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A Framework for Valuing Modern Business Models

A quick look at Datadog utilizing bottom-up metrics and the challenges of valuing I/P/SaaS names.

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Disclaimer

The following is not investment advice or a solicitation to buy or sell securities. As of the time of this writing, I do not have a position (long, short, or through derivatives) in Datadog.

Overview

My goal is not to make a call regarding fair valuations for where Datadog should trade. Rather, I hope to provide a view into some tools to value these names and ultimately show the difficulty in prescribing a fair valuation for them.

Traditional DCFs can be helpful (and misleading) tools in making investment decisions. Often, companies with strong qualitative characteristics (product-market fit in a good industry/vertical), excellent management, and strong financial fundamentals make great investments. Trying to quantify and input these non-financial attributes into a model is difficult for many traditional businesses. However, with the rise of I/P/SaaS, DTC, and other userbase centered companies, data and metrics around these qualitative attributes have become available. This gives financial analysts much better visibility into the company and allows them to build more granular models.

With the rise of many SaaS and DTC companies in the public markets (coupled with the failings of traditional DCFs models), it has become difficult to determine the attractiveness of such investments. As such, I provide a brief case study on Datadog utilizing given and imputed metrics to inform an investment decision, comment on the blind spots of using such approaches, and examine the broader implications in valuing and investing in new age companies.

I source much of the qualitative analysis on Datadog from various technical and financial bloggers/analysts and will provided links to their work. I will quickly paraphrase (read: plagiarize) many of their key points. This paper is more about looking at methods to model these names than sourcing perfect inputs. Building a model is not the same as determining a valuation. As I hope to show in this paper, the tools for modeling these businesses are intended to better understand their fundamentals and how changes in those fundamentals flow through the financial statements. This is an important piece of the broader company analysis process. I also show, however, that deciding on a fair price and valuation for companies at such an early stage in their life is ludicrous. Nonetheless, it is much easier to get carried away in paying for hope/potential than it is to pay for certainty – even when one believes they have great assumptions.

Many of my inputs are extremely rough (due to either a lack of data on the subject that I have access to or the need to simplify assumptions in writing this). A larger fund could take the time to do a more robust analysis on many of the inputs (i.e. what will the average mid-market firm spend on observability solutions at steady-state cloud adoption).

This paper is separated into several sections. First, I provide a brief explanation on utilizing granular bottom-up views of businesses and its use as a framework in driving the model build. Second, I summarize some key components of the Datadog story. Third, I apply the available

information into modeling the company. Lastly, I summarize the implications of using this approach for long term investors.

Bottom-Up Model Builds

Background

Recently, Customer Based Corporate Valuation (CBCV) has gained steam in the financial community. CBCV stems from the work of Dr. Daniel McCarthy at Emory University. He defines it as "valuing the firm by forecasting current and future customer behavior using customer data in conjunction with traditional finance data."

Many facets of McCarthy's CBCV methods are statistical in nature and I implore you to read McCarthy's papers (http://www.danielminhmccarthy.com/), watch his presentation on CBCV (https://www.youtube.com/watch?v=rJV2gZXDtEo), and view his commercial work with Wharton professor Peter Faber (https://www.thetaequity.com/).

In short, it attempts to deliver better insights and accuracy into modeling and valuing companies by looking bottom-up. Digital marketing, ecommerce, and digital platforms have changed the way brands are discovered and transact (I will leave that analysis to the great work done by Ben Thompson at Stratechery). As such, it warrants looking at the marketing bucket in a different light: one that sees sales and marketing spend as a driver of revenues, not an expense.

My Use

Even when building a model with this richer data, the outputs can lack insight. Traditional DCFs and valuation models attempt to discount cash flows to a present value at which point they establish a fair share price. I, instead, take a different approach. In this IRR approach we look at a fair scale value of the company (taking a 2029E EBITDA multiple to get to an expected enterprise value, subtracting by the estimated net debt to get to an equity value, and then dividing by our estimates for number of shares outstanding to get to a 2029 share price) and take an IRR back to the current share price. I attempt to correct for a two things with this method: first, it removes many components in choosing a discount rate which not only varies through time but is also virtually impossible to put a number on; and second, many of these growth companies are serial offenders when it comes to stock based compensation and its effect on cash flow to current equity holders.

Applications

Although bottom-up drivers of top-line performance have been utilized for years (i.e. users and ARPU for a social media company, utilizing cost curves for natural resource companies, etc), CBCV broadly looks at marketing as the lever to drive revenue. A subscription DTC consumer goods brand has a certain number of customers with an average basket size who churn at a certain rate, a SaaS company has a number of customers who subscribe to a certain number of seats every year. All of these customers carry a different lifetime value (LTV) and cost a

different amount to acquire (CAC); in the aggregate, these metrics and their trends change. Thus, we should view marketing as a key component of management's capital allocation performance, or ROIC (note: this is also where we will see the true operating leverage of these companies as Expand ARR dollars should be less expensive to acquire than Land ARR dollars which I dive into later).

This can also be applied to thinking about entire industries. For example, think through the LTV of an average consumer in terms of buying a mattress.

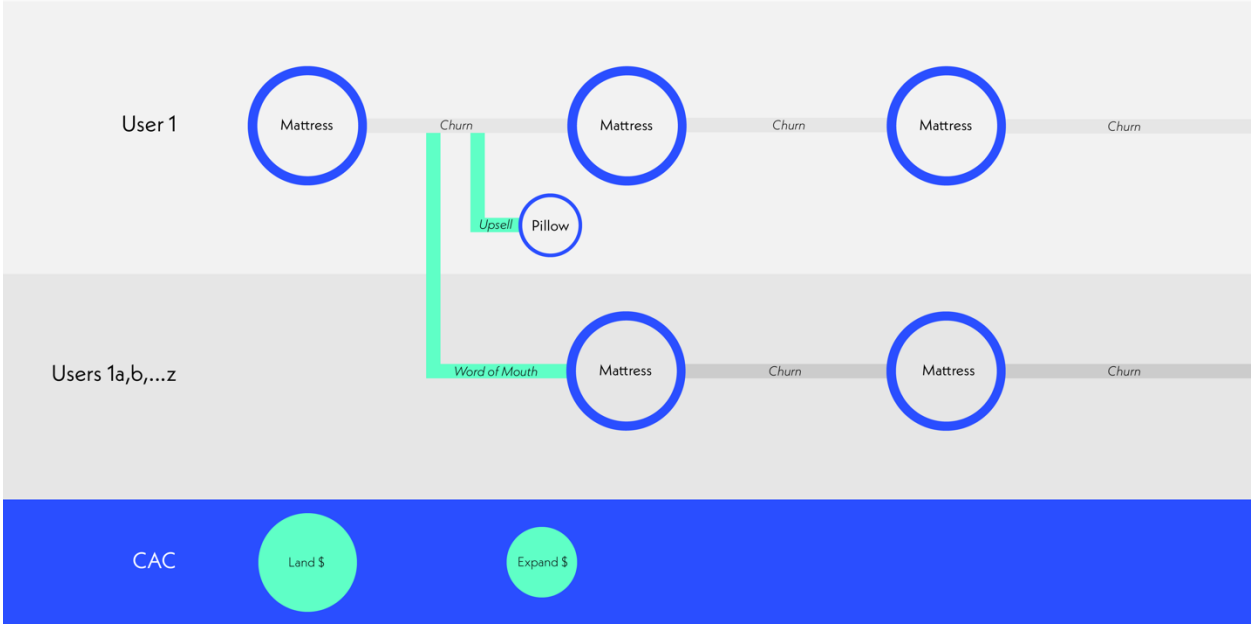

Exhibit 1: Mattress Customer Lifetime Value, Visual

An initial user (User 1) buys a mattress with the company after moving into a new apartment having seen ads on the subway and on Facebook promoting the brand and product. After 7 years (on average), it comes time to replace their mattress. They may choose to stay with the brand (retain their spend) or try a competing brand (churn). If they stay with the company, they might also notice the company now offers pillows, bed frames, bedding, and other accessories for the bedroom. Happy with their experience, they buy these ancillary products.

In addition, a secondary funnel (Users 1a, 1b, etc) consisting of the initial customer's children who grow up around the product (brand loyalty) or friends and family (cheap word of mouth acquisition) begins to emerge. Each of these customers will have their own journey with company – buying an initial mattress, deciding whether to replace their mattress with one of the company's mattresses in seven years, and/or possibly deciding to buy ancillary products from the brand such as pillows, bedsheets, nightlights, etc.

But how do we model things such as a new company introducing a mattress that has a 20-year product lifespan? These unknowns make valuing DTC and especially tech names even more difficult.

We would also want to model changes in customer acquisition costs. Numerically, it might look like this:

Product Inputs	
Mattress Gross Profit	$ 600
Accessory 1 Gross Profit	$ 125
Accessory 2 Gross Profit	$ 50

Customer Acquisition Assumptions	
User 1 Matress Land Ratio	2.00
Referral User Land Ratio	0.40
Expand Ratio for all Users	0.25

User Behavior Matrix	User 1	User 1A	User 1B	User 1C
Matress Retention	All	2 Cycles	1 Cycle	All
Expand Products	2	1	1	0

User 1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Mattress Gross Profit	$ 600							$ 600							$ 600	
Accessory Gross Profit								$ 175								
Customer Acquisition Cost	$(1,200)	$ -	$ -	$ -	$ -	$ -	$ -	$ (194)	$ -	$ -	$ -	$ -	$ -	$ -	$ (150)	$ -
Contribution Profit	$ (600)	$ -	$ -	$ -	$ -	$ -	$ -	$ 581	$ -	$ -	$ -	$ -	$ -	$ -	$ 450	$ -

User 1A	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Mattress Gross Profit		$ 600							$ 600							$ 600
Accessory Gross Profit									$ 125							
Customer Acquisition Cost		$ (240)	$ -	$ -	$ -	$ -	$ -	$ -	$ (181)	$ -	$ -	$ -	$ -	$ -	$ -	$ (150)
Contribution Profit	$ -	$ 360	$ -	$ -	$ -	$ -	$ -	$ -	$ 544	$ -	$ -	$ -	$ -	$ -	$ -	$ 450

User 1B	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Mattress Gross Profit		$ 600							$ 600							$ 600
Accessory Gross Profit									$ 50							
Customer Acquisition Cost		$ (240)	$ -	$ -	$ -	$ -	$ -	$ -	$ (163)	$ -	$ -	$ -	$ -	$ -	$ -	$ (150)
Contribution Profit	$ -	$ 360	$ -	$ -	$ -	$ -	$ -	$ -	$ 488	$ -	$ -	$ -	$ -	$ -	$ -	$ 450

User 1C	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Mattress Gross Profit		$ 600							$ 600							$ 600
Accessory Gross Profit																
Customer Acquisition Cost	$ -	$ (240)	$ -	$ -	$ -	$ -	$ -	$ -	$ (150)	$ -	$ -	$ -	$ -	$ -	$ -	$ (150)
Contribution Profit	$ -	$ 360	$ -	$ -	$ -	$ -	$ -	$ -	$ 450	$ -	$ -	$ -	$ -	$ -	$ -	$ 450

Consolidated User 1 Cohort	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Mattress Gross Profit	$ 600	$ 1,800	$ -	$ -	$ -	$ -	$ -	$ 600	$ 1,800	$ -	$ -	$ -	$ -	$ -	$ 600	$ 1,800
Accessory Gross Profit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 175	$ 175	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Customer Acquisition Cost	$(1,200)	$ (720)	$ -	$ -	$ -	$ -	$ -	$ (194)	$ (494)	$ -	$ -	$ -	$ -	$ -	$ (150)	$ (450)
Contribution Profit	$ (600)	$ 1,080	$ -	$ -	$ -	$ -	$ -	$ 581	$ 1,481	$ -	$ -	$ -	$ -	$ -	$ 450	$ 1,350

Exhibit 2: Numerical Example of Mattress Shopper LTV

An aside: Notice that if we have general assumptions of user behavior and how it might translate to a cohort (in this case through word of mouth marketing supplemented by brand marketing and digital advertising), we can try to address the question of what we should spend to acquire an average user who generates a certain amount of spend for us. We will later refer to this as the Customer or Cohort Level IRR and it's a key measure and driver of how a company's financial performance unfolds over time.

In the DTC consumer goods world, over time we would expect the blended (which includes all digital and physical advertising) return on ad spend (ROAS) to compress as new or existing participants in the mattress industry attempt to compete away any channel specific customer acquisition advantages the incumbent has. That is, we would expect the prices for digital advertising inventory targeted at mattress shoppers to increase (all else equal) up to a point where it becomes economically equal to other marketing channels. For the industry, we might even expect advertising acquisition costs to step in line with traditional acquisition techniques (selling wholesale).

