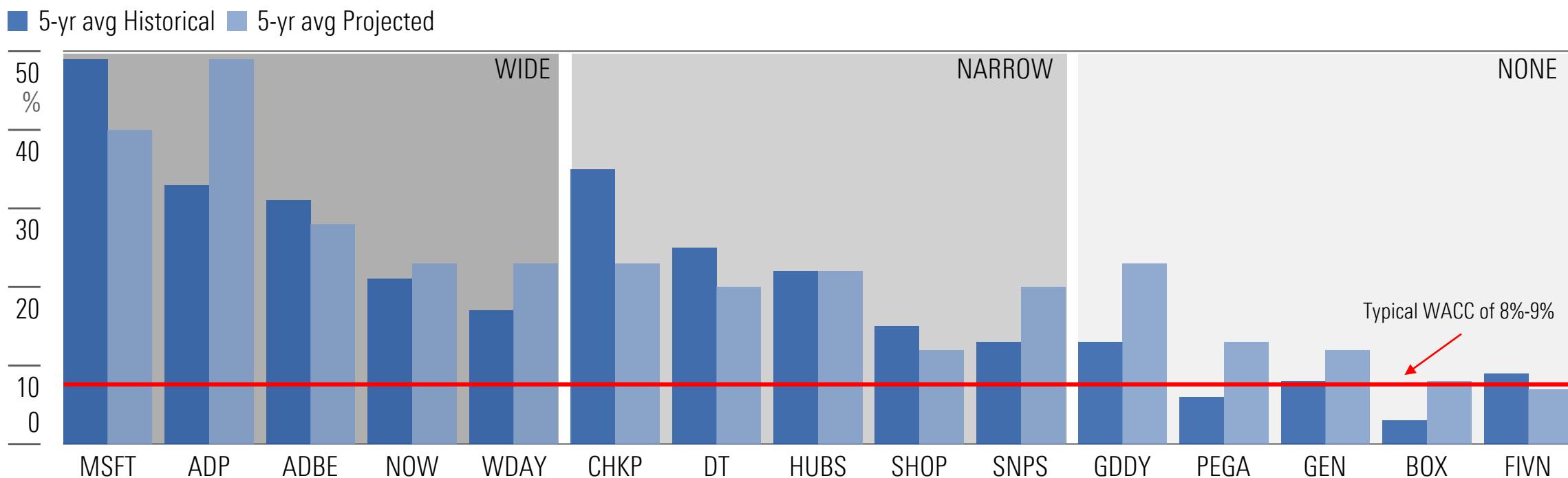


Source: Morningstar, based on most recent fiscal year.

## Wide-Moat Names Produce the Highest and Most Durable ROICs

Wide-moat firms typically produce some of the highest ROICs among our coverage, often approaching 25% or more. The software business model is attractive when it is successful and can offer attractive ROICs relative to an average WACC of roughly 8%-9%. Below, we present a representative sample of historical and projected ROICs for wide, narrow, and no-moat companies under Morningstar's software coverage. To summarize, less established firms with weaker retention rates and weaker product portfolios tend to have lower switching costs and higher CAC, creating less economic value and making them less moaty. Moatier firms tend to be stronger in those same areas.

### Successful Software Companies Tend to Produce Moaty Business Models with Attractive and Durable ROICs



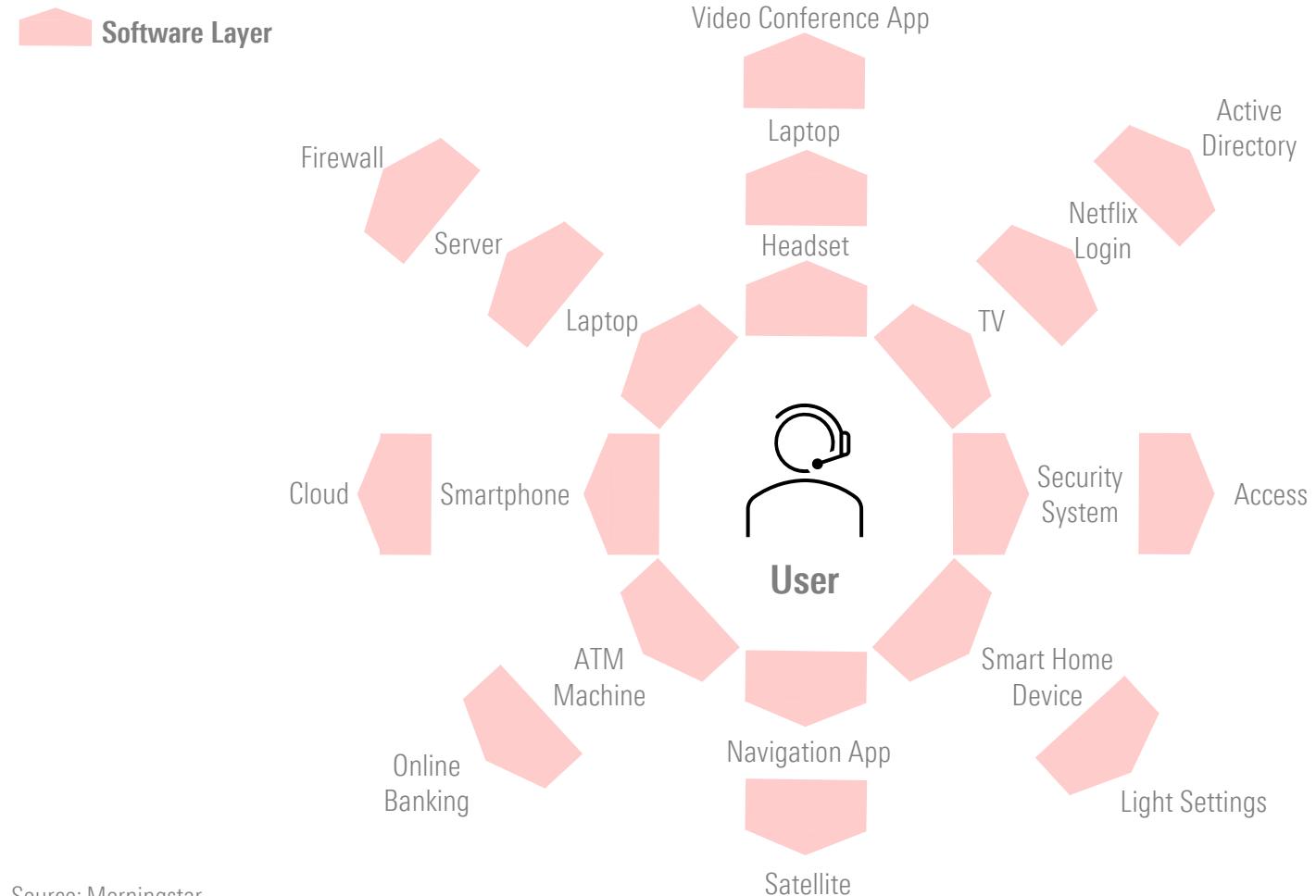
Source: Morningstar data for selected companies. Data as of December 2023

# Industry Basics

Software is everywhere. It enables the modern economy and can create attractive recurring revenue and margins.

# Software Is Everywhere!

## Software Is Pervasive in Modern Business



Source: Morningstar.

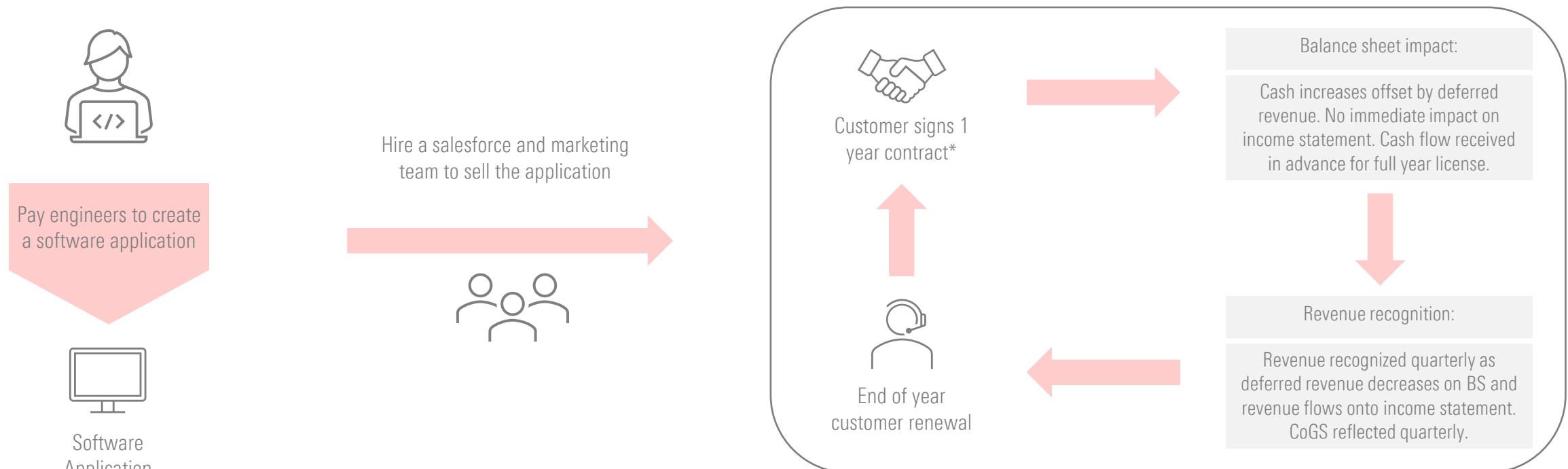
Software is ubiquitous and performs many tasks that we take for granted. It makes our lives easier and allows us to do whatever we want relatively easily. Software extends well beyond laptops and Windows. Much of the software we experience is embedded in a device or closed system, thus further insulating us from it. Withdrawing cash from an ATM, paying with Apple Pay, watching Netflix, making a phone call, following navigation routes in a car, playing Candy Crush, changing the temperature in your house on a Nest thermostat... it is all based on software.

The software we may think of is Windows, Excel, and whatever functional software our jobs may center around, such as customer relationship management. Many professionals often deal with common enterprise software solutions; however, software goes far beyond this. Software is truly everywhere in the modern world.

## The Software Model Provides Strong Cash Flows and Highly Visible Revenue

Software firms invest heavily up-front in R&D to create an application and then pay salespeople to sell it before seeing any revenue. Even after a contract is signed, it typically takes the vendor several years for a customer to become profitable from an accounting perspective. However, the software company is paid in advance, so from a cash flow perspective, it is profitable much sooner. The revenue stream is highly visible, given that the cash has already been collected and the contract has already been signed. Because software contracts are booked in advance, software analysts keep a close eye on items like the "backlog" and deferred revenue, which are forward-looking indicators of future revenue.

### Software Companies Invest Heavily Upfront and Create Valuable Recurring Revenue Streams Over Time



Source: Morningstar.