For I/P/SaaS there are several key trends that make these business models so intriguing. First, customers generally expand their usage with a product year over year (something these companies call net dollar retention). This could be from adding user seats to a product, running more data through the platform, or expanding the number of product "SKUs" they are using. I

will use the terminology of Land ARR Dollars and Expand ARR dollars throughout the paper. Land ARR Dollars are the initial Annual Recurring Revenue (ARR) a new customer contracts to spend with a I/P/SaaS Provider in their first year. Expand ARR Dollars are the additional ARR dollars the company adds through additional user licenses, adoption of new products, or increased usage (if charged by usage). This leads to the second point: in general, Expand ARR dollars are much cheaper to acquire than Land ARR dollars and thus these companies see extreme operating leverage at scale as the industry matures. For example, data from SumoLogic's S-1 allows us to back into numbers suggesting the company paid $2.16 per $1 of Land ARR in FY2019 but paid $1.76 per $1 of Expand ARR during the period. Again, at scale, when growth from both new customer lands and expands are significantly lower, this leads to impressive operating leverage. Lastly, if Net Dollar Retention is positive, the company should always experience sequential growth allowing for extremely predictable sources of revenue. Add in industry tailwinds around new customer adoption, ever increasing spend per customer, and a solid management team taking down incumbents and one can see the power of these stories. Valuing these stores is difficult, but at the foundation we can use customer or cohort level IRRs to analyze historical trends and drive future financial performance.

Customer/Cohort Level IRRs and ROICs

Modeling a company works best if you position yourself as the COO or CFO. Thinking as if we were strategic managers of the business, we would want to analyze past customer behavioral and understand the opportunities in our market. As an outside observer there are a few questions we should ask when analyzing prior performance:

- What are average starting ARRs for customers in a given cohort? Is this increasing or decreasing over time? Why is that (i.e. how much did new product releases contribute to Net Dollar Retention (NDR), how much product development runway does the company have)?
- What is the later stage spend of a cohort as a multiple of its initial year? How does this change over time (i.e. are more recent customer additions utilizing more products at the outset?, are customers in these new cohorts putting most of the seats in their organization on this software at the beginning of the contract vs prior cohorts starting with a small percentage of total seats?)
- What has the company historically spent to acquire new Land ARR and Expand ARR?

We can then ask questions surrounding important future events that may affect these metrics:

- How will future customers spend at the outset and in future periods (i.e. will net dollar retention and average spend per customer look like)
    - We can try to handicap this by deciding on an average spend at scale for all customers (based on the size of the company) and dividing that by spend multipliers to get an average initial spend
- Will there be commoditization of pricing in the space (competitor analysis)?

- How will the pace of new customer additions trend? (i.e. what are the industry tailwinds, how many potential customers have not adopted these products, will SMBs and enterprises adopt and spend differently)
- How could the cost to acquire a customer change in the future? Will Land or Expand ARR dollars get cheaper or more expensive (again, look at the competitive environment: greenfield opportunities are important as they provide an impetus to enter the funnel vs displacements; also, how does the company operate its funnel – i.e. Elastic as open source can acquire customers for much less than Splunk can selling to enterprises)?

Now think back to the question "what I would pay as a manager of that mattress company to acquire the spend of the cohort in Exhibit 2. If I believe my assumptions are correct (based on past analysis of customer behavior and if my CAC is repeatable and predictable), I then back into my initial CAC based upon the customer level IRR I seek. Here's the cohort IRR from the mattress example:

Consolidated User 1 Cohort	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Mattress Gross Profit	$ 600	$ 1,800	$ -	$ -	$ -	$ -	$ -	$ 600	$ 1,800	$ -	$ -	$ -	$ -	$ -	$ 600	$ 1,800
Accessory Gross Profit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 175	$ 175	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Customer Acquisition Cost	$(1,200)	$ (720)	$ -	$ -	$ -	$ -	$ -	$ (194)	$ (494)	$ -	$ -	$ -	$ -	$ -	$ (150)	$ (450)
Contribution Profit	$ (600)	$ 1,080	$ -	$ -	$ -	$ -	$ -	$ 581	$ 1,481	$ -	$ -	$ -	$ -	$ -	$ 450	$ 1,350
Blended Cohort IRR	85.7%															

Exhibit 3: Mattress Cohort IRR

In this example, I pay $1,200 to acquire an initial customer which provides me with an 85.7% IRR for the whole cohort. In fact, I will have spent 37% of my total marketing dollars for this cohort on the initial purchase to get a total of $4,343 in contribution profit from the cohort.

As we transition from mattresses to software, we will see these same dynamics play out as customers in a cohort greatly increase their spend every year at levels that are much cheaper to acquire. Visually one can view the powerful top line performance of this trend through a cohort chart. Here is Datadog's from their S-1:

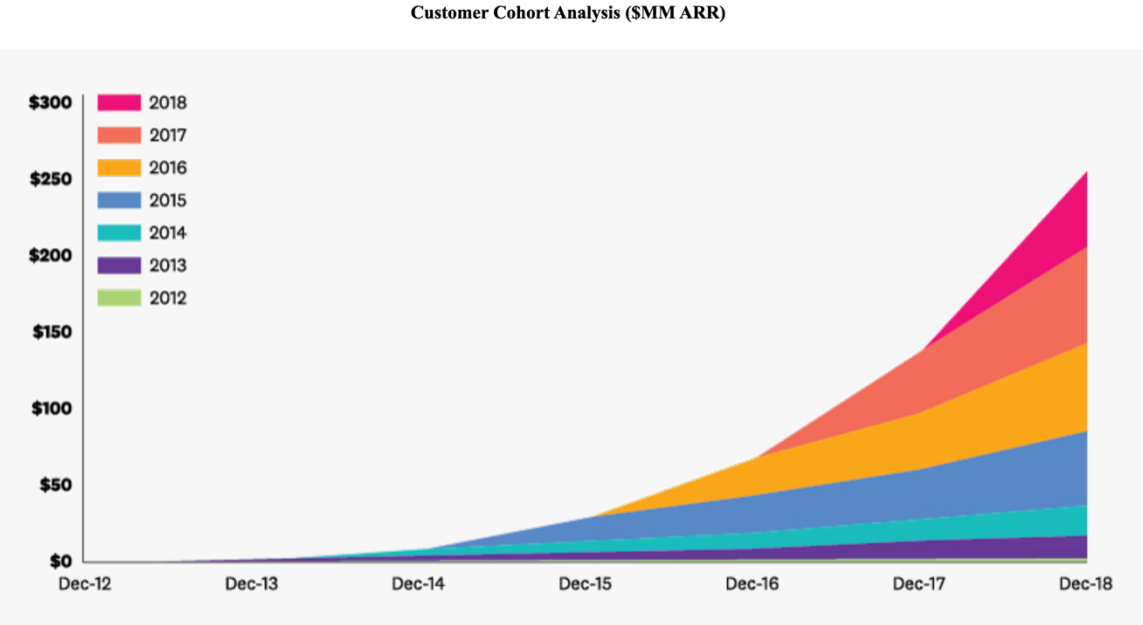

Exhibit 4: Datadog Customer Cohort Analysis, S-1

I will dive into the cohort level analysis for Datadog in a later section.

Datadog Overview

About and Thesis

Datadog (NASDAQ: DDOG) was founded in 2010 by Oliver Pomel (current CEO) and Alexis Le-Quoc (current CTO) to reduce friction between developer and system administration teams for monitoring. The company launched infrastructure monitoring, its first commercial solution in 2012, and has since launched APM, Log Management, UX Monitoring, Network Performance Monitoring, and Security Monitoring. Datadog was the first company to integrate metrics, traces, and logs into one toolset (they call this "three pillars of observability"). Today, Datadog's platform provides full, real-time observability into their customer's full technology stack to enable observability of data for operations, development, and business teams.

We are bullish on Datadog given the following trends:

- Beneficiary of greenfield opportunities in the early innings of the cloud transition
- Best-of-breed platform solution in terms of out-of-the-box experience
    - Datadog is by far the easiest to set up and get working out of the box with no special installation teams and over 350 integrations to support complex environments
    - Current point solutions that companies deploy will need to be consolidated and Datadog will be a key beneficiary (Gartner estimates that small companies run 3-10 monitoring solutions and large organizations run more than 30)

- Efficient go-to-market strategy
    - The company creates a strong top-of-funnel acquisition mechanism through its self-serve free trial which it supplements with a mid-market and enterprise sales force
- Strong product-market fit evidenced by increasing product usage and spend among existing customers
    - Datadog has strong Net Dollar Retention (146% at the time it went public and consistently over 130% since then) on the back of increasing usage and more product uptake by customers
    - 15% of customers use 4 or more products as of Q2FY2020 (up from 0% the prior year); 68% now use 2 or more products vs 25% in FY2018; 75% of new wins now include 2 or more products vs 25% in FY2018
- Rapid product development velocity that provides "TAM multipliers" through adjacent verticals
    - The company has increased its product offerings at an incredible pace and is continuing to invest in R&D (Growing its headcount at 60-70% year over year according to management)
    - This feeds back into strong net dollar retention for existing users who decide to expand their product usage and higher initial contract values from new customers who seek a single solution provider
- Founder led management team with a technical background

We see risks stemming from:

- Competitors are beginning to catch up on number of products
    - Splunk and New Relic (two legacy players that simply got outcompeted by DDOG) now have full observability solutions (with New Relic adding logs and Splunk adding traces)
    - In addition, Elastic has developed its own observability solutio
    - At full cloud adoption, this could cause some issues relating to point two:
- Commoditization of pricing due to increased competition from legacy players and others
    - Switching costs are relatively low for monitoring solutions (compared to data storage companies) and many facets of the code base are easily reproducible or available through open source avenues
        - While a company might lose past monitoring history, replacing a monitoring solution is as simple as removing the old agent and deploying a new agent
    - In addition, a search of DevOps forums yielded many recent complaints about Datadog's high pricing
    - DDOG has added a Marketplace (Jefferies September 2020 Software Conference) that allows users to buy functionality that the company does not currently offer. At the very least, this should increase stickiness for customers who need specific integrations or functionality only available on the marketplace.
- Usage based pricing models could cause short term volatility

- As we saw with Fastly's Q3FY2020 pre-release, usage-based pricing models have a live-by-the-sword, die-by-the-sword characteristic; while long term trends around data usage are overwhelmingly positive, short term impacts can be drastic
- Datadog saw some enterprises customers rationalize their spend in Q2FY2020

Note: check out https://softwarestackinvesting.com/ for more analysis on DDOG and platform plays. His technical product and qualitative analysis were influential in forming a view on Datadog. Many components of the industry and competitor analysis are taken from his articles.

Broad Industry Trends

Trends in cloud computing and development practices have drastically shaped the landscape for software companies in the past 20 years. I cover these trends in this section and will explore how they apply to Datadog's business in the next section.

Cloud Computing

Cloud computing provides organizations more agility around starting and scaling their applications. Operationally, cloud computing provides easier provisioning of servers, additions of servers, and less in-house IT know-how to implement and scale versus on-premise servers. Financially, this saw companies trade heavy capital expenditures for on-premise servers into rent like operating expenditures for the cloud.

The launch of AWS in 2002 for Amazon's internal retail infrastructure and concurrent industry trends in configuration management led to eventual full commercial rollout of AWS in 2006. AWS initially consisted of their S3 (cloud storage), EC2 (virtualized compute), and SQS (message queueing service) products. Developers who began using AWS demanded more infrastructure services on the platform which was needed to build internet applications. As developers asked for more of these services, AWS aimed to be the main provider. Today the company has over 175 services.

Two other major players, Azure (launched in 2008) and Google Cloud Platform (launched in 2008 as App Engine), have since entered the field in addition to a number of number of other players (the big 3 account for 58% of the market according to a JPM 2020 CIO survey). The growth of the major players (but specifically AWS) led to concerns from organizations around using single providers. IT organizations now use multiple cloud vendors for several reasons:

- Reliability and uptime concerns
  - Until 2018, AWS had a clear edge in coverage and reliability
- Avoid vendor lock-in which reduces leverage in negotiating pricing in the future
- Features
  - Cloud vendors have started to develop specializations (Azure for IoT)
- Geographic coverage
- Amazon's use of competing customer data for their retail operation

Due to concerns around using a single provider, solutions are needed that work with all cloud providers and on-premise infrastructure. Infrastructure agnostic software companies are a critical

component to any company's digital transition from their on-premise applications and infrastructure to multi-cloud or hybrid cloud environments.

These providers have several elements that make them successful:

- Specialization
    - The provider deeply understands the customer and their technological problem
    - Resultingly, customer feedback is more targeted and meaningful
- Single code base
    - Being platform agnostic means that customers only have to maintain one code base
    - For example, instead of using AWS's and Microsoft's database product, a company could use MongoDB's Atlas Cloud product
- Talent
    - Talent often flocks to independent players as the upside is larger
        - It is easy to get lost in the crowd at an Amazon or Microsoft
- Product Development Velocity
    - Independents can release software at breakneck paces far beyond what cloud providers can do in a specific area
    - Datadog released 3 new products in 2019, for example

Lastly, we are in the early innings of the cloud transition.