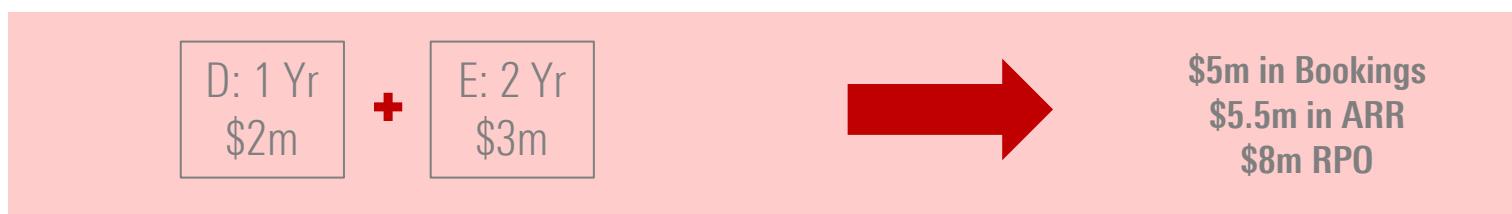
# Measures Like Bookings, RPO, and ARR Provide Insight Into Revenue Trends

## Key SaaS Related Metrics Help Investors Understand the Health of Future Revenue Growth

Contracts Booked on Day 1 (length & total dollar amount)



Book 2 more contracts on day 366,  
Contract A does not renew



Source: Morningstar

Investors will inevitably encounter a lot of SaaS-specific jargon. Understanding key metrics is necessary to understand any SaaS-based business. Below, we provide key revenue-related terms. Understanding these metrics will help an investor better predict future revenue trends.

**Bookings:** The total value of all contracts signed within a specific period. This shows how much new business a company generates in a specific period.

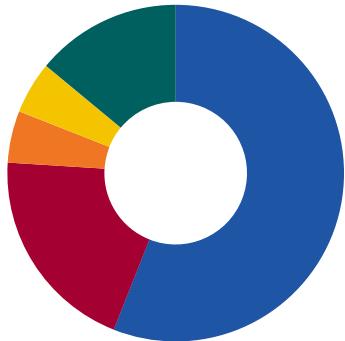
**Revenue Performance Obligation (RPO):** Sometimes referred to as “backlog,” this is the revenue a company has contracted to earn in the future. This is a key forward-looking indicator because it shows how much future revenue a company has already booked.

**Annual Recurring Revenue (ARR):** This measures the recurring revenue base. It gives a sense of how large the recurring revenue base is in the current period, even if, for example, a contract was booked mid-year.

**Deferred Revenue:** Cash received in advance for services that have not yet been delivered

# Enterprise Software Industry Snapshot

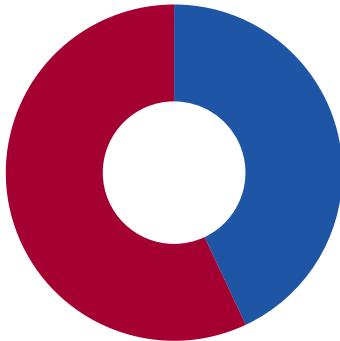
## Most Revenue Is Derived from North America



Source: Morningstar and Gartner. Data as of June 2023.

The U.S. is overwhelmingly the largest single enterprise software market, which pushes the North American market to the top, followed by Western Europe. Software is typically localized for language, currency, and other impacts when offered outside the U.S. Since much of software is consumed on a per-user basis, the largest software customers will tend to be the largest companies by number of employees.

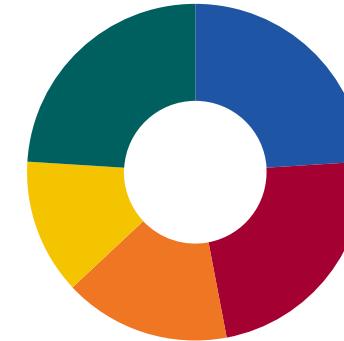
## Infrastructure Is Slightly Larger Than Application



Source: Morningstar and Gartner. Data as of June 2023.

Some industry observers cut enterprise software into infrastructure and application categories, split 57%/43%. Infrastructure software, such as Windows, is a framework that supports applications, such as Excel, designed to perform specific tasks. The line admittedly can get blurry between infrastructure and application.

## Customer Experience Software Is the Largest Category



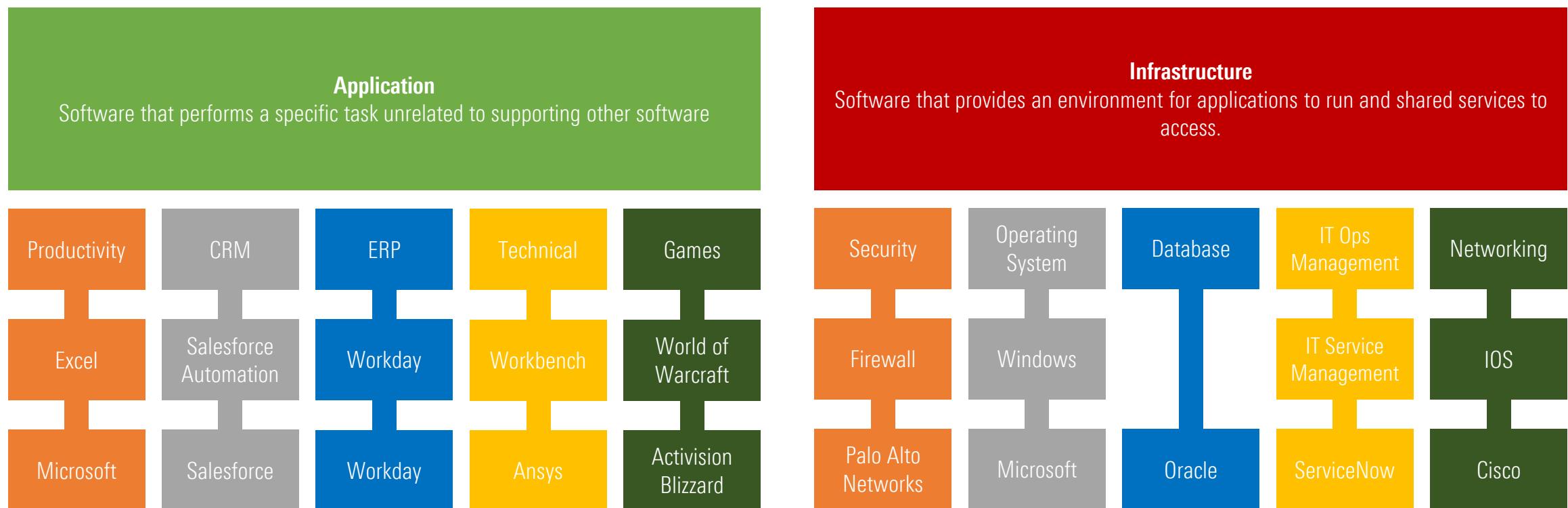
Source: Morningstar and Gartner. Data as of June 2023.

Drilling down further, customer experience-related software, such as Salesforce's marketing cloud, is the largest single category of enterprise software, accounting for nearly one-fourth of industry revenue, with database management, such as Oracle, a close second. Cybersecurity software is a fast-growing and increasingly important software vertical.

# There Is a Dizzying Array of Software Categories

There are many categories of software overlapping significantly; therefore, rigidly defining niches can be a fruitless exercise. However, we recognize that as an introductory exercise, giving a broad, if overly simplified, view of the basics of “what is out there.” Below, we filter by the broadest categories of software in infrastructure, a shared platform (Windows), and an application that performs a specific task (Excel). Truly understanding the nuances and differences of each software offering requires specific company and even application-level knowledge for each individual solution.

## Common Software Categories



Source: Morningstar.

## Software Can Be Delivered Through a Variety of Means

The software model has evolved over time from the mainframe to perpetual license (on-premises) to software as a service, which is often described interchangeably with "cloud." To confuse matters, many software vendors sell the same solution in various delivery models, such as perpetual license and SaaS. These models differ in important ways, such as the extensibility of the software, the payment structure, and the ultimate residency of the code. While SaaS has become the dominant model today, it is important to understand the nuances between each delivery model, as the other models still exist and affect the economics of the business model.

### Comparison of Different Software Models

	Perpetual License	Term License	Subscription	SaaS	Open Source	Embedded
<b>Software Resides</b>	On-Premises	On-Premises	On-Premises	Cloud	On-Premises	On-Premises
<b>Up-Front Fee</b>	Full License	"Rent"	"Rent"	"Rent"	Free	"Rent"
<b>Ongoing Payments (Maintenance)</b>	X	X	X	X	None	X
<b>Software Updates</b>	X	None	X	X	X	X
<b>Update Frequency</b>	Infrequent	None	Regular	Frequent	Irregular	Regular

Source: Morningstar.

# SaaS Has Become the Dominant Software Delivery Model Because of Its Superior Economics and Service

## Benefits of the SaaS Model Often Outweigh the Costs

	Benefits	Downside
Vendor	<ul style="list-style-type: none"> <li>▪ High degree of revenue visibility via an attractive recurring revenue base</li> <li>▪ Single code base to maintain vs. multiple code bases and legacy products in on-premises model</li> <li>▪ Rapid feature introduction, often in days or quarters, versus years or “never” for on-premises model</li> <li>▪ Rapid customer response time</li> <li>▪ Expands market due to lower upfront costs.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Higher initial capital outlays: pay for hosting versus on-premises model of leaving hosting costs to client.</li> <li>▪ Slower recognition of revenue and profits: receive smaller payments over time instead of one large payment at the start for on-premises.</li> <li>▪ Potentially lower switching costs: “point and click” subscriptions = easier switching, but other factors usually complicate this simplified intuition.</li> </ul>
Customer	<ul style="list-style-type: none"> <li>▪ Lower up-front costs: pay smaller, recurring subscription fees instead of large one-time payment</li> <li>▪ Up and running quickly</li> <li>▪ Always have the current version; there is no need to choose between buying the latest version or remaining stuck on the legacy version</li> <li>▪ Rapid software updates available right away</li> <li>▪ Predictable expense stream; expenses naturally scale with usage/users.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Potentially less control of data</li> <li>▪ Some industries have data security concerns and prefer to keep certain functions “on-site”</li> <li>▪ More expensive in the long run under certain assumptions</li> </ul>