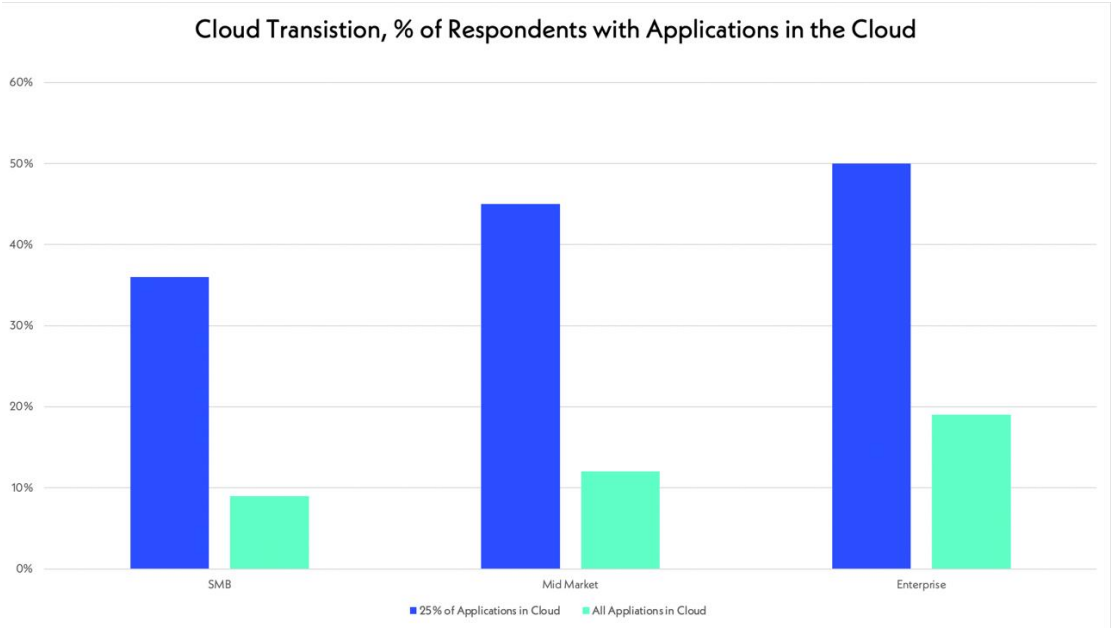

Exhibit 5: O'Reilly Cloud Adoption in 2020 Survey; % of businesses by size with 25% or all of their applications in the cloud, N=1,283

The chart illustrates the number of respondents by business size (SMBs at 100-1,000 employees, mid-market firms at 1,000-5,000 employees, enterprise at 5,000+) who have either up to 25% of their applications in the cloud or all their applications in the cloud. In addition, only 25% of

respondents expected to transition all of their applications to the cloud in the next 12 months (this survey was done before COVID). Also, more than half respondents used multiple cloud vendors. Finally, Gartner predicts that all on-premise enterprise applications will transition to the cloud by 2024 and expects 66% of companies to be multi-cloud (4 Trends Impacting Cloud Adoption in 2020).

Note: Most of this section is heavily consolidated from Software Stack Investing https://softwarestackinvesting.com/independent-software-providers-and-the-cloud-vendors/

DevOps

Traditionally, development and IT operations teams were siloed. Developers would build the software and the operations team would configure, maintain, and monitor the infrastructure. The DevOps movement integrates these teams to increase the speed to market, improve reliability and scalability, and improve collaboration. In short, DevOps allows developers to think about the deployment and maintenance of infrastructure in the same way they think about code.

DevOps has several key practices:

- Continuous Integration/Continuous Delivery
    - The practice of regularly merging code changes into a central repository
    - Finds bugs quicker, improves quality, and reduces time to validate and release new software
- Microservices
    - The practice of building an application as a set of small services that run its own processes and communicates through lightweight mechanisms such as APIs
        - This contrasts to the old monolithic style of building applications
- Infrastructure as Code
    - Infrastructure is managed using code and software development techniques
    - There is no need to manually setup and configure resources and thus it makes infrastructure easy to deploy
- Monitoring and Logging
    - Organizations monitor metrics and logs to see how application and infrastructure performance impacts the end user
    - Captures, categorizes, and analyzes logs generated by applications and infrastructure

Infrastructure as Code provides a stark contrast to how things were done before DevOps. With manual releases, a systems admin in the operations organization would log on to each of the production machines to deploy the latest version of each code. Infrastructure as Code allows a developer to use code to provision, configure, and manage their infrastructure using orchestration tools (such as Terraform, AWS CloudFormation, Azure Resource Manager).

Recently, DevSecOps has gained traction which allows security practices to be integrated into DevOps. As a natural extension of their logging capabilities, Elastic and Datadog have released

SIEM (Security Information and Event Management) solutions in the past year. In addition, Elastic acquired end point protection company Endgame in 2019.

I cover monitoring and logging in detail in the Observability and Monitoring Industry section.

Key Section Points

Broadly, we see three trends that benefit Datadog:

- Multi-cloud as the future; as such, platform agnostic players will win
- Early innings of cloud transition which provides Datadog many greenfield opportunities
- Datadog's out-of-the-box functionality appeals to development teams who do not want to set up/maintain their own solutions (ELK stack, Prometheus/Grafana)

Observability & Monitoring Industry

The Observability and Monitoring industry is a dichotomy of young, cloud-native companies and legacy companies built for on-premise monitoring. The legacy players were late to shift to the cloud (and away from perpetual licenses) which found them losing share to Datadog as customers transitioned to the cloud. Today, many have acquired or developed a full observability platform for modern applications.

Observability gained traction in the mid-2010s as companies began dedicating teams to quickly analyze and fix issues that arose within network and application monitoring. In addition, with the rise of DevOps the surface area that needed to be monitored (network, application, user experience, security, API logging) grew. There are three facets of monitoring. First, the user needs to pick good indicators or metrics to monitor. As the platform collects time series of data, it needs to be able to find crucial anomalies. Second is log analysis. Every software generates logs of activity. This may be at the OS level (system logs), security level (resource access events), or application logs (such as a page request). These logs can then be analyzed and benchmarked. Third is traces. Traces provides a view into how a request progresses through an applications code by providing a waterfall view that quickly allows an analyst to identify any bottlenecks. Legacy providers were typically only focused on one facet of monitoring. Splunk would handle log analysis and New Relic would handle tracing. Thus, as issues arose and needed fixed, the user would have to jump between tools. As such, full observability became a necessity and Datadog was able to gain share from Splunk and New Relic.

Datadog started in Infrastructure Monitoring which allowed for real time monitoring of IT infrastructure across public clouds, private cloud, and hybrid environments. All data is in a central repository with easy to use dashboards, infrastructure visualization, monitoring, and customized data retention policies. Since all software and systems generate logs, it was natural for Datadog to expand beyond Infrastructure Monitoring. In 2017, the company released its Application Performance Monitoring (APM) product. APM provides full visibility into the health and function of applications and allows for trace visualization, app analytics, service maps, broad development language support, dashboards, and fully automated anomaly detection. With its entry into the APM space, Datadog began to compete against New Relic and Dynatrace.

The following year, Datadog entered the logging vertical where it went up against Splunk and Elastic. Log Management allows customers to index logs, process logs, enrich them, and analyze logs through queries in an easy to use language. Traditionally, log management providers would charge by the number of logs ingested into the system regardless of whether they were analyzed or not (Splunk, the main enterprise provider, had an infamous pricing model). Datadog's pricing model, named Logging Without Limits, allowed a customer to ingest unlimited logs and only pay when analyzed. Customers could now cheaply ingest all their logs versus only ingesting a sample of them with Splunk. In 2019, Datadog added Synthetics and Real User Monitoring (RUM) to their product portfolio. Synthetics simulate a user experience/request to identify if the infrastructure or the application is working properly. RUM analyzes and provides visualizations on how application front ends are experienced by the user. Recently, Datadog has added Network Performance Monitoring, Security Monitoring, and acquired an observability solution for the pre-production workflow.

While many potential customers may have seen incumbents (New Relic, Dynatrace, Splunk) as best-of-breed solutions, Datadog was an excellent choice for those wanting an integrated, single-source solution for these problems. Naturally, this gave the company a strong advantage for greenfield wins; however, recently legacy players and other open source competitors have caught up on their full observability offerings.

Matrix of Product Offerings

Product	Datadog	Splunk	Elastic	Dynatrace	New Relic
Log Mngt	Yes	Yes	Yes	Yes	Yes
APM	Yes	Yes	Yes	Yes	Yes
Metrics (Infra)	Yes	Yes	Yes	Yes	Yes
Network	Yes	Yes	Yes	Yes	Yes
RUM	Yes	Yes	Yes	Yes	Yes
Synthetics	Yes	No	No	Yes	Yes
SIEM	Yes	Yes	Yes	No	No
Endpoint Protection	No	No	Yes	No	No
Incident Mngt	Beta	VictorOps	No	No	No

Exhibit 5: Software Stack Investing Chart on Datadog and Competitor Product Offerings; https://softwarestackinvesting.com/datadog-ddog-q2-recap/

Going forward, it will be interesting to watch the competitive dynamic play out as incumbent solutions have also morphed into one-stop shops (through acquisitions or in-house development). Given switching costs are lower in the observability vertical, we should expect to see some pricing pressure in the industry and CAC to creep up.

Lastly, the ability of players with observability backgrounds to enter adjacent markets is a key theme. For example, Datadog's recent Incident Management product (in beta) directly competes with PagerDuty's main business. For companies that prefer a single solution to best-of-breed point solutions, it will be hard not to replace PagerDuty when Datadog's product is good enough. Furthermore, it is much easier for providers with a background in observability to enter adjacent markets than it is for players in those adjacent markets to build out an integrated observability solution. This adds additional optionality into Datadog's TAM and will be key thing to watch.

Quick Notes on Competitors

- Elastic
    - Founded as an opensource search company, but over time other use cases for ingesting large amounts of log data allowed the company to enter the log analysis, APM, security analysis, business intelligence markets
    - Famous for the ELK stack
    - The company has an open source and free tier which allows for easy use and trial of the software; they monetize through managed cloud and self-managed enterprise cloud offerings
    - Best for those looking for a customizable solution and those with non-standard observability use cases
- Splunk
    - Founded in 2003 and one of the earliest providers of monitoring solutions
    - Heavy in the enterprise space with 92 of the Fortune 100 as customers
    - Originally focused on log analysis and log search
        - Many companies would then use New Relic or Dynatrace for tracing and APM
    - Their pricing model led to a tough period after 2015; they changed pricing models in September 2019
    - The company acquired SignalFX in 2019 to complete their full observability solution
- Dynatrace
    - 2,200 customers
        - No major internet brands or platforms as customers
    - Solid solution, but poor product development pace
    - Was spun out of a PE group in 2019
- New Relic
    - Founded in 2008
    - 17,000 customers; 50% of Fortune 100 are customers
    - The company was initially heavily focused on APM but did not initially adapt to the cloud well
        - When the company did begin to roll out full observability solutions they did not feel integrated
    - In 2019, the company released its New Relic One Platform that provided a single source for observability

- They differentiated the platform as a customizable back end in which developers could build the front end on top of
- Best for companies that want the most customizable solution or one that works out of the box
- New Relic provides their log and traces platform for free to users utilizing under 100GB per month

Competitive activity around new integrate solutions from Splunk, Dynatrace, and New Relic will be a vital element to watch. We expect Datadog to capture a solid portion of the market that wants a solution that works out of the box (specifically in SMB and mid-market segments) while Elastic wins customers with fringe use cases or those looking for customizable solutions and legacy players compete well in enterprise.

I look at methods for determining TAM in a later section.

Datadog Value Proposition

As the first to develop a full observability solution, Datadog has transformed itself into a best-of-breed platform for those wanting an integrated solution that adds immediate value. The platform simply works, is simple to setup, and provides a seamless experience when jumping between different products (APM and logs for example).

In providing a full solution, the company can provide instant value to the end user. Datadog accelerates the cloud transition by giving companies confidence that their applications and networks work and that problems can be addressed with ease. Additionally, when problems do arise, the integrated solution reduces mean time to detection and mean time to response versus legacy applications where an IT analyst would have to jump between applications to determine the root cause of a problem. Lastly, a usage-based pricing model aligns customer spend with the value they gain from Datadog.

On the acquisition front, a free trial period and ample documentation allows prospective customers to test the platform without interfacing with a sales force. Out of the box, Datadog comes with over 350+ integrations and can be used without any specialized training or integration teams. As a platform built for collaboration, it is frequently deployed across an organization's entire infrastructure and can be utilized by developer, operations, and business teams to perform analysis.

Today, legacy providers and Elastic provide full observability solutions and free trials or tiers; consequently, many of these advantages have been competed away. Today, Datadog is differentiated as the best-of-breed single solution provider with a great user experience.

Business Model Overview

I cover the analysis of the business model in later section. This section gives a brief overview of the financials.

Datadog employs a usage-based pricing model that is specific for each of its solutions. Companies can have unlimited users on the platform but are charged by the usage for each solution a company adds. For example, Infrastructure Monitoring, Network Monitoring, APM is charged by the number of hosts you are monitoring while Log Management and Security Monitoring are charged by the number of GBs of logs or log events per month. Datadog has annual or monthly plans available (enterprise customers can negotiate for multi-year, semi-annual deals as well, per the risk factor section) where customers subscribe to a committed amount of usage (ratably over a month or delivered as used) with additional charges for incremental usage.

Revenue concentration is low with no 10% customers and verticals most affected by COVID representing less than 10% of ARR. For FY2019, 25% of revenues came from outside North America representing an untapped growth area for the company in the future. Revenue grew 83% in FY2019 to $363mn and 97% in FY2019. For Q2FY2020, revenue grew 68% year over year and 6.7% sequentially to $140mn. Management has guided to $144mn for Q3 and $569mn for the year at the midpoint which implies an uptick to $154mn in Q4 (36% y/y growth). There are several factors we will look at that drive revenue in a later section – most importantly ARR and net dollar retention. The company provides a calculated billings metric which is a poor indicator of future performance (the metric can vary widely based on timing of billings and length of contracts).

The company's cost of goods sold relates to hosting costs and personnel related expenses for operations and global support. Gross margins have trended around the 75-76% range the past 10 quarters with the company guiding towards 80% long term.

Research and Development has grown to 32% of revenue as of Q2FY2020 from 24.5% in FY2017. The R&D opex bucket includes personnel costs for designing, developing, testing and delivering new and existing products. As of December 2019, R&D includes 556 of the 1,403 employees. Management has stated the company is growing its R&D headcount at 60-70% (Jefferies September 2020 Software Conference). We expect the company to continue to invest heavily in product development to sustain its product development velocity and improve upon its existing products. Since investing in R&D is a key driver to growing revenues and NOPAT through the development of additional products, we view it as a component of management's capital allocation. We will dive deeper into this in a later section.

Sales and Marketing is Datadog's investment to obtain new ARR and grow spend in existing accounts. The company has an enterprise sales team, an inside sales team for acquiring new customers for mid-market, a customer success team that works with on-boarding and expansions for existing customers, and a partner team that works with reseller and referral partners. These teams are split into geographic areas across APAC, EMEA, and the Americas. Datadog targets the development and IT operations community with hosted events and cheaply acquires top of funnel traffic through content marketing, email marketing, and digital advertising. Top of funnel traffic can easily sign up for a free trial of the platform without dealing with sales personnel which leads to frictionless adoption from developers in an organization; management notes that even enterprises often have bottom-up adoption of their products. Given sales and marketing is

the driver of new ARR, we will evaluate it as a component of management's capital allocation in a later section. In addition, at scale when the company has fewer new ARR lands and expand ARR grows based on usage rates, we will see incredible operating leverage for the company. Sales and Marketing was 44% of revenue in FY2017, 45% in FY2018, 40% in FY2019, and 36.6% in Q2FY2020. There are 581 employees in the sales and marketing organization.

General and Administrative spend has historically hovered around 10% of revenue.

Operating margins were -3% in FY2017, -5.6% in FY2018, -5.6% in FY2019, and 0.5% in Q2FY2020.

The company capitalizes its software costs and accounts for the asset in the Plant, Property, and Equipment line item. Capital expenditures, including capitalized software costs, were $2mn in FY2017 (2.3% of sales), $16mn in FY2018 (8% of sales), and 23mn in FY2019 (6.5% of sales).

Notes on Financials

Despite its rapid growth, Datadog is a rare breed in the I/P/SaaS space given it is cash flow positive (even when adjusting for share based compensation). Unadjusted FCF margins were 20bp in FY2019, 14.7% in Q1FY2020, and 13.3% in Q2FY2020.

The company completed a convertible note raise in Q2FY2020. The $747.5mn of notes mature in June 2025 and bear an interest rate of .125% with a conversion price at $92.30. The company spent $89mn on a capped call transaction to cover dilution on 8.1mn shares. Per convertible note accounting standards, the notes will be amortized over the period with the non-cash interest expense reflected in the income and cash flow statement. As of Q2FY2020, Datadog has $1.466bn of cash and equivalents.

Since going public, the company has ramped up its share-based compensation activities. In its first quarter as a public company (Q3FY2019), share-based compensation spend as a percent of revenue was 4.9%. By Q2FY2020, SBC had risen to 12%. Shares outstanding at the end of the period increased to 302.3mn from 295.7mn during the same timeframe, or 2.2%

Management

Datadog has a founder led management team with CEO Oliver Pomel at the helm and Alexis Le-Quoc as CTO. Both were at education data system company Wireless Generation until its acquisition by News Corp in 2010. Pomel was VP of Technology at the company from 2002 to 2010 while Le-Quoc was Director of Live Operations. They have been in their current roles at Datadog since its founding in 2010. Both receive a base compensation of $375,000 with bonuses the past two years around $150,000. Pomel received $18mn in option awards in 2019 and Le-Quoc received $10.8mn. The proxy statement is absent of specific criteria the compensation committee uses to determine performance-based compensation awards. Pomel has control of 39mn shares (7mn are options and ~5mn are in trusts) and Le-Quoc has control over 24mn shares (6.4mn are options).

The Chief Product Officer, Amit Agarwal, has been with the company since 2012 and has experience in product management at Quest Software and IBM. David Obstler has been the CFO since November 2018. Previously he served of CFO at TravelClick (2014-2018), OpenLink Financial (2012-2014), MSCI (2010-2012), and Risk Metrics Group (2005-2010). Prior to being a CFO, he worked as an investment banker at JP Morgan, Lehman Brothers, and Goldman Sachs. He has an MBA from Harvard Business School. The Chief Revenue Officer, Dan Fougere, has been with the company since 2017. Prior to that, he worked in various sales roles at Medallia, a SaaS customer feedback company, and BMC.

Analysis of Key Metrics & Drivers

Annual Run-Rate Revenue (ARR), Net Dollar Retention, and Customer Spend

ARR is the annualized run rate of revenue at a point in time; it may apply to a single customer, a yearly cohort of customers, or a group of customers by spend. This is not quarterly revenue times 4. For example, a company that signs a 1-year contract on December 1st for $100 of services would have an ARR of $100 but only $8.5 in revenue during the December quarter. The company calculates ARR by multiplying the MRR (monthly run rate of spend) by 12. This includes all monthly subscribers, annual subscribers, and any overage usage.

Net dollar retention is defined as the ARR in the current period of all customers as of 12 months prior to the current period end (Current Period ARR) divided by the ARR of those same customers in 12 months prior (Prior Period ARR). For example, a net dollar retention rate of 120% implies that all customers who were paying customers 12 months ago are spending 1.2x that amount on average as of the current period. This only includes customers that were with the company 12 months ago and prior and does not include customers who were added in the past 12 months.

With these definitions, the cohort chart on page 58 of the S-1, and metrics given by the company, we can begin to understand customer spend and behavior with Datadog.

First, think back to Exhibit 4 which showed the spend per cohort on Datadog's platform from 2012 to 2018. The left axis is labeled in increments of $50mn of ARR and the chart is quite small. I blew up and printed out the chart to take measurements to estimate ARR for the cohorts.

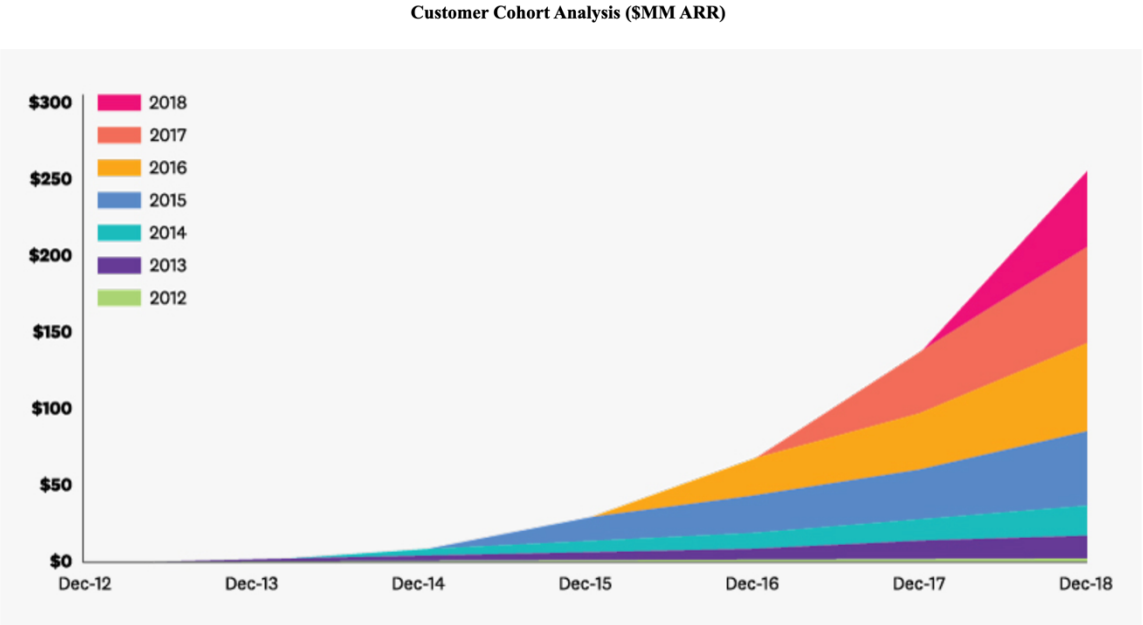

Exhibit 4: Datadog Customer Cohort Analysis, S-1

ARR by Cohort Year	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
2020 Cohort							
2019 Cohort							
2018 Cohort							$ 49.0
2017 Cohort						$ 42.5	$ 63.5
2016 Cohort					$ 25.0	$ 38.0	$ 60.5
2015 Cohort				$ 15.0	$ 24.0	$ 31.5	$ 51.0
2014 Cohort			$ 4.5	$ 6.0	$ 11.0	$ 15.0	$ 19.5
2013 Cohort		$ 1.0	$ 2.5	$ 3.5	$ 6.0	$ 11.0	$ 14.5
2012 Cohort	$ 0.5	$ 0.5	$ 1.0	$ 1.5	$ 1.5	$ 2.0	$ 2.0
Total ARR	**$ 1**	**$ 2**	**$ 8**	**$ 26**	**$ 68**	**$ 140**	**$ 260**

Exhibit 7: Datadog Implied Cohort Spends per S-1 Chart

Note: Obviously, these are not exact measurements (to the nearest mm); the 2012 and 2013 were extremely difficult to dial down. As an example, my estimates have ARR for the 2014 cohort at $4.5mn in FY2014 vs $4.8mn of ARR per the S-1 and $19.5mn for the cohort in FY2018 vs $19.2mn for the cohort per the S-1. My implied net dollar retention for FY2018 is in line with the S-1 as well (141%).

Once we have this data we can look at how cohorts behave. Below is the net dollar retention matrix of these cohorts for a given year. Since the company gives net dollar retention for all customers that have been with the company for 12 months of greater, we can also view the blended net dollar retention.

Net Dollar Retention	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
2020 Cohort							
2019 Cohort							
2018 Cohort							
2017 Cohort							149%
2016 Cohort						152%	159%
2015 Cohort					160%	131%	162%
2014 Cohort				133%	183%	136%	130%
2013 Cohort			250%	140%	171%	183%	132%
2012 Cohort		100%	200%	150%	100%	133%	100%
Total		100%	233%	138%	163%	144%	151%

Exhibit 8: Datadog Implied Net Dollar Retention for Cohorts

We can then analyze average net dollar retention rates for cohort spend:

Average Retention by Year	
1st Year	157%
2nd Year	163%
3rd Year	155%
4th Year	138%

Exhibit 8: Datadog Average Implied Net Dollar Retention by Cohort Year

Looking at these rates in more detail I see a few trends. For context, Datadog released its APM product in February 2017 and Logs product in March 2018. In FY2017, Datadog experienced a decrease in NDR, but saw a sharp increase in 2018. In 2018 specifically, the company saw strong increase in NDR from recent cohorts (2016 and 2017) which could be attributed to new product launches. Additionally, first year net dollar retentions have fallen since their peak in FY2016 with the 2015 cohort. One possible explanation is that customers are starting their Datadog journey with more usage and/or products. However, looking at first year spend from new customers in FY2017, FY2018, and FY2019, we see an interesting dynamic.

Customers & ARR	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019
Customers					3,800	5,400	7,700	10,500
Net Customers in period						1,600	2,300	2,800
Avg First Year ARR						$ 26,563	$ 21,304	$ 28,582
New ARR		$ 1	$ 7	$ 25	$ 42	$ 73	$ 120	$ 200
New ARR from Existing Customers		$ -	$ 2	$ 10	$ 17	$ 30	$ 71	$ 120
New ARR added per Existing Customer						$ 7,895	$ 13,148	$ 15,556
New ARR from New Customers		$ 1	$ 5	$ 15	$ 25	$ 43	$ 49	$ 80
% ARR added from existing customers		0%	31%	39%	40%	41%	59%	60%
% ARR added from new customers		100%	69%	61%	60%	59%	41%	40%

Exhibit 9: Datadog Customer & ARR Trends; management said 40% of ARR came from new customers on the Q4FY2019 call; the FY2019 number is imputed given the methods we explain later in this section

Average first year ARR of a new customer (ARR from new customers in the period/net customer additions) has been in the $20,000 range. This is surprising given that initial product usage among new customers has increased substantially. According to management, in Q2FY2020 75% of new customers started their Datadog journey with 2 or more products. This is up from 25% for FY2018 and 65% for FY2019. What is impressive, however, is the rate at which existing customers have increased their ARR. In 2017, the average existing customer added $7,895 in ARR. By 2019, the average customer added $15,556. Digging deeper, we see this was driven by mid-market and enterprise firms.

Large Accounts Breakdown	FY2016	FY2017	FY2018	FY2019
Total Customers	3,800	5,400	7,700	10,500
Total ARR	$ 68	$ 140	$ 260	$ 460
Customers over $100k ARR	130	240	453	858
% of ARR	48%	60%	68%	72%
ARR from 100k Customers	$ 32	$ 84	$ 177	$ 331
Average ARR per 100k Customer	$ 249,231	$ 350,000	$ 390,287	$ 385,704
Customers under 100k ARR	3,670	5,160	7,247	9,642
% of ARR	52%	40%	32%	28%
ARR from under 100k Customers	$ 35	$ 56	$ 83	$ 129
Average ARR per under 100k Customer	$ 9,564	$ 10,853	$ 11,481	$ 13,347

Exhibit 10: Datadog Customer Breakdown by ARR Spend; on the Q4FY2019 call management noted that customers with over $100k in ARR represented over 70% of spend

Datadog has seen customers with over $100k ARR become the majority of their spend – growing from 48% of ARR in 2016 to over 70% in 2019. It is not surprising, however, to see that the average customer increased their spend so heavily between 2016 and 2018 (due to the launch of their APM and Logging product). The company did introduce synthetics and RUM in FY2019, but average spend may have fallen due to an increase in mid-market customers that spend at the lower end of $100,000+. Management has given color around product usage. In Q2FY2020, the company noted that 15% of users now use 4 or more products, up from 0% in the prior year's quarter. Additionally, 68% of customers now use 2 or more products, up from 58% at the end of FY2019 and 25% in FY2018. In the Quantifying TAM section, I dive into detail on how to think about future customer spends – both initial contract values and scale values.