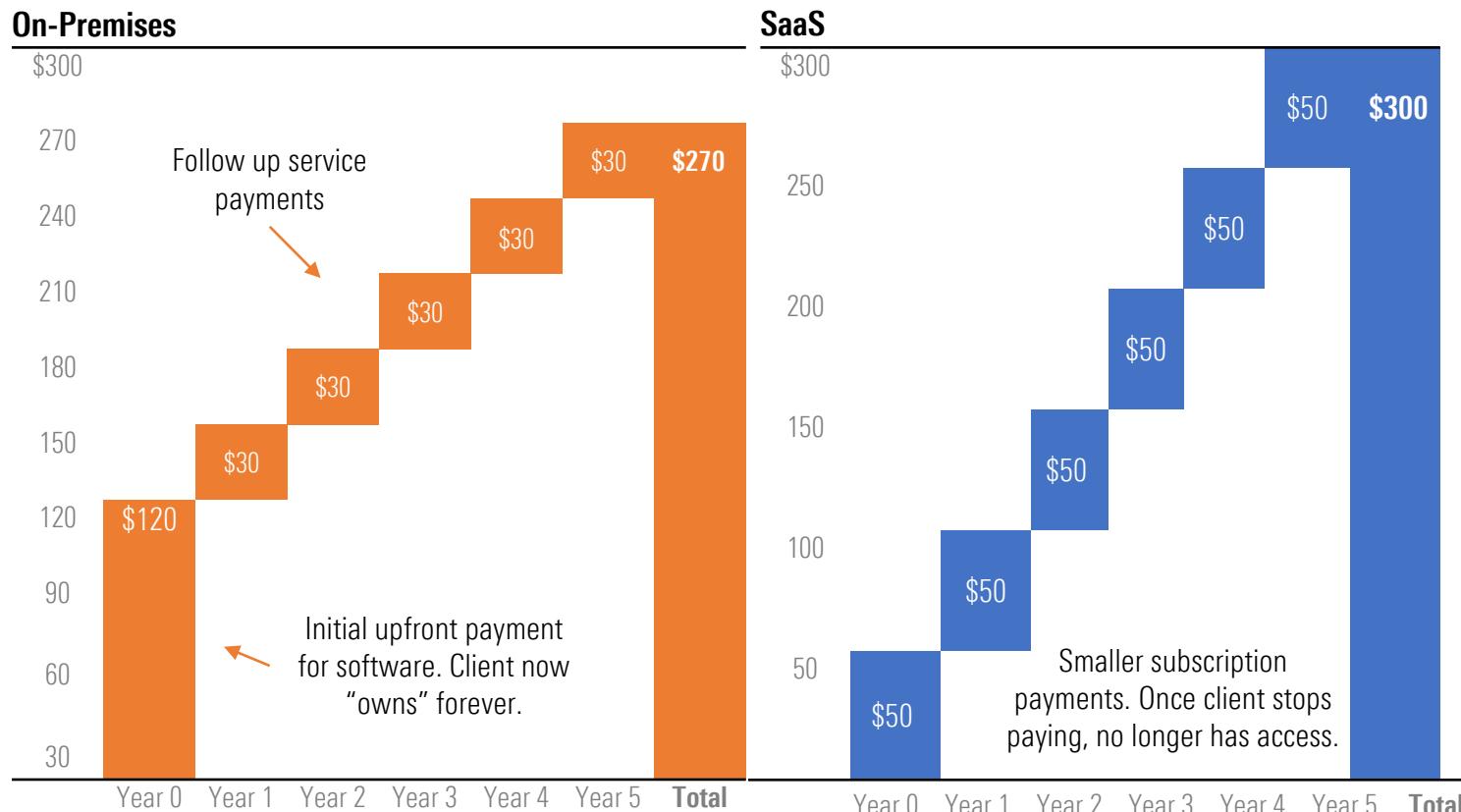
Source: Morningstar.

Since its introduction in 2000, the SaaS model has become the most pervasive software delivery mechanism. This is mainly because:

- SaaS offers better service for the customer via continuous and rapid updates to the software that are instantly available to all users.
- SaaS offers superior economics for the customer initially via lower up-front costs and superior economics for the software provider over time via a more consistent and valuable revenue stream.
- SaaS is also more efficient from a scale perspective because of “multi-tenancy” (only needing to maintain a single data store for multiple customers instead of multiple data stores) and extensibility (ability to maintain a single code base while extending the functionality of the application).

# SaaS Models Differ From Legacy On-Premises Models from an Accounting Standpoint

## Hypothetical Comparison Between On-Premises and SaaS Economics



Source: Morningstar.

From a cash flow and profitability standpoint, it takes several years for a SaaS model to equal and eventually surpass an on-premises model. When a legacy on-premise software business transitions to a SaaS-based model, the margin and profitability profile initially worsen before it gradually improves and improves.

Under the legacy on-premises model, a provider sells the right to use a software application indefinitely (perpetual license) and usually sells a maintenance agreement. The maintenance agreement covered support and updates to the software over a period of several years into the future. A SaaS model offers different packaging in that the customer buys the right to use software for a period of time, often a year, and this subscription covers both the access to the software and any maintenance the software company is doing behind the scenes. SaaS payments start off smaller, but the model is more profitable, stable, and predictable over time.

# Software Has Grown at a Multiple of GDP, Even Tending to Grow During Economic Downturns

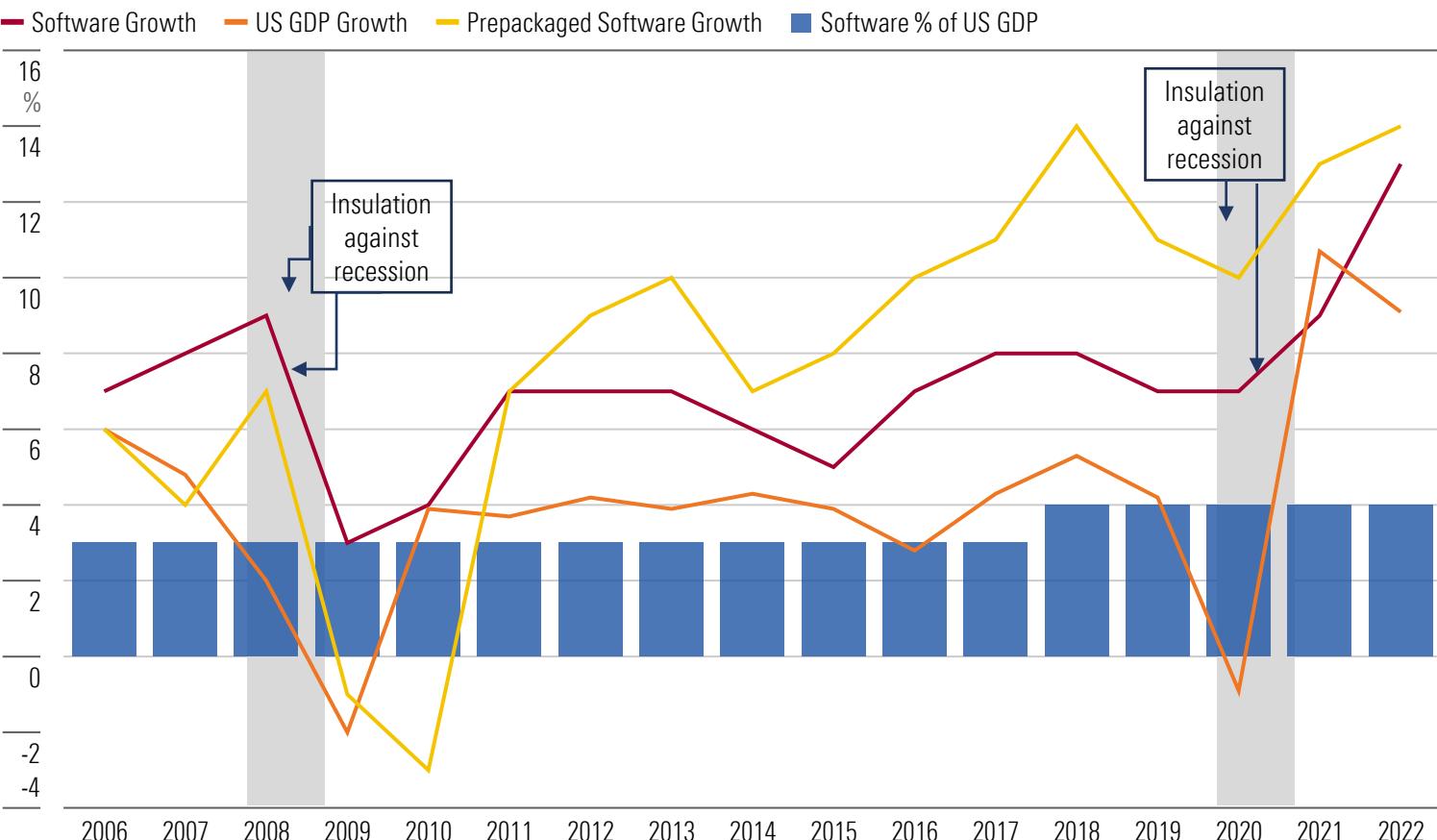
## Software Still Growing Its Share of GDP

According to the U.S. Bureau of Economic Analysis, or BEA, total software spending in the U.S. was \$925 billion in 2022. Annual spending on software has consistently outgrown GDP for decades, steadily growing its share of GDP. In 1990, software accounted for just 1.4% of GDP, whereas in 2022 it was 3.6%. From an industry life cycle viewpoint, software started relatively recently, becoming more and more prominent once computers were popularized in the 80s and 90s. While software is not "new" anymore, it is still not in the true maturity or decline phases. We expect the above GDP growth will continue.

## Growth Has Not Gone Negative During Recessions

Software spending has been insulated from macroeconomic conditions and has expanded during recessionary periods. While the pandemic was a unique downturn, software's recessionary growth was particularly noticeable. While software budgets aren't completely immune to business conditions, much software is necessary for operations, and software increases productivity, often a focus during tougher business environments.

## Software Investment Is Growing in Importance

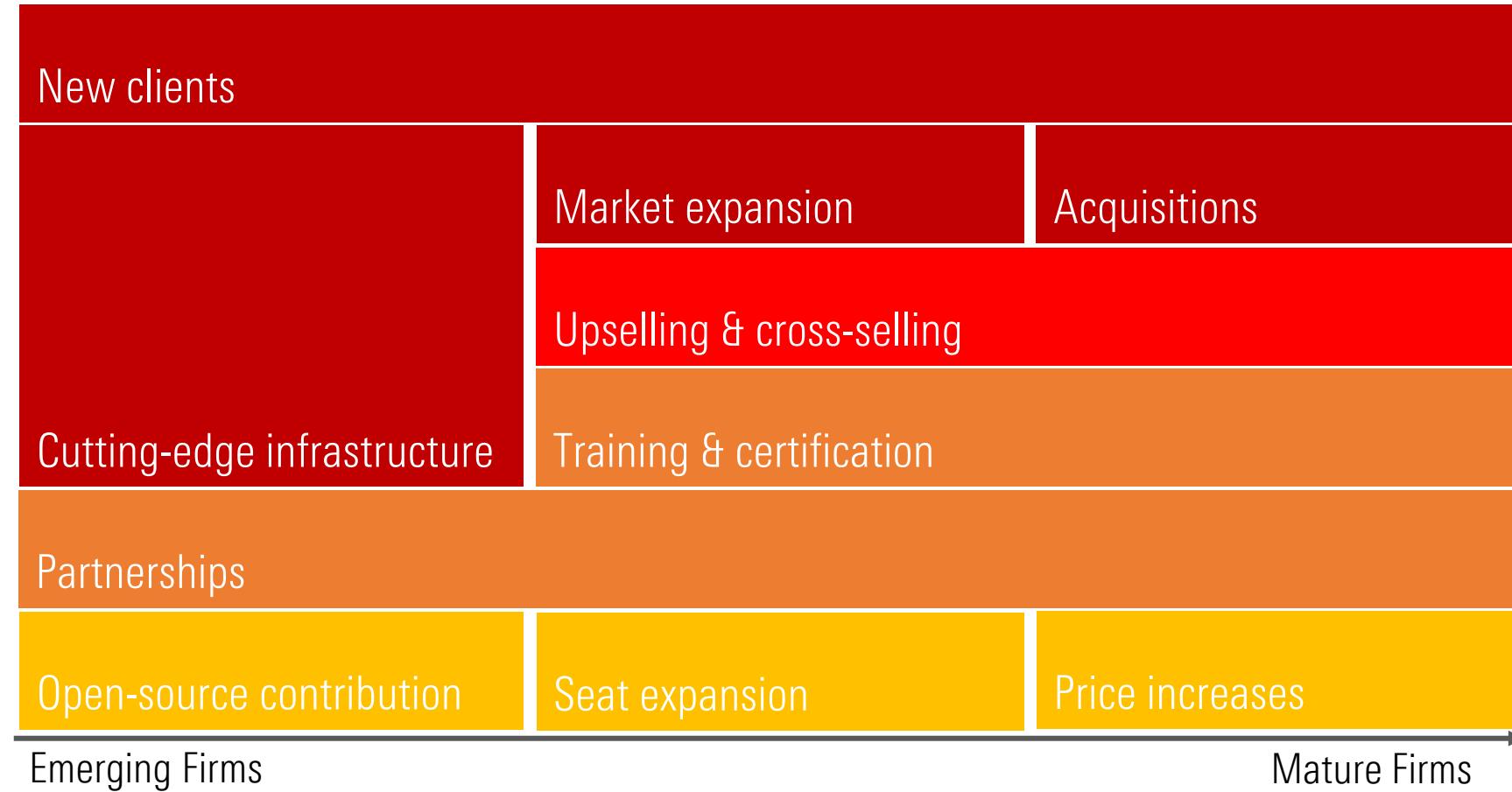


Source: Morningstar and BEA. Data as of Aug. 15, 2023.