Customer Acquisition Cost & Customer Level IRRs

I look at return on sales and marketing spend as the ultimate metric to determine management's capital allocation performance. If I, as a management team, can pay $1 today for a perpetuity of $2 in contribution profit every year, I would be a fool not to make that investment every time. Datadog has a strong blended return on marketing spend. Preferably, investors would like color from the company around marketing dollars aimed at Land ARR versus Expand ARR which would help by providing granularity for analyzing unit economics (as of the time of this writing I had not received a response from IR). For our analysis, I focus on new ARR dollars added in the period (both Land and Expand) and divide it by the Sales and Marketing spend in the period to get to a blended ROMS (return on marketing spend). A 1.2 ROMS implies that the company received $1.2 of ARR for every $1 they spent on marketing.

Customer Acquisition Cost	**FY2017**	**FY2018**	**FY2019**
Sales & Marketing Spend	$ 44	$ 89	$ 147
% of spend to acquire new customers	100%	100%	100%
marketing dollars to land	$ 44	$ 89	$ 147
marketing dollars to expand	$ -	$ -	$ -
First Year ARR Added	$ 43	$ 49	$ 80
Net Customer Addiditions	1,600	2,300	2,800
1st Year ARR/CAC	0.96	0.55	0.54
Inverse (CAC Multiple)	1.04	1.81	1.84
Expand ARR	$ 30	$ 71	$ 120
Expand Marketing Spend per $ of new net dollars			
Inverse (CAC Multiple)			
New ARR Dollars (Land + Expand)	$ 73	$ 120	$ 200
Blended ROMS	**1.64**	**1.35**	**1.36**
Inverse Roms (CAC Multiple)	**0.61**	**0.74**	**0.73**

Exhibit 11: Datadog Implied Customer Acquisition Spend

In 2017, Datadog received $1.64 of ARR for every dollar they spent on marketing. This has fallen to $1.35 and $1.36 in FY2018 and FY2019, respectively.

With the implied customer acquisition ratios, first year spend data, and net dollar retention rate trends we have calculated we can start to model unit economics.

Customer LTV Assumptions	
1st Year Contract Value	$28,000
Land CAC Multiple	1.80
Expand CAC Multiple	0.70
Gross Profit	75%
1stYR NDR	150%
2ndYR NDR	135%
3rdYR NDR	125%
4thYR NDR	115%
Steady State NDR	105%

Year	1	2	3	4	5	6	7	8	9	10	11
Contract Value, beginning of period	$ -	$ 28,000	$ 42,000	$ 56,700	$ 70,875	$ 81,506	$ 85,582	$ 89,861	$ 94,354	$ 99,071	$ 104,025
Net Dollars Added	$ 28,000	$ 14,000	$ 14,700	$ 14,175	$ 10,631	$ 4,075	$ 4,279	$ 4,493	$ 4,718	$ 4,954	$ 5,201
Contract Value, end of period	$ 28,000	$ 42,000	$ 56,700	$ 70,875	$ 81,506	$ 85,582	$ 89,861	$ 94,354	$ 99,071	$ 104,025	$ 109,226
Contribution Profit, before CAC	$ 21,000	$ 31,500	$ 42,525	$ 53,156	$ 61,130	$ 64,186	$ 67,395	$ 70,765	$ 74,304	$ 78,019	$ 81,920
Customer Acquisition Cost	$ 50,400	$ 9,800	$ 10,290	$ 9,923	$ 7,442	$ 2,853	$ 2,995	$ 3,145	$ 3,302	$ 3,467	$ 3,641
Contribution Profit	$ (29,400)	$ 21,700	$ 32,235	$ 43,234	$ 53,688	$ 61,333	$ 64,400	$ 67,620	$ 71,001	$ 74,551	$ 78,279
Customer Level IRR	105.91%										
Liftime Contribution Profit	$ 645,900										
Lifetime Marketing Spend	$ 90,707										
LTV/CAC	7.12										

Exhibit 12: Quick Math on Datadog Unit Economics

In this customer level IRR model we look at potential average customer spend throughout their lifetime (we stop at 11 years as years 6-11 are assumed to be steady state at which point they grow at the rate of y/y data usage) by starting with an initial ARR of a customer in year 1, driving their spend in years 2 through 5 based on the average net dollar retention rates in a given year for prior cohorts, and driving their steady-state term spend at a 105% net dollar retention rate. For contribution profit (before CAC), we multiply that year's ARR by Datadog's gross margins (75% for simplicity). We then subtract customer acquisition costs (multiples of Land and Expand ARR added during the period) to get to a customer level contribution profit for a given year. We then take an IRR of this spend. For Datadog, we see a customer level IRR of 106% and a LTV to CAC ratio of 7.12. We can apply this same analysis to cohorts which we will use to drive future financials.

Methodologies

I want to step back now and show how we attempt to derive ARR and NDR values for periods after the cohort chart (starting in FY2019).

First off, from the chart we know FY2016, FY2017, and FY2018 ending ARR values. We also are given net dollar retention rates for FY2017 and FY2018. For FY2017, our Expand ARR is 2016 ARR multiplied by the 2017 NDR of 141%. Knowing the difference between 2016 and 2017 ARR gives us all new ARR (Land + Expand). We then subtract all new ARR for 2017 by the Expand ARR to get to Land ARR for the period. Then, given the ending ARR value for 2017, we can then figure out Expand ARR for 2018. We also know Land ARR for 2018 since we can take the difference of total new ARR and Expand ARR to find it, but we want to build a model to drive future ARR values and thus want to test its accuracy.

Income Statement Metrics	Q1FY17	Q2FY17	Q3FY17	Q4FY17	FY17	Q1FY18	Q2FY18	Q3FY18	Q4FY18	FY18	Q1FY19	Q2FY19	Q3FY19	Q4FY19	FY19	Q1FY20	Q2FY20	Q3FY20E	Q4FY20E	FY20E
Revenue	$ 18	$ 22	$ 27	$ 34	$ 101	$ 40	$ 46	$ 51	$ 62	$ 198	$ 70	$ 83	$ 96	$ 114	$ 363	$ 131	$ 140	$ 156	$ 180	$ 607

ARR Waterfall	Q1FY17	Q2FY17	Q3FY17	Q4FY17	FY17	Q1FY18	Q2FY18	Q3FY18	Q4FY18	FY18	Q1FY19	Q2FY19	Q3FY19	Q4FY19	FY19	Q1FY20	Q2FY20	Q3FY20E	Q4FY20E	FY20E
A Beginning of Period ARR	68	$ 79	$ 93	$ 112	68	$ 140	$ 168	$ 193	$ 214	$ 140	$ 261	$ 284	$ 339	$ 389	$ 261	$ 461	$ 533	$ 567	$ 629	$ 461
B ARR of Rolling 1YR+ Cohort	68				68	$ 79	$ 93	$ 112	$ 140	$ 140	$ 168	$ 193	$ 214	$ 261	$ 261	$ 284	$ 339	$ 389	$ 461	$ 461
C Net Dollar Retention (y/y cohort)	141%	141%	141%	141%	141%	151%	151%	151%	151%	151%	146%	146%	146%	146%	146%	146%	136%	135%	133%	133%
D New ARR of Rolling 1YR+ Cohort (B*C)	$ 95	$ 119	$ 140	$ 169	$ 211	$ 211	$ 245	$ 282	$ 313	$ 381	$ 381	$ 415	$ 461	$ 525	$ 613	$ 613				
E New ARR Realized in period (D-H/Realization Multiple)		$ 33	$ 39	$ 48	$ 60		$ 74	$ 85	$ 94	$ 114	$ 100	$ 124	$ 116	$ 130	$ 145					
F ARR of T-3Q Cohort		$ 11	$ 11	$ 12	$ 15		$ 15	$ 3	$ 17	$ 4		$ 33	$ 23	$ 20	$ 43					
G ARR of T-2Q Cohort		$ 11	$ 12	$ 15	$ 15		$ 3	$ 17	$ 4	$ 33		$ 23	$ 20	$ 43	$ 21					
H ARR of T-1Q Cohort		$ 12	$ 15	$ 15	$ 3		$ 17	$ 4	$ 33	$ 23		$ 20	$ 43	$ 21	$ 20					
I Quarterly Realized Revenue of Previous Period Cohorts (SUM: A: E-H)		$ 37	$ 43	$ 50	$ 58		$ 69	$ 75	$ 90	$ 109		$ 121	$ 135	$ 151	$ 172					
J Subscription Revenue Added applicable to new wins (Revenue - I)		$ 3	$ 3	$ 1	$ 3		$ 1	$ 8	$ 5	$ 5		$ 10	$ 5	$ 5	$ 8					
K New Cohort QRR (J * Realization Multiple)		$ 4	$ 4	$ 1	$ 4		$ 1	$ 8	$ 6	$ 5		$ 11	$ 5	$ 5	$ 8					
L New Cohort ARR (=K*4)	$ 11	$ 11	$ 11	$ 12	$ 45	$ 15	$ 15	$ 3	$ 17	$ 50	$ 4	$ 33	$ 23	$ 20	$ 80	$ 43	$ 21	$ 20	$ 32	$ 115
M End of Period ARR (D+F+G+H+L)	$ 79	$ 93	$ 112	$ 140	$ 140	$ 168	$ 193	$ 214	$ 261	$ 261	$ 284	$ 339	$ 389	$ 461	$ 461	$ 533	$ 567	$ 629	$ 729	$ 729
N End of Period QRR (M/4)	$ 20	$ 23	$ 28	$ 35	$ 35	$ 42	$ 48	$ 54	$ 65	$ 65	$ 71	$ 85	$ 97	$ 115	$ 115	$ 133	$ 142	$ 157	$ 182	$ 182

Exhibit 13: Datadog ARR Model

The model works as such:

- It starts with the beginning of period ARR which is the previous quarters ARR (Row A)
- Then it computes Expand ARR and the resulting ending ARR for all customers from 12 months and prior (Row D)
    - To do this, it takes the ARR from 1 Year ago (Row B) and multiplies it by the net dollar retention rate (Row C)
- ARR is not the same as revenue, which is the metric we want to drive in future period; therefore, we need to account for a realization multiple (Row E is the calculation of Expand ARR in the period divided by the realization multiple to get the amount of revenue that will be realized from this these Expand ARR additions in the period)
    - The realization multiple looks at how much new ARR was added in a period vs new revenue to figure out the timing of revenue; a realization multiple of 1 indicates that new ARR was added on the first day of the period; a multiple of 2 suggests it was added in the middle of the period
- Next, we must consider cohorts from 1 quarter to 3 quarters prior (Rows F-H)
    - This is where the model makes a big assumption: it assumes these recent cohort do not expand or churn their spend until at least 1 year out. Most SaaS companies do not provide color on this and such we assume these cohorts have the same ARR throughout their first year
- We then need to figure out the quarterly revenue all previous cohorts contributed to the period. To do this we simply add Rows B and Rows E-H together and divide by 4 (Row I)
- Finally, we can get to revenue added in the period by new customers taking the total period revenue and subtracting it by the quarterly revenue contributions of all previous cohorts (Row J)
    - We then multiply this by the realization multiple to get to a quarterly run rate (Row K) which we then multiply by 4 to get to Land ARR from these new customers (Row L)
- Lastly, in Row M we compute the ending ARR period by adding together Rows D, F, G, H, and L

This model has a few quirks. First, the model assumes that all t minus one quarter to t minus three quarter cohorts retain their spend at 100%. Since the model is calculating new ARR dollars based on the difference of period revenue and the QRR from t-12 month cohorts that retain their spend at some NDR and QRR for cohorts from the prior 3 quarters, this means that any churn by customers in the prior 3 cohorts would raise new ARR dollars landed in the period and any expansion would understate new ARR dollars landed in the period. Thus, it is better to view this data on yearly basis. I note that the yearly Land ARR $ are in line with the cohort chart for FY2017 ($44.8mn in the model and $42.5mn for the chart) and FY2018 ($49.7mn in the model and $49mn for the chart) and the contribution of Land ARR $ for FY2019 is consistent with the mix management noted on the Q4FY2019 call (40%).

Also of note: for periods after Q2FY2019, we do not have an exact NDR rate. Estimates are made for the post-IPO period that are consistent with historical trends.

Quantifying TAM: Customers, Cohorts, & Their Spend

Total Addressable Customers

To understand Datadog's TAM we need to understand the total number of potential customers in the space, the average spend of those customers at scale (which includes the number of products customers utilize and the amount of usage they run on the platform), and its competitive positioning.

Early analyst reports on the Datadog noted it had a strong product for companies (specifically mid-market) that were looking for an all-in-one solution and did not need best-of-breed point solutions. Over the past year – as evidenced by Exhibit 6 – competing point solutions have introduced their own all-in-one products. It is difficult to predict and model commoditization of pricing, but investors should note it as a risk factor for the space. Consequently, we believe most customers (SMBs, mid-market, and enterprise) will favor an integrated solution.

According to S&P Capital IQ, there are 345,000 global companies with 200-999 employees and 122,000 companies with over 1,000 employees. Datadog's capture of these potential companies is limited to those that need paid observability solutions. On the enterprise side, some Fortune 100 companies with the technical know-how and need for a completely customized solution may build off open source. For most companies, regardless of size, the simplicity of setup, usage, and maintenance will favor integrated solutions at scale. Therefore, we model in 95% of companies with under 1,000 employees using integrated solutions at scale and 80% of companies with over 1,000 employees using integrated solutions. These values are of the percentage of companies that require observability solutions. Some SMBs may not need solutions for Infrastructure or APM due to the simplicity of their operation; we model this at 10% of SMBs.

Customer Spend

Next, we look at the potential spend of these customers at scale. We separate it this into two groups: SMBs (200-999 employees) and Enterprises (1,000+ employees).

At full scale (which I define as most customers having all necessary products and, accordingly, after which net dollar retention grows at the rate of usage), I expect the average SMB customer to spend $45,000 in ARR and the average enterprise to spend $400,000. The enterprise value is an extremely rough estimate based on current ARR of over $100k customers ($385,000) and the fact that only 15% of customers use 4+ products currently. At scale I would expect full product usage to become more prevalent. Naturally, enterprise is a large category as it spans all customers over 1,000 employees; at scale, this category should be a healthy mix of large enterprises spending over $1mn and mid-market firms in the low six figures. The SMB scale

value is based on recent spend of small companies (low $10,000 range) multiplied by 3 which I find to be a conservative estimate based on 5 year spend multipliers for early cohorts.

Customers initially spend much less than their scale value. I discuss how we model this in a later section.

Datadog TAM

Given the above assumptions on customer spend and applicable customers, I put the scale TAM applicable to Datadog at $47.2bn and the total observability market at $60.3bn. This compares with Gartner estimates of $37bn in 2023 (Datadog believes this does not fully include multi cloud or hybrid cloud environments). In addition, Datadog believed their TAM at the time of going public was $35bn based on average ARRs for their SMB and enterprise customers.

Industry Customer Cadence: Transition to the Cloud

One of the more compelling points of the Datadog (and I/P/SasS in general) is that the market opportunity is still in the early innings. Recent estimates see us in the 3rd inning of the cloud transition which provides ample run room for Datadog and others to capture greenfield opportunities.

I analyze the market opportunity for customer wins by looking solely at potential greenfield cloud wins (displacements of on-premise technologies is included) by estimating the current market penetration for observability solutions, projecting what % of applicable SMBs and enterprises will be transitioned to cloud observability solutions by 2025 (when most organizations should complete their transition), and what % of applicable SMBs and enterprises will be transitioned to cloud observability solutions by 2029. In my current model, I straight-line average these wins over the projection period. This does not materially affect my valuation (since I take an IRR to the estimated 2029 share price), but it is not an exact representation for interim periods.

Cloud Migration Assumptions	
% SMBs Migrated by 2025	70%
% Enterprises Migrated by 2025	85%
% SMBs Migrated by 2029	90%
% Enterprises Migrated by 2029	99%
Estimated # of Biz Currently Using Observability	144,019
SMBs	103,711
Enterprises	40,309

Obersvability Market Total Business Usage by Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
SMB	103,711	126,527	149,343	172,160	194,976	217,792	233,349	248,905	264,462	280,019
Enterprise	40,309	51,974	63,639	75,304	86,969	98,634	102,695	106,756	110,818	114,879

Net Adds per Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
SMB		22,816	22,816	22,816	22,816	22,816	15,557	15,557	15,557	15,557
Enterprise		11,665	11,665	11,665	11,665	11,665	4,061	4,061	4,061	4,061

Exhibit 14: Observability Customer Cadence

I estimate that 30% of SMBs and 33% of enterprises are currently in the cloud and using some observability tools. This implies 144,000 companies currently use some form of observability solutions (note: the sum of paying customers for Splunk, Datadog, New Relic, Dynatrace, and Elastic is ~63,000). For 2025, I project 70% of SMBs and 85% of enterprises will have migrated to the cloud. Lastly, in 2029 90% of SMBs and 99% of enterprises will have completed their cloud migration.

Average net customer additions per year for the industry in 2021 through 2025 will be 22,816 for SMBs and 11,665 per year for enterprises. For the 2025 through 2029 period this falls to 11,557 for SMBs and 4,061 for enterprises.

Financial Model

Bottom Up Drivers: Customers Additions & Spend

Provided the assumptions on industry customer additions per year, we can begin to project Datadog's future revenue.

For Datadog, I drive customer wins using an expected win % for SMBs and enterprises. I expect Datadog to win 40% of SMBs and 15% of enterprises over the projection period.

Datadog Wins	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
SMB		8,670	8,670	8,670	8,670	8,670	5,912	5,912	5,912	5,912
Enterprise		1,400	1,400	1,400	1,400	1,400	487	487	487	487
Total Customer Wins		10,070	10,070	10,070	10,070	10,070	6,399	6,399	6,399	6,399

Exhibit 15: Datadog Implied Customer Wins through 2029

This is a sharp increase from historical customer additions for Datadog (from ~2,500/year to 10,000). Again, these are a straight-line average over the period. We are ultimately trying to get to a reasonable scale value for revenue and FCF in 2029 to back into an expected IRR. For that stated purpose, interim financials and metrics are relatively meaningless to us.

For customer spend, we expect them to spend an initial amount with the company (Land ARR) until they reach their scale value. It is easy to see why the cadence in net dollar retention and initial customer spend might change over time. An early customer of Datadog might have been a small team within a Fortune 500 company using infrastructure monitoring and over the course of time expanded to full enterprise usage for infrastructure monitoring, APM, and RUM. In fact, in their S-1, Datadog mentions that their top 25 customers at the time increased their spend 33.9x on average from their first year ARR. In contrast, a company that transitions to the cloud in 2024 would be looking to purchase a fully integrated solution set at the outset. Their spend might then might only grow at the rate usage plus any ancillary product adds. It is important to keep these factors in mind when evaluating past performance and driving future metrics. Ultimately, the average scale ARR value for all solutions an average Datadog customer uses is the most important metric.

One solution to drive the change in Land ARR values over time is through a cohort matrix. On the left axis we would have the corresponding cohort and on the top we would have various metrics (avg starting spend, avg scale spend, NDR at scale). This allows us to make varying assumptions on customer cohorts based on their timing and allows us to react with more certainty to new information as it becomes available. As previously mentioned, I am not specifically focused on interim metrics. For this reason, I use a simple matrix for all customers in the projection period.

Customer Assumptions Matrix	Starting Spend	5 Year Spend Multiplier	Scale NDR
SMB	$ 15,000	3.00	105%
Enterprise	$ 120,000	3.33	105%

Exhibit 16: Datadog Customer Assumptions Matrix

Provided these assumptions, SMB customers reach their scale value of $45,000 in ARR by 3x-ing their spend over 5 years (which implies a 131.6% NDR rate over the period and a starting ARR of $15,000) while enterprise customers 3.33x their spend over 5 years (which implies a 135.1% NDR rate and a starting ARR of $120,000). Lastly, I assume that after 5 years (when customers have reached their full use of Datadog's products) that net dollar retention grows at 105%. I base this assumption on a ballpark growth of data for these companies.

We also need to assume net dollar retention rates for customers in the 2020 and prior cohort to drive performance going forward. My estimates for ending 2020 ARR for this cohort (which includes all customers for the company up to Q4FY2020) is $729mn. I assume net dollar retention for the cohort is 125% in 2021, 120% in 2022, 115% in 2023, 110% in 2024, and 105% thereafter. The net dollar retention rate for all cohorts going forward is represented in this matrix (separated into SMB and enterprise):

Net Dollar Retention Matrix,SMB	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029
2020 Cohort	125%	120%	115%	110%	105%	105%	105%	105%	105%
2021 Cohort		132%	132%	132%	132%	105%	105%	105%	0%
2022 Cohort			132%	132%	132%	132%	105%	105%	105%
2023 Cohort				132%	132%	132%	132%	105%	105%
2024 Cohort					132%	132%	132%	132%	105%
2025 Cohort						132%	132%	132%	132%
2026 Cohort							132%	132%	132%
2027 Cohort								132%	132%
2028 Cohort									132%
2029 Cohort									

Net Dollar Retention Matrix, Ente	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029
2020 Cohort	125%	120%	115%	110%	105%	105%	105%	105%	105%
2021 Cohort		135%	135%	135%	135%	105%	105%	105%	105%
2022 Cohort			135%	135%	135%	135%	105%	105%	105%
2023 Cohort				135%	135%	135%	135%	105%	105%
2024 Cohort					135%	135%	135%	135%	105%
2025 Cohort						135%	135%	135%	135%
2026 Cohort							135%	135%	135%
2027 Cohort								135%	135%
2028 Cohort									135%
2029 Cohort									

Exhibit 17: Datadog Cohort Net Dollar Retention Matrix

Our revenue build is the same model for determining Land and Expand ARR as seen in Exhibit 13. Each cohort has its own drivers for land and expand ARR additions which then flow through to the consolidated ARR model as seen in Exhibit 13 (note: for simplicity, I assume the revenue realization multiple is 1). The model progresses by quarter through FY2029, but for the purpose of fitting this on the page I collapsed it to annual values.

Customer Data	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Customers, beginning of period	3,800	5,400	7,700	10,500	13,400	23,470	33,540	43,610	53,680	63,750	70,149	76,548	82,947
net customer additions in period	1,600	2,300	2,800	2,900	10,070	10,070	10,070	10,070	10,070	6,399	6,399	6,399	6,399
Customers, end of period	5,400	7,700	10,500	13,400	23,470	33,540	43,610	53,680	63,750	70,149	76,548	82,947	89,346
q/q													
y/y		*42.6%*	*36.4%*	*27.6%*	*75.1%*	*42.9%*	*30.0%*	*23.1%*	*18.8%*	*10.0%*	*9.1%*	*8.4%*	*7.7%*
SMB Customer Net Adds					8,670	8,670	8,670	8,670	8,670	5,912	5,912	5,912	5,912
Enterprise Customer Net Adds					1,400	1,400	1,400	1,400	1,400	487	487	487	487

Revenue	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Revenue	$ 101	$ 198	$ 363	$ 607	$ 1,029	$ 1,572	$ 2,224	$ 3,008	$ 3,958	$ 4,914	$ 5,834	$ 6,747	$ 7,633
q/q													
y/y		*96.6%*	*83.2%*	*67.4%*	*69.4%*	*52.8%*	*41.5%*	*35.2%*	*31.6%*	*24.2%*	*18.7%*	*15.6%*	*13.1%*

ARR Waterfall	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Beginning of Period ARR	68	$ 140	$ 261	$ 461	$ 729	$ 1,209	$ 1,789	$ 2,485	$ 3,321	$ 4,340	$ 5,259	$ 6,179	$ 7,087
ARR of Rolling 1YR+ Cohort	68	$ 140	$ 261	$ 461	$ 729	$ 1,209	$ 1,789	$ 2,485	$ 3,321	$ 4,340	$ 5,259	$ 6,179	$ 7,087
Net Dollar Retention (y/y cohort)	141%	151%	146%	133%	125%	123%	122%	122%	122%	118%	115%	112%	110%
New ARR of Rolling 1YR+ Cohort	$ 95	$ 211	$ 381	$ 613	$ 911	$ 1,491	$ 2,187	$ 3,023	$ 4,042	$ 5,111	$ 6,032	$ 6,940	$ 7,814
ARR of T-3Q Cohort													
ARR of T-2Q Cohort													
ARR of T-1Q Cohort													
MRR of Previous Period Cohorts													
Subscription Revenue Added													
New Cohort MRR (1 * Realization Multiple)													
New Cohort ARR (=MRR*4)	$ 45	$ 50	$ 80	$ 115	$ 298	$ 298	$ 298	$ 298	$ 298	$ 147	$ 147	$ 147	$ 147
End of Period ARR	$ 140	$ 261	$ 461	$ 729	$ 1,209	$ 1,789	$ 2,485	$ 3,321	$ 4,340	$ 5,259	$ 6,179	$ 7,087	$ 7,961

Exhibit 18: Datadog Annual ARR and Revenue Assumptions

Since it is collapsed it does not show the specific quarterly intermediate calculation as seen here:

ARR by Cohort	FY17	FY18	FY19	FY20	Q1FY21	Q2FY21	Q3FY21	Q4FY21	FY21	Q1FY22	Q2FY22	Q3FY22	Q4FY22	FY22	Q1FY23	Q2FY23	Q3FY23	Q4FY23
2020-Cohort																		
Cohort dollars, beginning of period					$ 729	$ 729	$ 729	$ 729		$ 911	$ 911	$ 911	$ 911		$ 1,093	$ 1,093	$ 1,093	$ 1,093
T-1YR Cohort ARR					$ 533	$ 567	$ 629	$ 729		$ 774	$ 820	$ 865	$ 911		$ 956	$ 1,002	$ 1,048	$ 1,093
NDR					125%	125%	125%	125%		120%	120%	120%	120%		115%	115%	115%	115%
NDR $ Added					$ 133	$ 142	$ 157	$ 182		$ 155	$ 164	$ 173	$ 182		$ 143	$ 150	$ 157	$ 164
Cohort dollars, end of period					$ 774	$ 820	$ 865	$ 911		$ 956	$ 1,002	$ 1,048	$ 1,093		$ 1,134	$ 1,175	$ 1,216	$ 1,257
2021 Cohort								$ 45.55					$ 45.55					$ 40.99
SMB Cohort																		
ARR, beginning of period					0	$ 33	$ 65	$ 98		$ 130	$ 130	$ 130	$ 130		$ 171	$ 171	$ 171	$ 171
New ARR added					$ 33	$ 33	$ 33	$ 33										
ARR t-12months										$ 33	$ 65	$ 98	$ 130		$ 140	$ 151	$ 161	$ 171
NDR										132%	132%	132%	132%		132%	132%	132%	132%
NDR $, cummulative through period										$ 10	$ 21	$ 31	$ 41		$ 44	$ 48	$ 51	$ 54
ARR, end of period					$ 33	$ 65	$ 98	$ 130		$ 140	$ 151	$ 161	$ 171		$ 216	$ 219	$ 222	$ 225
Enterprise Cohort																		
ARR, beginning of period					0	$ 42	$ 84	$ 126		$ 168	$ 168	$ 168	$ 168		$ 227	$ 227	$ 227	$ 227
New ARR added					$ 42	$ 42	$ 42	$ 42										
ARR t-12months										$ 42	$ 84	$ 126	$ 168		$ 183	$ 197	$ 212	$ 227
NDR										135%	135%	135%	135%		135%	135%	135%	135%
NDR $, cummulative through period										$ 15	$ 29	$ 44	$ 59		$ 64	$ 69	$ 74	$ 80
ARR, end of period					$ 42	$ 84	$ 126	$ 168		$ 183	$ 197	$ 212	$ 227		$ 291	$ 296	$ 301	$ 307
Cohort ARR, beginning of period					$ -	$ 75	$ 149	$ 224		$ 298	$ 298	$ 298	$ 298		$ 398	$ 398	$ 398	$ 398
Cohort ARR, end of period					$ 75	$ 149	$ 224	$ 298		$ 323	$ 348	$ 373	$ 398		$ 432	$ 465	$ 498	$ 532
2022 Cohort													$ 25.01					$ 33.43
SMB Cohort																		
ARR, beginning of period										0	$ 33	$ 65	$ 98		$ 130	$ 130	$ 130	$ 130
New ARR added										$ 33	$ 33	$ 33	$ 33					
ARR t-12months															$ 33	$ 65	$ 98	$ 130
NDR															132%	132%	132%	132%
NDR $, cummulative through period															$ 10	$ 21	$ 31	$ 41
ARR, end of period										$ 33	$ 65	$ 98	$ 130		$ 140	$ 151	$ 161	$ 171
Enterprise Cohort																		
ARR, beginning of period										0	$ 42	$ 84	$ 126		$ 168	$ 168	$ 168	$ 168
New ARR added										$ 42	$ 42	$ 42	$ 42					
ARR t-12months															$ 42	$ 84	$ 126	$ 168
NDR															135%	135%	135%	135%
NDR $, cummulative through period															$ 15	$ 29	$ 44	$ 59
ARR, end of period										$ 42	$ 84	$ 126	$ 168		$ 183	$ 197	$ 212	$ 227
Cohort ARR, beginning of period										$ -	$ 75	$ 149	$ 224		$ 298	$ 298	$ 298	$ 298
Cohort ARR, end of period										$ 75	$ 149	$ 224	$ 298		$ 323	$ 348	$ 373	$ 398

Exhibit 19: Datadog 2020, 2021, 2022 Cohort Driver Example

Using the previously mentioned assumptions and matrices we can toggle various industry trends, market share assumptions, customer spends, specific cohort NDR rates, among other things we wish to model to predict scale revenue for Datadog.

In summary, this section attempts to formalize the process behind driving revenue and reaching a scale value. Given these assumptions, we arrive at a revenue estimate of $7.6bn in FY2029.

Marketing Investments

This incredible growth in revenue must come from somewhere. Every quarter the company invests in sales and marketing to drive new ARR dollars from both existing clients (Expand ARR) and new clients (Land ARR). Based on our analysis and assumptions in the Customer

Acquisition section, we assume Expand ARR dollars are cheaper to acquire. As Datadog matures and continues to see strong net dollar retention among existing clients (the blended NDR value is in the middle green row in Exhibit 18), its share of Expand ARR dollars as a percentage of total new ARR dollars grows. This provides immense operating leverage as these dollars are cheaper to acquire and are assumed to be a perpetuity if the NDR is positive. For example, in 2025 we expect the share of Expand ARR dollars to increase to 70% from 60% in FY2019. By 2029, we expect Expand ARR dollars to account for 83% of all new ARR dollars.

In driving marketing spend, we make the following two assumptions:

- Datadog must spend $1.7 to acquire $1 of Land ARR
- Datadog must spend $0.7 to acquire $1 of Expand ARR

As such our sales and marketing cost bucket is driven by our prior calculations on Land and Expand ARR for a given period. For FY2029, this implies the company spends $774mn, or 10.1%, of sales on sales and marketing – down from 40.4% in FY2019.

Gross Margins, Opex, and other Income Statement Drivers

In accordance with my philosophy that drivers of the valuation will ultimately depend on Datadog's steady state financial profile, I do a simple straight-line average leverage of margins to my estimates for FY2029 values. For gross profit, this is 80%. I expect the company to spend 18% of revenue on research and development and 8% of revenue on general and administrative in FY2029. Lastly, I model in a 21% tax rate. Altogether, this implies EBIT margins of 43.9% in FY2029.

Capital Expenditures

The majority of Datadog's PP&E are software development assets. Going forward, I expect the company to spend 4% of revenue on capital expenditures with depreciation in line with capex in later periods.

Share Count

The estimated share count for the company in FY2029 is of the utmost importance to consider if we want to understand a return on this investment. To estimate this value, I drive share-based compensation as a percentage of revenue and divide it by the average option strike price (which I grow at 10% yearly) for the period to get an estimated number of shares granted. To give Datadog the benefit of the doubt, I have the company aggressively ramping down their share-based compensation activities from 12% of revenue in Q2FY2020 to a steady state value of 3% starting in FY2025. This implies 444mn shares outstanding in FY2029, up from 302mn in Q2FY2020.

Share Count - SBC	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Revenue	$ 101	$ 198	$ 363	$ 607	$ 1,029	$ 1,572	$ 2,224	$ 3,008	$ 3,958	$ 4,914	$ 5,834	$ 6,747	$ 7,633
Stock Based Compenation	$ 3	$ 5	$ 19	$ 62	$ 82	$ 110	$ 111	$ 120	$ 119	$ 147	$ 175	$ 202	$ 229
% of revenue	3.0%	2.6%	5.2%	10.3%	8.0%	7.0%	5.0%	4.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Estimated Share/Option Price		$ 0.35	$ 1.93	$ 5.52	$ 6.14	$ 6.77	$ 7.47	$ 8.24	$ 9.10	$ 10.04	$ 11.07	$ 12.22	$ 13.49
COE				10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
Estimated Shares Granted		14.882	9.878	11.332	13.411	16.251	14.888	14.596	13.053	14.690	15.804	16.560	16.977

Equity Issuance	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Target Offering Amount	$ -	$ -	$ 709	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
New Shares Offered	0.000	0.000	27.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Share Count Schedule	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Share Count, beginning of period	243.111	243.111	257.994	296.386	308.164	321.575	337.826	352.714	367.310	380.362	395.052	410.856	427.416
Shares Repurchased	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Shares granted under SBC	0.000	14.882	9.878	11.332	13.411	16.251	14.888	14.596	13.053	14.690	15.804	16.560	16.977
Issuance of Equity	0.000	0.000	27.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Convertible Debt	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	0.001	0.914	0.446	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Share Count, end of period	243.111	257.994	296.386	308.164	321.575	337.826	352.714	367.310	380.362	395.052	410.856	427.416	444.392

Exhibit 20: Share Count Assumptions

Other Financial Statement Drivers

In my models I try not to devote too much attention to items immaterial to the long-term cash flow generation of the company (and value of its assets). As such, for the balance sheet I keep most metrics around their average historical value based on days outstanding and do not guide line items such as Other Assets, Goodwill, tax loss carryforwards, or cash from financing relating to option exercises; additionally, due to circulatory issues with cash and equivalents I do not assume any interest income. Instead, I focus on ensuring that the cash conversion cycle and resulting cash flow margins are logical.

Lastly, I expect Datadog to pay down its convertible debt in Q2F2025 with available cash on the balance at par (given the capped call transaction).

Financial Statements Summary

Revenue	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Revenue	$ 101	$ 198	$ 363	$ 607	$ 1,029	$ 1,572	$ 2,224	$ 3,008	$ 3,958	$ 4,914	$ 5,834	$ 6,747	$ 7,633
q/q													
y/y		*96.6%*	*83.2%*	*67.4%*	*69.4%*	*52.8%*	*41.5%*	*35.2%*	*31.6%*	*24.2%*	*18.7%*	*15.6%*	*13.1%*
Cost of Goods Sold	$ 23	$ 47	$ 89	$ 123	$ 207	$ 317	$ 448	$ 605	$ 795	$ 986	$ 1,169	$ 1,351	$ 1,527
Gross Profit	$ 77	$ 152	$ 274	$ 485	$ 821	$ 1,255	$ 1,777	$ 2,403	$ 3,163	$ 3,928	$ 4,665	$ 5,396	$ 6,107
% margin	*76.7%*	*76.5%*	*75.5%*	*79.8%*	*79.8%*	*79.9%*	*79.9%*	*79.9%*	*79.9%*	*79.9%*	*80.0%*	*80.0%*	*80.0%*
Research & Development	$ 25	$ 55	$ 111	$ 197	$ 318	$ 460	$ 615	$ 784	$ 968	$ 1,122	$ 1,238	$ 1,323	$ 1,374
% of revenue	*24.5%*	*27.9%*	*30.7%*	*32.5%*	*30.9%*	*29.3%*	*27.7%*	*26.1%*	*24.4%*	*22.8%*	*21.2%*	*19.6%*	*18.0%*
Sales & Marketing	$ 44	$ 89	$ 147	$ 214	$ 664	$ 734	$ 815	$ 913	$ 1,041	$ 805	$ 806	$ 797	$ 774
% of revenue	*43.9%*	*44.9%*	*40.4%*	*35.3%*	*64.5%*	*46.7%*	*36.6%*	*30.4%*	*26.3%*	*16.4%*	*13.8%*	*11.8%*	*10.1%*
General & Administrative	$ 11	$ 19	$ 36	$ 62	$ 103	$ 153	$ 211	$ 278	$ 356	$ 430	$ 496	$ 556	$ 611
% of revenue	*11.3%*	*9.4%*	*9.9%*	*10.2%*	*10.0%*	*9.7%*	*9.5%*	*9.2%*	*9.0%*	*8.7%*	*8.5%*	*8.2%*	*8.0%*
Operating Income	$ (3)	$ (11)	$ (20)	$ 11	$ (263)	$ (92)	$ 135	$ 428	$ 799	$ 1,572	$ 2,125	$ 2,719	$ 3,348
% margin	*-3.0%*	*-5.6%*	*-5.6%*	*1.8%*	*-25.6%*	*-5.9%*	*6.1%*	*14.2%*	*20.2%*	*32.0%*	*36.4%*	*40.3%*	*43.9%*
Other Income, Net	$ 1	$ 1	$ 4	$ (16)	$ (39)	$ (39)	$ (39)	$ (39)	$ (19)	$ -	$ -	$ -	$ -
% of revenue	*0.8%*	*0.4%*	*1.1%*	*-2.7%*	*-3.7%*	*-2.5%*	*-1.7%*	*-1.3%*	*-0.5%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Earnings before Income Tax	$ (2)	$ (10)	$ (16)	$ (5)	$ (302)	$ (131)	$ 97	$ 390	$ 780	$ 1,572	$ 2,125	$ 2,719	$ 3,348
Income Tax	$ 1	$ 1	$ 1	$ 1	$ -	$ -	$ 21	$ 82	$ 164	$ 330	$ 446	$ 571	$ 703
% tax rate	*-50.1%*	*-12.2%*	*-4.6%*	*-14.6%*	*0.0%*	*0.0%*	*21.8%*	*21.0%*	*21.0%*	*21.0%*	*21.0%*	*21.0%*	*21.0%*
Net Income	$ (3)	$ (11)	$ (17)	$ (6)	$ (302)	$ (131)	$ 76	$ 308	$ 616	$ 1,242	$ 1,679	$ 2,148	$ 2,645
EPS	$ (0.01)	$ (0.04)	$ (0.06)	$ (0.02)	$ (0.94)	$ (0.39)	$ 0.21	$ 0.84	$ 1.62	$ 3.14	$ 4.09	$ 5.03	$ 5.95
share count	243.111	257.994	296.386	308.164	321.575	337.826	352.714	367.310	380.362	395.052	410.856	427.416	444.392

Exhibit 21: Datadog Pro-Forma Income Statement; note: the near-term increase in marketing is due to the straight-line average of new customers through 2025