# Software Companies Have Many Levers to Pull for Growth

## Software firms can grow themselves in a myriad of ways

■ Little investment ■ Low investment ■ Moderate investment ■ High investment



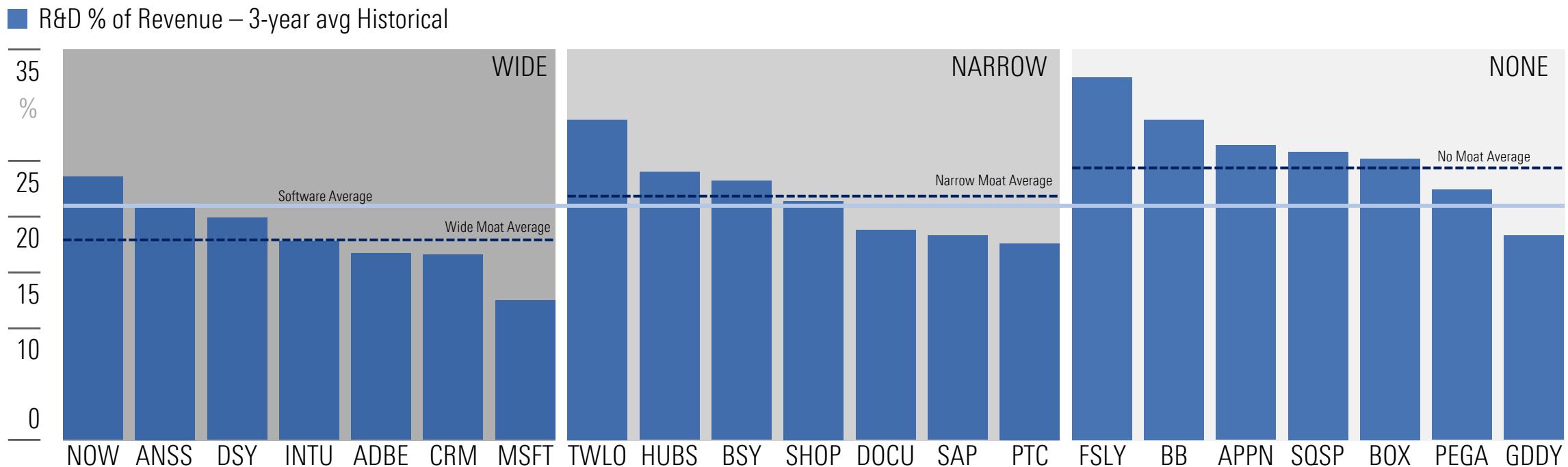
- Software firms are almost always seeking new clients
- Product creation and innovation can be sourced from open-source code, partnerships, and/or developing cutting-edge apps/infrastructure internally
- Once a product is ready for the market, software firms look to “land” by signing a new client (often referred to as a “new logo”)
- Once a client has made the initial purchase, software companies try to “expand” via seat expansion within that client
- Upselling, cross-selling, and price increases are other tools used to grow revenue
- Firms will target new markets and clients, and acquisitions are often used as a tool to accomplish this.

Source: Morningstar.

## R&D Investments Weigh on Near-Term Margins but Support Competitive Positioning and Long-Term Growth

Software firms must innovate to build a successful product and invest heavily in research and development. R&D efforts are often split between introducing new products and maintaining existing applications. Development never ends, as the competition is constantly improving. A key to software is that it is extremely scalable. The incremental costs of having additional users on a software application are minimal. Adding paying users across a relatively fixed development base improves scale and margins. We show below how relative R&D spending actually tends to decline as a firm's moat expands. This is not because they spend less, but because they scale as they grow.

### Software Companies Spend 21% of Revenue on R&D Efforts on Average; R&D Spend Supports Moats and Benefits as a Company Gains Scale

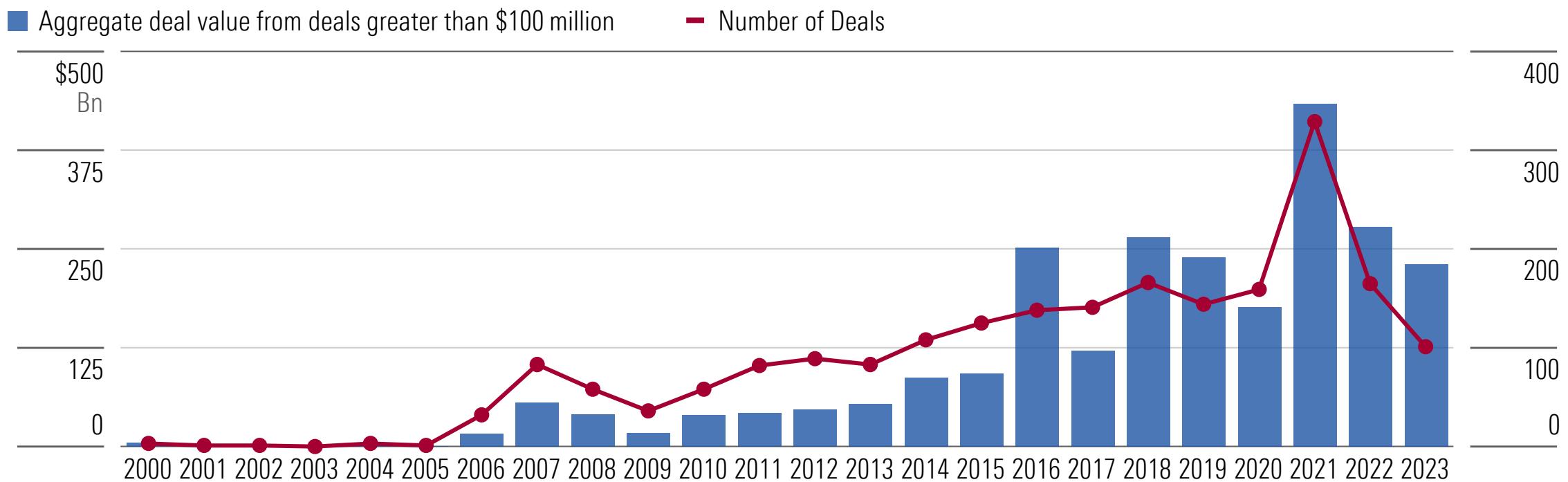


Source: Morningstar data for selected companies. Data as of December 2023

## Acquisitions Are Common Within the Software Industry, Used as a Tool to Expand Product Scope and Capabilities

Software firms typically make acquisitions to supplement R&D efforts under a build-or-buy framework. In other words, if a firm believes they cannot build something in-house with the appropriate cost and speed, they consider buying it. The motivation for deals may include acquiring a specific engineering team, improving on an existing product, breaking into new markets via new product capabilities, or gaining new customers. Smaller deals are often value-accretive over the long term, while larger deals often increase the difficulty and are harder to pull off.

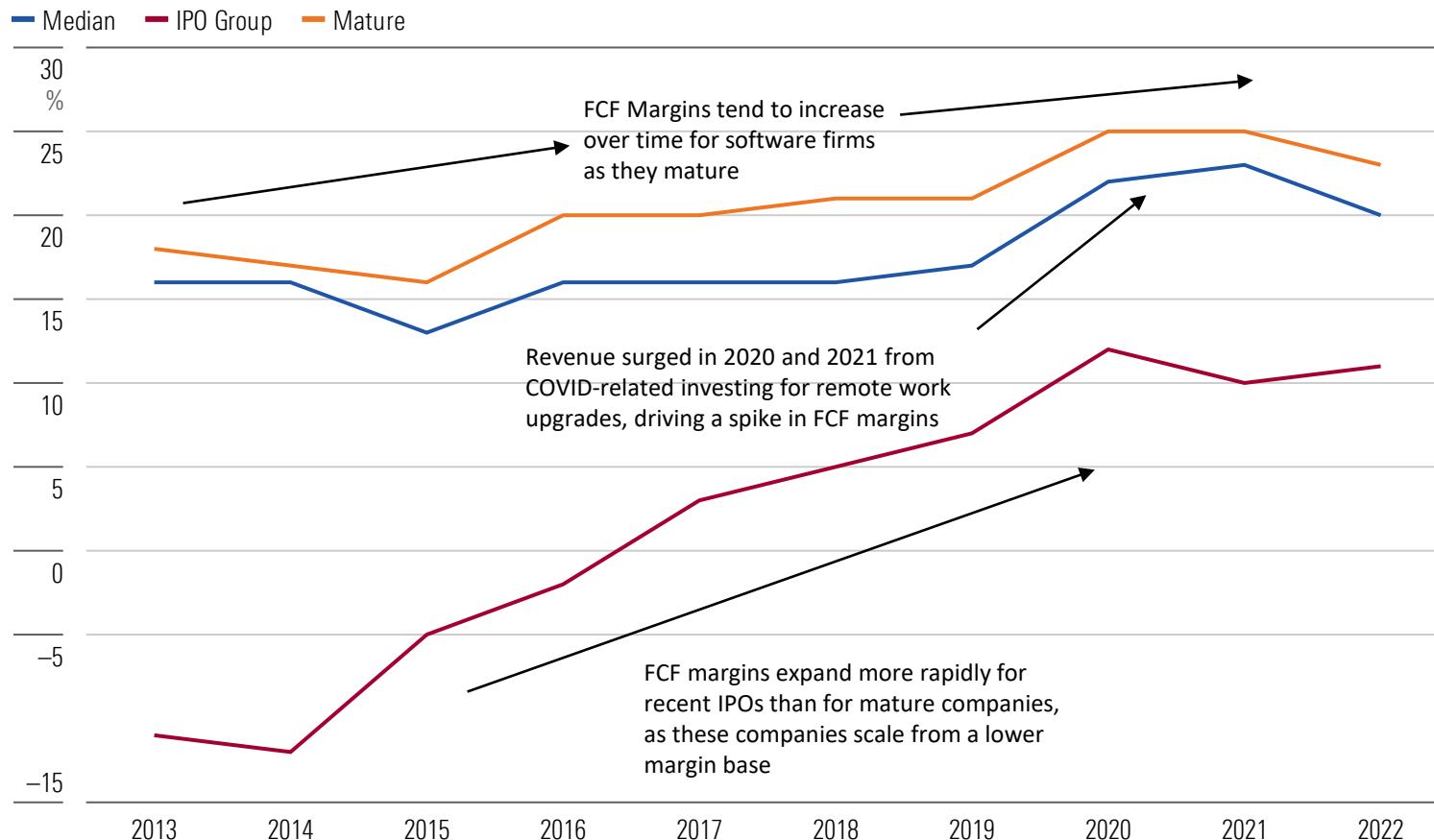
### Acquisitions allow software firms to expand their capabilities faster than organic development



Source: Morningstar, PitchBook. Data as of October 2023

# Software Companies Take Years to Scale but Are Ultimately Highly Profitable

## The Median Software FCF Margin Has Increased Over Time Despite Being Weighed Down by Many IPOs



Source: Morningstar and PitchBook. Data as of November 2023

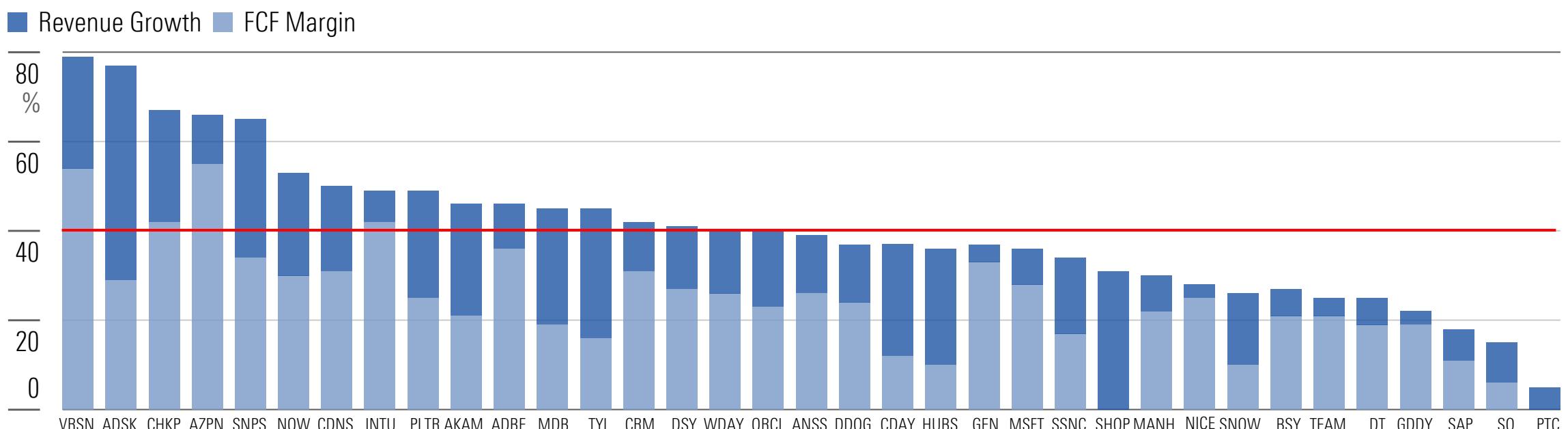
We favor free cash flow margins as the most relevant measure of profitability because they come closest to describing the underlying economics of software companies. FCF margins exclude stock-based compensation and amortization of acquired intangible assets, which gives a better sense of the margins the business could ultimately achieve once the initial sales and growth process has matured. FCF margins also consider that the software vendors contractually receive cash upfront.

In addition to this, free cash flow margins expand over time as a company scales and matures. Mature companies generate margins in the mid-20% range, while more recent IPOs often produce margins in the 10%-12% range. FCF margins for some of our most mature and profitable companies can be near 40%.

## The “Rule of 40” Combines Growth and Margins

Software investors commonly employ the “Rule of 40” as a benchmark for software firms. The Rule of 40 represents revenue growth plus profit margin (usually EBITDA or FCF margin). If the result exceeds 40%, the firm is considered healthy. This framework recognizes that companies grow faster when they are young, and as they mature, growth slows, and margins improve. Having a metric that combines growth and margin allows an investor to compare software companies at different stages of their lifecycle. The median of our software coverage hits the rule of 40 this quarter, although there is a wide range of results across our coverage.

### Healthy Software Companies Exhibit a Balance of Growth and Profitability



Source: Morningstar, PitchBook, and company reports for most recent fiscal quarter. Data as of November 2023.

## Growth Expectations Are a Key Valuation Driver for Software

Growth expectations tend to matter for the valuation of any stock from any sector. However, growth expectations can be especially impactful for software valuations because software firms are often still in the higher growth phase of their business cycle and because growth is indicative of the strength of their product and their ability to keep scaling. Comparing expected revenue growth with price/sales multiples reveals that, all else being equal, investors pay a premium for software companies that are growing faster. Other factors, such as margins, still matter, particularly as a company matures, but as investors dig into the software space, they'll want to pay close attention to growth expectations.

## Investors Consistently Pay Higher Multiples for Software Companies That Grow More Quickly

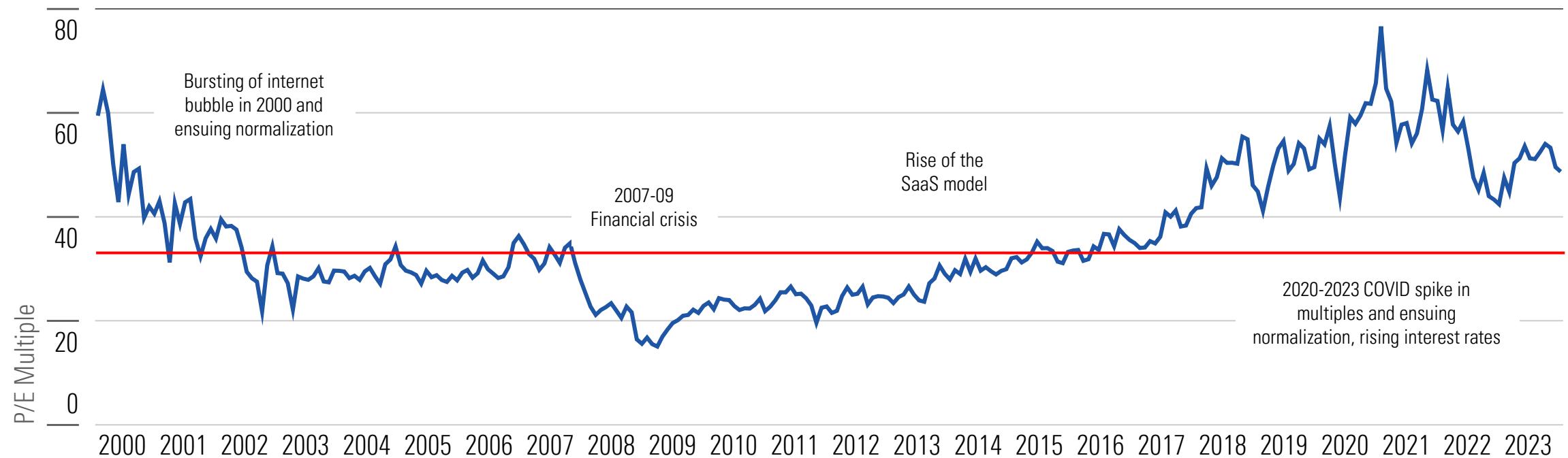


Source: Morningstar and PitchBook. Data as of November 2023.

## Software Multiples Can Swing Wildly as Expectations Change

Trailing P/E multiples for Morningstar's software companies have varied over time. Multiples contracted following the bursting of the 2000 internet bubble, reset lower in conjunction with the financial crisis in 2008, expanded for over a decade driven by the rise of the SaaS model, spiked higher during COVID as the economy accelerated its shift towards digital work, and came off the COVID highs as COVID faded and interest rates rose once again. Given the large swings in growth expectations and interest rates, valuations can also swing dramatically as the market tries to predict the future.

### Software Valuations Have Seen Dramatic Swings Over the Last Several Decades, With Growth Expectations and Interest Rates Being Key Factors



Source: Morningstar and PitchBook. Data as of November 2023.

# Capital Allocation in Software Correctly Focuses on Research and Development

Capital allocation in the software industry typically varies by size, with smaller and younger firms focused on innovation and growth. Larger firms engage in share buybacks and a more substantial acquisition strategy, given prodigious cash flow generation. While rare in software, a few mature companies offer a dividend. This playbook is appropriate and views consistent reinvestment in innovation and technology-based tuck-in acquisitions as the most effective capital allocation approach.

## Software Companies Typically Emphasize Product Development (R&D), Acquisitions, and Share Repurchases for Capital Allocation Purposes

Percent of Revenue for Latest Fiscal Year

Firm	Moat	Capital Allocation Rating	Research & Development	Acquisitions	Dividends	Share Repurchases	Capital Expenditures	Operating Cash Flow
Microsoft (MSFT)	Wide	Exemplary	13%	1%	9%	10%	13%	41%
Oracle (ORCL)	Narrow	Poor	17%	55%	7%	3%	17%	34%
Adobe (ADBE)	Wide	Exemplary	17%	1%	N/A	36%	3%	45%
Salesforce (CRM)	Wide	Standard	16%	1%	N/A	13%	3%	23%
SAP (ETR: SAP)	Narrow	Poor	20%	1%	9%	5%	N/A	18%
Intuit (INTU)	Wide	Exemplary	18%	0%	6%	14%	0%	35%
ServiceNow (NOW)	Wide	Exemplary	24%	1%	N/A	N/A	8%	38%
Shopify (SHOP)	Narrow	Standard	27%	31%	N/A	0%	1%	2%
Synopsys (SNPS)	Narrow	Exemplary	32%	8%	N/A	17%	3%	34%
Cadence Design Systems (CDNS)	Narrow	Exemplary	35%	17%	N/A	30%	3%	35%
Workday (WDAY)	Wide	Exemplary	37%	0%	N/A	1%	6%	27%
Dassault Systemes (PAR: DSY)	Wide	Standard	19%	1%	4%	8%	2%	27%
Snowflake (SNOW)	None	Exemplary	38%	18%	N/A	0%	1%	26%
Atlassian (TEAM)	Narrow	Standard	53%	0%	N/A	4%	1%	24%
Autodesk (ADSK)	Wide	Exemplary	24%	2%	N/A	20%	1%	41%
<b>Median</b>			24%	1%	0%	9%	3%	34%

Source: Morningstar, PitchBook, and company reports for each firm's most recent fiscal year. Data as of November 2023.

# Software Outlook

We see software growing more than 10% annually through 2027.

# Software Has Grown Tremendously, and We Think the Future Remains Bright

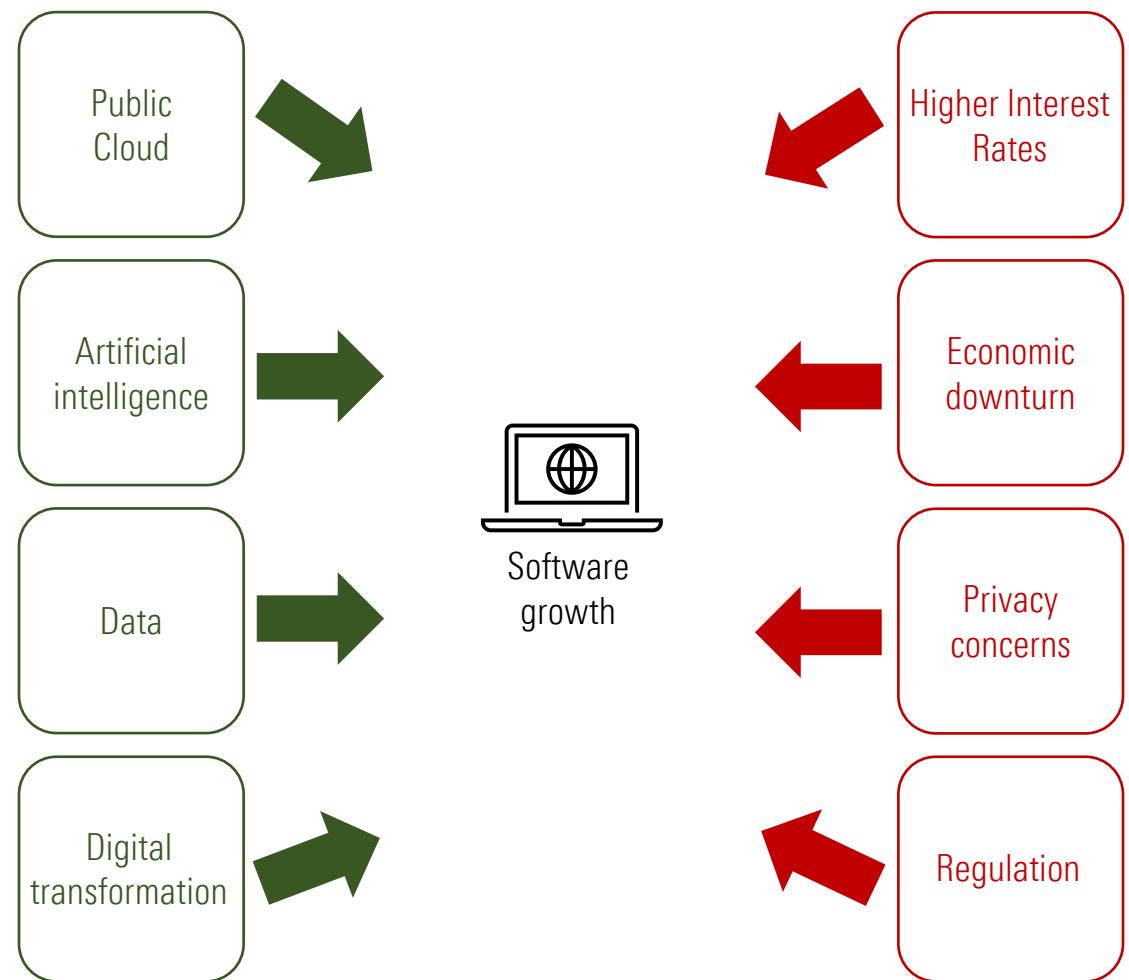
We expect revenue and margin expansion for software players to continue to skew favorably overall.

## Tailwinds

- **Artificial intelligence:** We see demand for generative AI use cases fueling software growth in the coming years.
- **Data:** The exponential growth in data and the need for storage will only multiply. Software firms have the expertise to organize, protect, and use this data.
- **Public cloud:** The rise of the public cloud has driven heavy software investment across industries. Firms take on the expertise of hybrid or cloud-native software firms to support the transition from on-premise to cloud.
- **Digital transformation:** Accelerated by the pandemic, there is a push for firms to implement digital workflows.

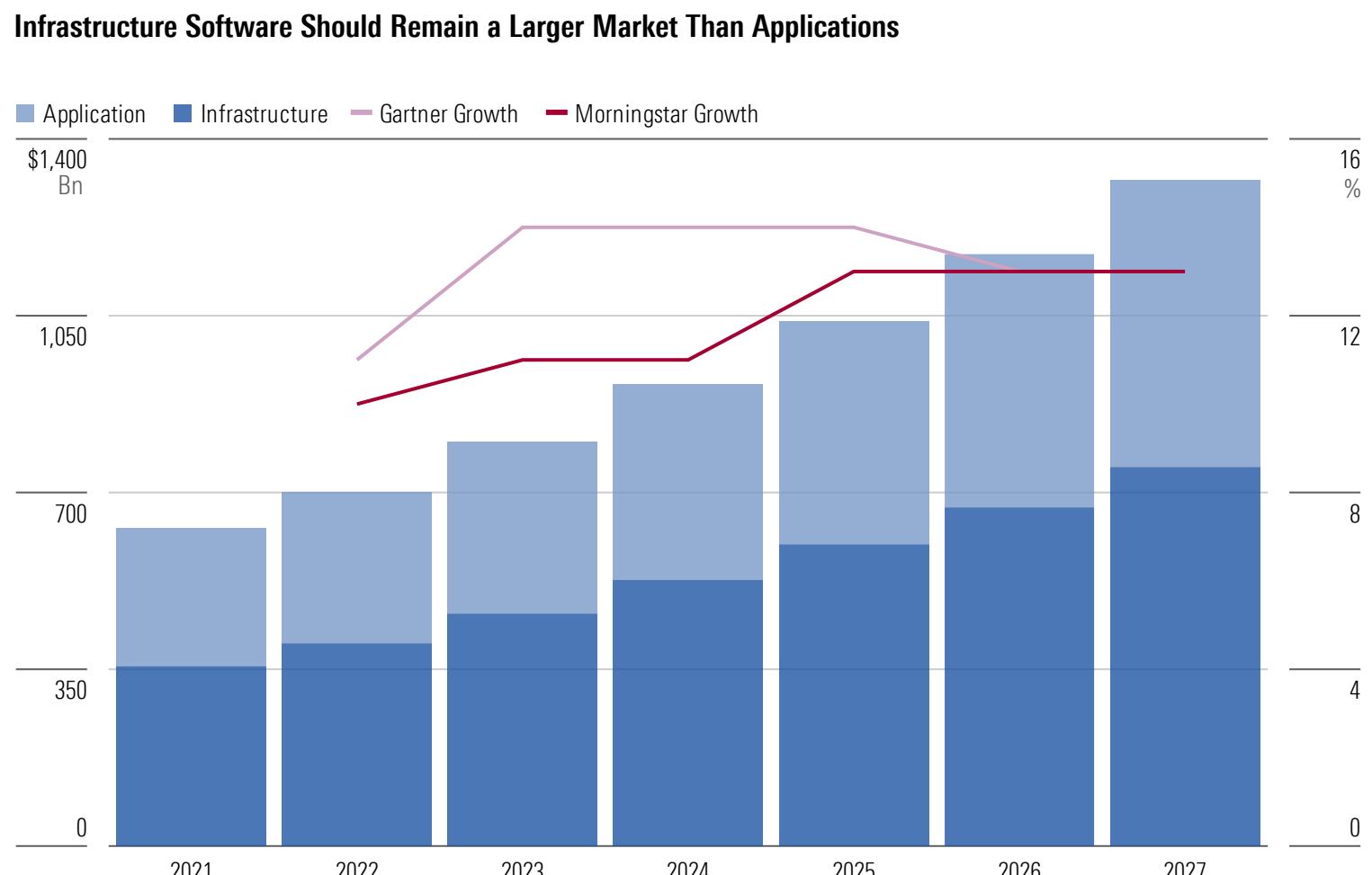
## Headwinds

- **Higher interest rates:** Higher interest rates make it more expensive to fund growth as a software firm (via debt and PE funding) and can also lead to leaner budgets for customers
- **Economic downturn:** Customers are tightening their IT budgets in tough macroeconomic times or macro factors like foreign exchange pressures.
- **Privacy concerns:** Reluctance to onboard software or digitize workflows due to data privacy concerns hampered SaaS and public cloud growth early on.
- **Regulation:** Regulatory intrusion is one of the most significant risks.



# The Software Market Should Remain a Robust Area for Growth in the Coming Years

Total software revenue is expected to grow more than 10% annually through 2027, including approximately 14% in 2024. Software industry revenue growth is derived from existing clients in the form of additional seats and new modules and from new vendors and new business formation. Pricing tends to be lumpy, as software vendors may raise prices by 10% once every three years rather than annually by 2% to 3%. 2023 was a busy year for price hikes, as vendors pulled that lever well above normal historical levels. While Gartner provides widely followed software industry data, our bottom-up forecast is slightly less aggressive over the next two years, which we attribute to our view of heightened macroeconomic uncertainty lasting throughout 2024.

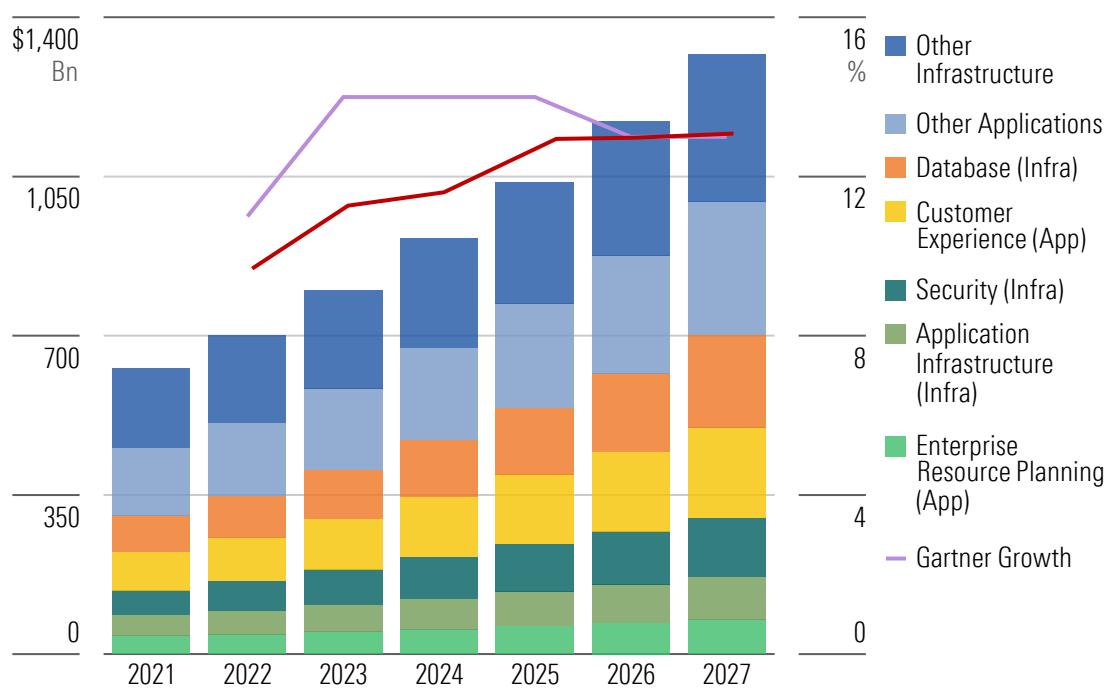


Source: Gartner, Morningstar for growth estimates for core software coverage including ADBE, AZPN, BLKB, CRM, DOCU, DSGX, GWRE, HUBS, MANH, MSFT, NOW, PEGA, RNG, SHOP, TEAM, TWLO, TYL, and ZM. Data as of Dec. 15, 2023

# AI and Revenue-Producing Software Related to Customers Should Drive Growth Over the Next Several Years

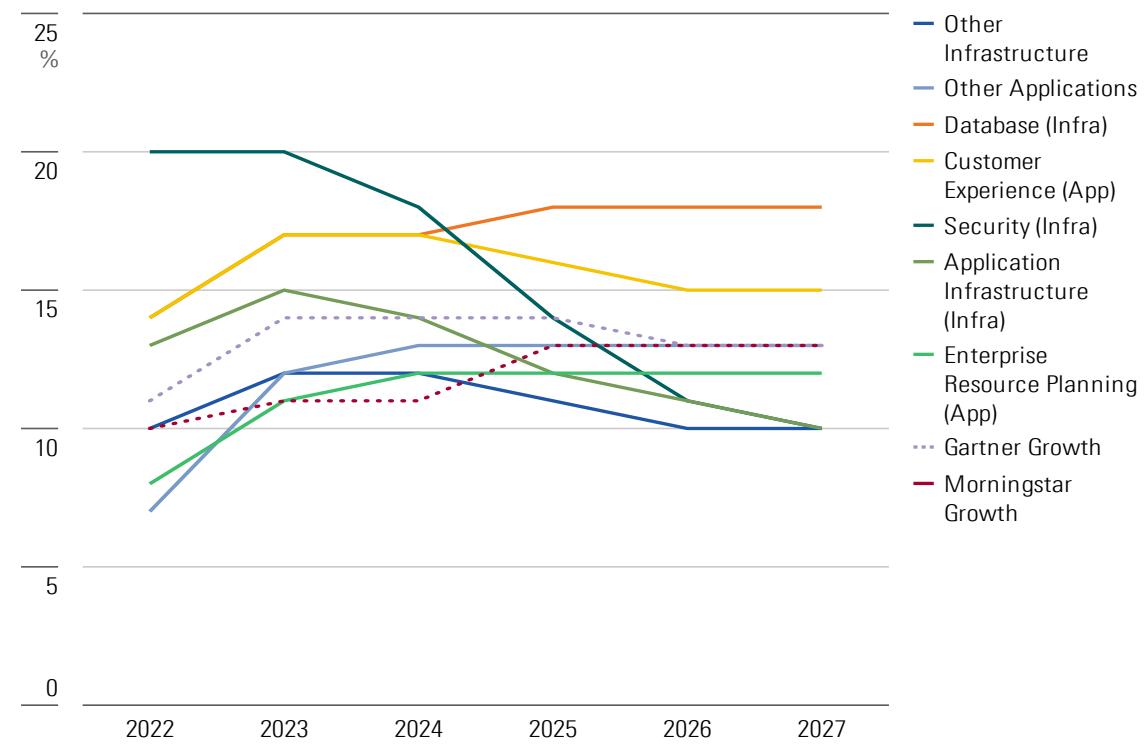
Database software is the largest category within infrastructure software. At the same time, customer experience is the largest category within application software, a dynamic we do not expect to change over the next five years. Further, despite being the largest category, we expect they will also be the fastest-growing areas over the next five years. Database-related solutions are growing due to the need to organize and prepare data to apply generative AI. Customer experience grows because it helps users generate new sales.

## Database and Customer Experience Remain the Largest Software Categories...



Source: Gartner and Morningstar for growth estimates for core software coverage. Data as of June 29, 2023

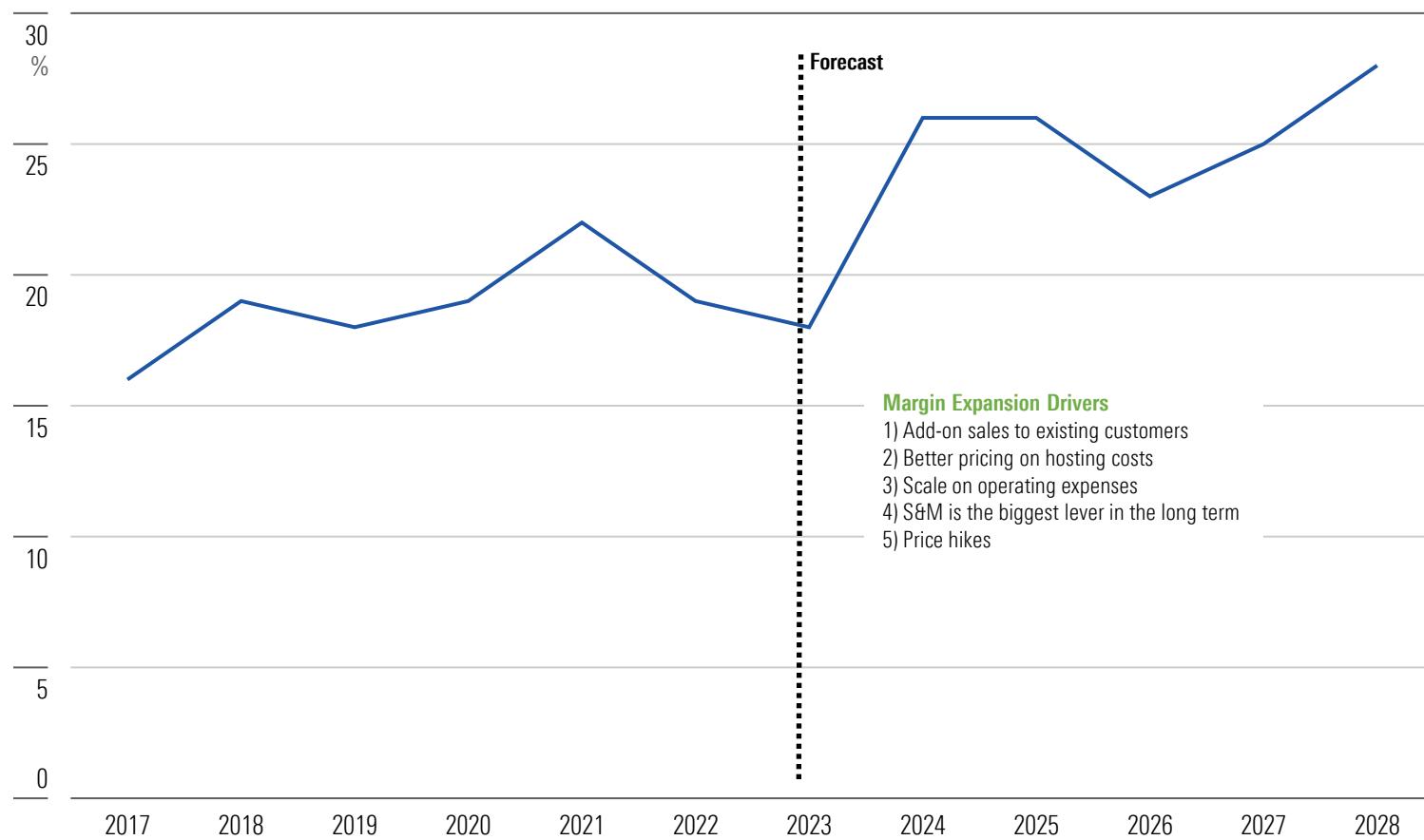
## And They Are Also Growing the Fastest



Source: Gartner and Morningstar for growth estimates for core software coverage. Data as of June 29, 2023

# We Expect Margins to Continue to Expand Over Time Based Largely on Scale

## While Free Cash Flow Margins May Be Somewhat Volatile Year to Year, We Predict an Upward Trajectory



Source: Morningstar growth estimates for core software coverage including ADBE, AZPN, BLKB, CRM, DOCU, DSGX, GWRE, HUBS, MANH, MSFT, NOW, PEGA, RNG, SHOP, TEAM, TWLO, TYL, and ZM. Data as of Dec. 15, 2023

Any software firm's margins should expand within 25 to 150 basis points annually under normal circumstances. We would not expect young or recent IPOs to enjoy margin expansion, as they are still building internal infrastructures and investing heavily in product development and sales expansion. While improvements may be lumpy, our forecast is consistent overall with prior experience.

Software companies are unique in that there is leverage even in the cost of goods sold, which would come in the form of improved pricing based on higher volumes for hosting costs. We also see expense leverage in sales and marketing, research and development, and general and administrative expenses. R&D offers the least scale, as firms must invest to innovate, while S&M offers the most scale in the long run, as it represents 26% on average of sales and is typically the largest expense. As growth slows, we would naturally expect S&M to decline. Indeed, our most mature companies tend to have the lowest S&M as a percentage of sales.

# ESG Snapshot

Data security risks are unlikely to have a lasting negative impact on software providers

# While ESG Risks Are Not Pervasive, Data Security and Privacy Are Likely to Remain an Obvious Issue

Sustainalytics identifies most software companies as having either low or medium ESG risk, which suggests that the industry is less risky than other sectors on average. The biggest areas of increased risk relative to overall market ESG Risk Ratings include human capital, data privacy, and security.

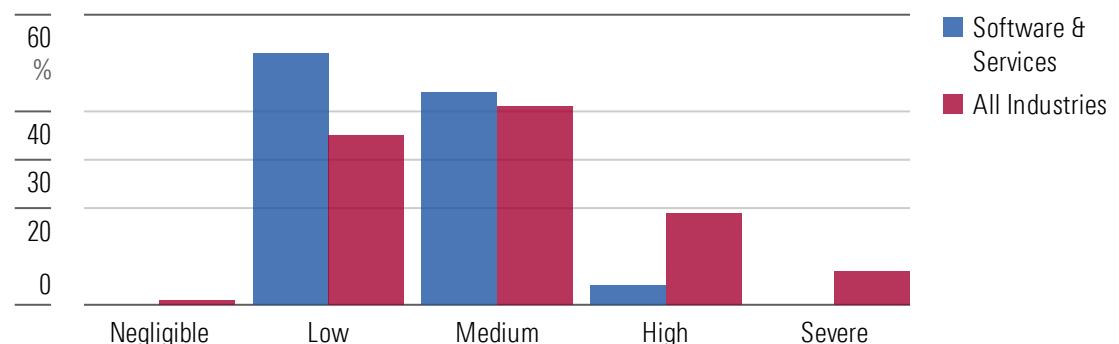
## Human Capital

The software industry's exposure to this material, environmental, social, and governance issue is high due to the complexity and skill software engineers must possess to develop advanced capabilities such as AI. Advanced innovation carries higher future uncertainty. We think virtually all software companies are similarly affected by these issues, with the solution being considerably higher compensation than other professions.

## Data Privacy and Security

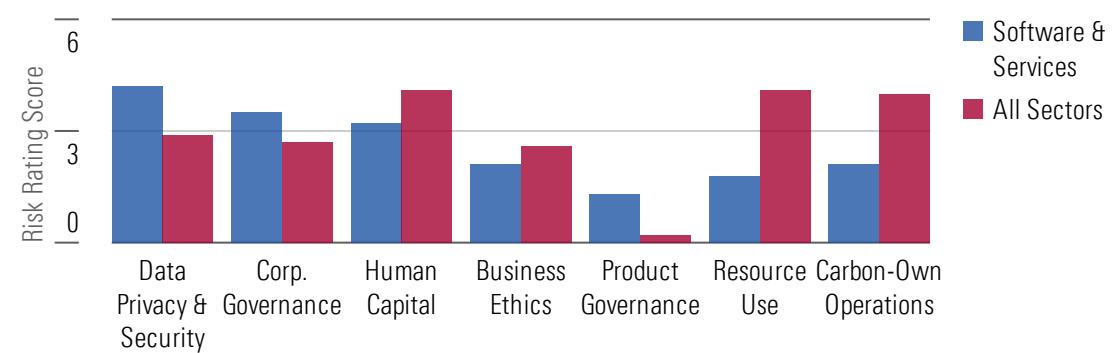
Software has high exposure to data privacy and security issues. Software houses and uses data and must protect it. For this reason, cyber attacks often target vulnerabilities within the code or design of the application itself. We observe headlines describing cyber attacks and data leaks on a routine basis. While there is a risk that the software company suffers reputational damage, we have not seen this result in lasting financial damage to the vendor thus far.

## Most of Our Software Coverage Faces a Medium ESG Risk



Source: Morningstar, Sustainalytics. Data as of August 2023.

## Data Privacy and Human Capital Score as Top ESG Issues

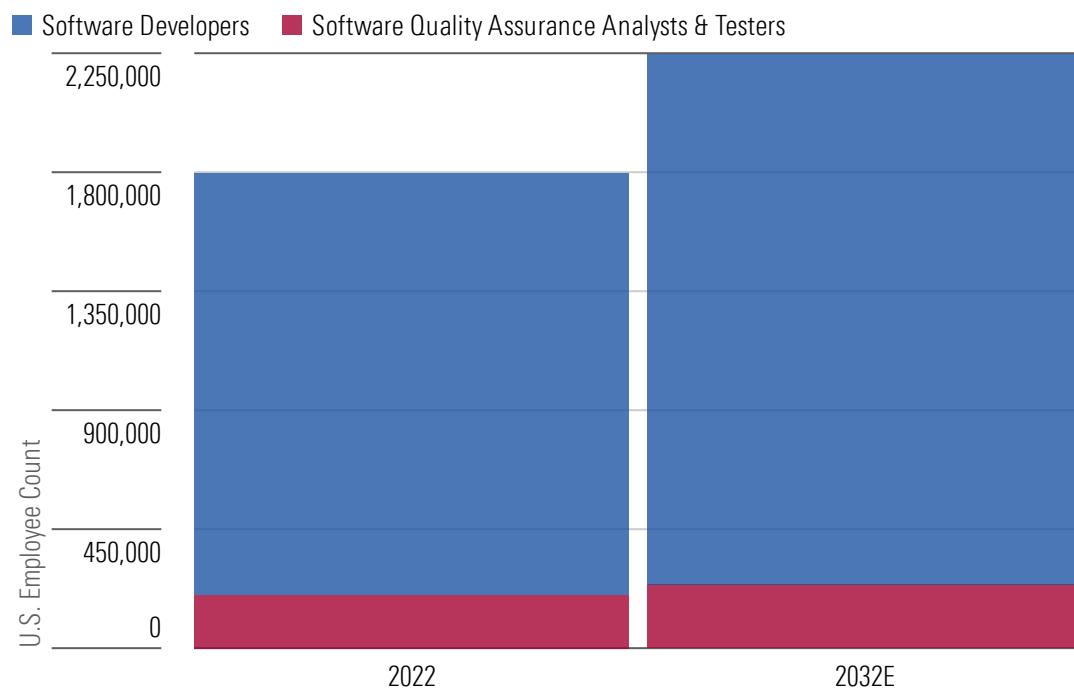


Source: Morningstar, Sustainalytics. Data as of August 2023.

# The Shortage of Talented Software Engineers Has Been an Issue for Decades

Software companies struggle to attract and retain the highly skilled developers they need amid a global talent shortage exacerbated by the increased pace of digital transformation during the pandemic and the “great resignation.” While this pressure has eased somewhat in 2023, we expect the competition for skilled software developers to remain an issue for software companies. We will continue manifesting through rapid hiring, high salaries, and elevated stock-based compensation.

## Demand for software talent is expected to increase by 25% over the next decade



Source: U.S. Bureau of Labor. Data as of November 2023

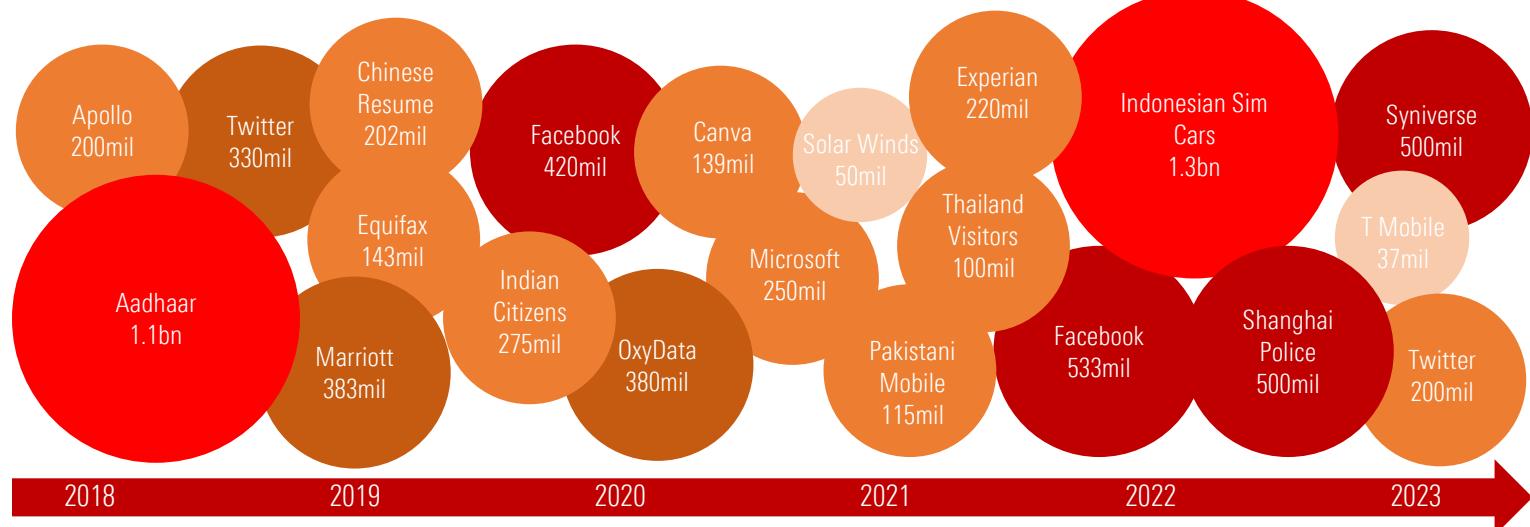
## Attracting and retaining highly skilled labor comes at a price

Attracting	Retaining
<p>As software complexity increases in organizations, more specialized talent is required. Companies compete to hire from a small pool of qualified developers.</p> <p>Hiring tactics include:</p> <ul style="list-style-type: none"> <li>▪ Signing bonus offer</li> <li>▪ Competitive compensation offer</li> <li>▪ Competitive benefits offer</li> <li>▪ Flexible/remote work policies.</li> </ul>	<p>Companies are under threat of losing their most specialized developers to competitors.</p> <p>Methods to retain employees include:</p> <ul style="list-style-type: none"> <li>▪ Competitive compensation increases</li> <li>▪ Ensuring superior benefits</li> <li>▪ Strong diversity, equity &amp; inclusion program</li> <li>▪ Employee ownership programs</li> <li>▪ Stock-based compensation.</li> </ul>

Source: U.S. Bureau of Labor, Sustainalytics. Data as of November 2023

# Data Privacy and Security Is a Critical ESG Issue for Software Companies

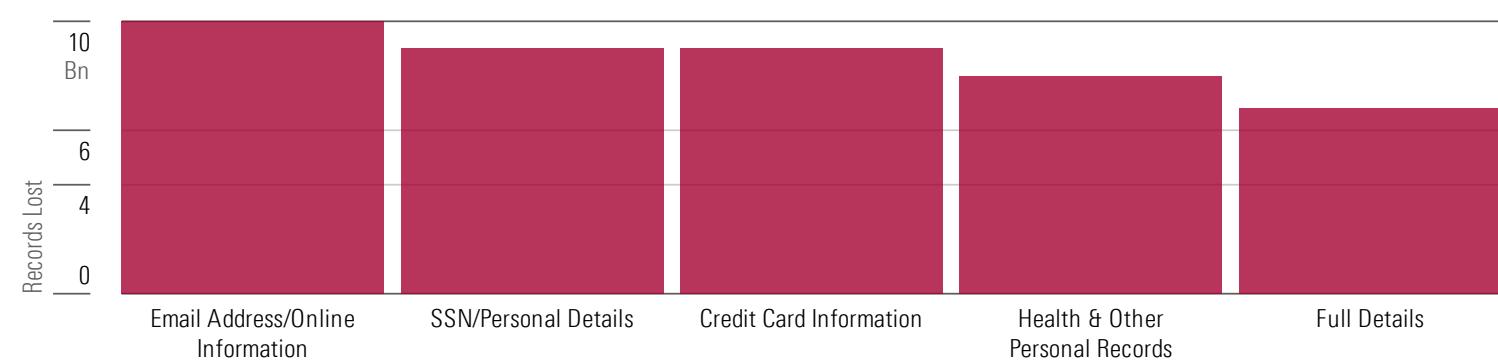
## The Biggest Data Breaches in the Last Five Years by Number of Records Stolen



While data privacy and security have long been an issue for software companies, the threat landscape continues evolving, with attacks increasing in both severity and complexity.

Over the last five years, we have seen a steady increase in the size of data breaches and the cost to remediate and settle these incidents. Large, name-brand companies are frequently targeted, given that their databases of client records would typically be enormous. We expect these trends to continue to proliferate as bad actors continue to target vulnerable entities using ever more complex tools.

## Largest Types of Data Breaches in the Last Five Years



Relatedly, we have seen an increase in zero-day, aka previously unseen, attacks. This rapid increase over the last five years points to the increasing complexity of the security landscape.

The largest hacks involve email addresses and online information, followed by social security numbers and personal details, credit card information, health records, and other details. We expect attack vectors to continue to evolve over time.

Source: [Informationisbeautiful.com](http://Informationisbeautiful.com). Data as of November 2023.

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