Assets	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Current Assets:													
Cash & Equivalents	$ 60	$ 54	$ 774	$ 1,517	$ 1,369	$ 1,430	$ 1,716	$ 2,256	$ 2,353	$ 3,824	$ 5,759	$ 8,191	$ 11,143
change in cash				$ (1,075)	$ (149)	$ 61	$ 287	$ 540	$ 97	$ 1,471	$ 1,936	$ 2,431	$ 2,952
Accounts Receivable	$ 31	$ 56	$ 102	$ 158	$ 265	$ 392	$ 545	$ 728	$ 951	$ 1,153	$ 1,354	$ 1,553	$ 1,745
metric	$ 101	$ 198	$ 363	$ 607	$ 1,029	$ 1,572	$ 2,224	$ 3,008	$ 3,958	$ 4,914	$ 5,834	$ 6,747	$ 7,633
average in period		$ 43	$ 79	$ 130	$ 212	$ 329	$ 468	$ 636	$ 840	$ 1,052	$ 1,253	$ 1,454	$ 1,649
days outstanding	112.14	102.86	103.02	78.29	75.05	76.31	76.87	77.22	77.43	78.13	78.42	78.65	78.86
Deferred Contract Costs, current	$ 2	$ 4	$ 8	$ 14	$ 23	$ 34	$ 48	$ 64	$ 83	$ 101	$ 119	$ 136	$ 153
metric	$ 101	$ 198	$ 363	$ 607	$ 1,029	$ 1,572	$ 2,224	$ 3,008	$ 3,958	$ 4,914	$ 5,834	$ 6,747	$ 7,633
average in period		$ 3	$ 6	$ 11	$ 19	$ 29	$ 41	$ 56	$ 73	$ 92	$ 110	$ 127	$ 144
days outstanding	6.16	6.85	8.40	6.67	6.57	6.68	6.73	6.76	6.77	6.84	6.86	6.88	6.90
Prepaid Expenses and Other	$ 8	$ 9	$ 19	$ 30	$ 50	$ 74	$ 102	$ 136	$ 178	$ 216	$ 254	$ 291	$ 327
metric	$ 101	$ 198	$ 363	$ 607	$ 1,029	$ 1,572	$ 2,224	$ 3,008	$ 3,958	$ 4,914	$ 5,834	$ 6,747	$ 7,633
average in period		$ 8	$ 14	$ 24	$ 40	$ 62	$ 88	$ 119	$ 157	$ 197	$ 235	$ 273	$ 309
days outstanding	28.03	16.17	19.35	14.69	14.07	14.31	14.41	14.48	14.52	14.65	14.70	14.75	14.79
Total Current Assets	$ 100	$ 122	$ 904	$ 1,719	$ 1,707	$ 1,930	$ 2,411	$ 3,185	$ 3,566	$ 5,293	$ 7,486	$ 10,171	$ 13,368
Property & Equipment	$ 11	$ 22	$ 33	$ 42	$ 52	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Operating Lease Assets		$ -	$ 53	$ 58	$ 58	$ 58	$ 58	$ 58	$ 58	$ 58	$ 58	$ 58	$ 58
delta				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Goodwill	$ 6	$ 8	$ 9	$ 17	$ 17	$ 17	$ 17	$ 17	$ 17	$ 17	$ 17	$ 17	$ 17
delta				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intangible Assets	$ 1	$ 1	$ 1	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3
Deferred Contract Acquisition Costs, noncurrent	$ 3	$ 7	$ 17	$ 26	$ 43	$ 64	$ 89	$ 118	$ 155	$ 187	$ 220	$ 252	$ 284
metric	$ 101	$ 198	$ 363	$ 607	$ 1,029	$ 1,572	$ 2,224	$ 3,008	$ 3,958	$ 4,914	$ 5,834	$ 6,747	$ 7,633
average in period		$ 5	$ 12	$ 22	$ 34	$ 53	$ 76	$ 103	$ 136	$ 171	$ 204	$ 236	$ 268
days outstanding	11.06	13.44	17.52	12.95	12.20	12.40	12.49	12.55	12.58	12.70	12.74	12.78	12.81
Restricted Cash	$ 3	$ 11	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3
delta				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Assets	$ 2	$ 9	$ 17	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18
delta				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Non-Current Assets	$ 27	$ 58	$ 134	$ 167	$ 195	$ 223	$ 248	$ 278	$ 314	$ 347	$ 379	$ 412	$ 443
Total Assets	$ 127	$ 180	$ 1,038	$ 1,886	$ 1,901	$ 2,153	$ 2,658	$ 3,462	$ 3,880	$ 5,640	$ 7,866	$ 10,583	$ 13,810

Liabilities & Shareholder's Equity	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Current Liabilities:													
Accounts Payable	$ 5	$ 13	$ 15	$ 20	$ 33	$ 49	$ 68	$ 91	$ 119	$ 144	$ 169	$ 194	$ 218
metric	$ 101	$ 198	$ 363	$ 607	$ 1,029	$ 1,572	$ 2,224	$ 3,008	$ 3,958	$ 4,914	$ 5,834	$ 6,747	$ 7,633
average in period		$ 9	$ 14	$ 18	$ 26	$ 41	$ 59	$ 80	$ 105	$ 131	$ 157	$ 182	$ 206
days outstanding	19.26	23.29	15.52	10.58	9.38	9.54	9.61	9.65	9.68	9.77	9.80	9.83	9.86
Accrued Expenses and other	$ 17	$ 30	$ 39	$ 59	$ 99	$ 147	$ 204	$ 273	$ 357	$ 432	$ 508	$ 582	$ 654
metric	$ 101	$ 198	$ 363	$ 607	$ 1,029	$ 1,572	$ 2,224	$ 3,008	$ 3,958	$ 4,914	$ 5,834	$ 6,747	$ 7,633
average in period		$ 23	$ 35	$ 49	$ 79	$ 123	$ 176	$ 239	$ 315	$ 394	$ 470	$ 545	$ 618
days outstanding	60.34	55.82	38.98	29.46	28.14	28.62	28.83	28.96	29.03	29.30	29.41	29.50	29.57
Operating Lease Liabilities	$ -	$ -	$ 12	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15
delta				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Deferred Revenue, current	$ 35	$ 69	$ 134	$ 208	$ 348	$ 515	$ 715	$ 955	$ 1,248	$ 1,513	$ 1,778	$ 2,039	$ 2,290
metric	$ 101	$ 198	$ 363	$ 607	$ 1,029	$ 1,572	$ 2,224	$ 3,008	$ 3,958	$ 4,914	$ 5,834	$ 6,747	$ 7,633
average in period		$ 52	$ 102	$ 171	$ 278	$ 431	$ 615	$ 835	$ 1,102	$ 1,381	$ 1,645	$ 1,908	$ 2,164
days outstanding	127.81	127.71	134.97	102.69	98.50	100.15	100.89	101.35	101.62	102.55	102.93	103.23	103.50
Total Current Liabilities	$ 57	$ 112	$ 200	$ 301	$ 495	$ 725	$ 1,002	$ 1,334	$ 1,739	$ 2,104	$ 2,469	$ 2,830	$ 3,177
Deferred Tax Liability				$ 11	$ 11	$ 11	$ 11	$ 11	$ 11	$ 11	$ 11	$ 11	$ 11
delta				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Lease Liabiltiies, noncurrent	$ -	$ -	$ 49	$ 53	$ 53	$ 53	$ 53	$ 53	$ 53	$ 53	$ 53	$ 53	$ 53
delta				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Convertible Senior Notes, net	$ -	$ -	$ -	$ 578	$ 616	$ 654	$ 691	$ 729	$ -	$ -	$ -	$ -	$ -
Other Liabiltiies, noncurrent	$ 1	$ 1	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3
delta				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Deferred Revenue, noncurrent	$ 4	$ 1	$ 4	$ 5	$ 8	$ 12	$ 17	$ 23	$ 30	$ 36	$ 42	$ 49	$ 55
metric	$ 101	$ 198	$ 363	$ 607	$ 1,029	$ 1,572	$ 2,224	$ 3,008	$ 3,958	$ 4,914	$ 5,834	$ 6,747	$ 7,633
average in period		$ 3	$ 3	$ 5	$ 7	$ 10	$ 15	$ 20	$ 26	$ 33	$ 39	$ 45	$ 52
days outstanding	13.83	2.57	4.37	2.79	2.35	2.38	2.40	2.41	2.42	2.44	2.45	2.46	2.46
Total Non-Current Liabilities	$ 5	$ 3	$ 55	$ 651	$ 692	$ 733	$ 776	$ 819	$ 97	$ 103	$ 110	$ 116	$ 122
Total Liabilities	$ 62	$ 115	$ 256	$ 952	$ 1,186	$ 1,459	$ 1,777	$ 2,153	$ 1,836	$ 2,207	$ 2,579	$ 2,946	$ 3,299
Total Shareholder's Equity	$ 65	$ 65	$ 782	$ 934	$ 715	$ 694	$ 881	$ 1,309	$ 2,044	$ 3,433	$ 5,287	$ 7,637	$ 10,511
Total Liabilities & Shareholder's Equity	$ 127	$ 180	$ 1,038	$ 1,886	$ 1,901	$ 2,153	$ 2,658	$ 3,462	$ 3,880	$ 5,640	$ 7,866	$ 10,583	$ 13,810

Exhibit 22: Datadog Pro-Forma Balance Sheet

Cash from Operations	FY17	FY18	FY19	FY20	FY21	FY22	Q1FY23	Q2FY23	Q3FY23	Q4FY23	FY23	Q1FY24	Q2FY24	Q3FY24	Q4FY24	FY24	FY25	FY26	FY27	FY28	FY29
Net Income	$ (3)	$ (11)	$ (17)	$ (6)	$ (302)	$ (131)	$ (4)	$ 12	$ 26	$ 41	$ 76	$ 49	$ 68	$ 86	$ 105	$ 308	$ 616	$ 1,242	$ 1,679	$ 2,148	$ 2,645
Depreciation & Amortization	$ 3	$ 6	$ 12	$ 14	$ 31	$ 55	$ 20	$ 21	$ 23	$ 25	$ 89	$ 27	$ 29	$ 31	$ 33	$ 120	$ 158	$ 197	$ 233	$ 270	$ 305
Impairments	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Stock Based Compensation	$ 3	$ 5	$ 19	$ 62	$ 82	$ 110	$ 25	$ 27	$ 29	$ 31	$ 111	$ 27	$ 29	$ 31	$ 33	$ 120	$ 119	$ 147	$ 175	$ 202	$ 229
Amortization of Debt Discount	$ -	$ -	$ -	$ 19	$ 38	$ 38	$ 9	$ 9	$ 9	$ 9	$ 38	$ 9	$ 9	$ 9	$ 9	$ 38	$ 19	$ -	$ -	$ -	$ -
Change in Operating Assets & Liabilities																					
Receivables	$ (19)	$ (25)	$ (48)	$ (58)	$ (107)	$ (127)	$ (38)	$ (38)	$ (38)	$ (38)	$ (152)	$ (46)	$ (46)	$ (46)	$ (46)	$ (183)	$ (223)	$ (201)	$ (202)	$ (199)	$ (192)
Deferred Contract Acquisition Cost	$ (3)	$ (9)	$ (20)	$ (18)	$ (27)	$ (32)	$ (10)	$ (10)	$ (10)	$ (10)	$ (38)	$ (11)	$ (11)	$ (11)	$ (11)	$ (46)	$ (56)	$ (50)	$ (50)	$ (50)	$ (48)
Prepaid Expenses & Other	$ (4)	$ (1)	$ (10)	$ (11)	$ (20)	$ (24)	$ (7)	$ (7)	$ (7)	$ (7)	$ (29)	$ (9)	$ (9)	$ (9)	$ (9)	$ (34)	$ (42)	$ (38)	$ (38)	$ (37)	$ (36)
Other Assets	$ (1)	$ (7)	$ (8)	$ (1)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Accounts Payable	$ 5	$ 7	$ 2	$ 4	$ 13	$ 16	$ 5	$ 5	$ 5	$ 5	$ 19	$ 6	$ 6	$ 6	$ 6	$ 23	$ 28	$ 25	$ 25	$ 25	$ 24
Accrued Expenses & Other	$ 3	$ 11	$ 6	$ 15	$ 40	$ 48	$ 14	$ 14	$ 14	$ 14	$ 57	$ 17	$ 17	$ 17	$ 17	$ 69	$ 84	$ 76	$ 76	$ 75	$ 72
Deferred Revenue	$ 30	$ 32	$ 68	$ 74	$ 144	$ 171	$ 51	$ 51	$ 51	$ 51	$ 205	$ 62	$ 62	$ 62	$ 62	$ 246	$ 300	$ 271	$ 271	$ 267	$ 257
Other	$ 2	$ 3	$ 19	$ 15	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cash from Operations	$ 14	$ 11	$ 24	$ 110	$ (107)	$ 124	$ 65	$ 85	$ 103	$ 122	$ 375	$ 131	$ 154	$ 176	$ 199	$ 661	$ 1,002	$ 1,667	$ 2,169	$ 2,701	$ 3,257

Cash from Investing	FY17	FY18	FY19	FY20	FY21	FY22	Q1FY23	Q2FY23	Q3FY23	Q4FY23	FY23	Q1FY24	Q2FY24	Q3FY24	Q4FY24	FY24	FY25	FY26	FY27	FY28	FY29
Capital Expenditures	$ (8)	$ (16)	$ (23)	$ (25)	$ (41)	$ (63)	$ (20)	$ (21)	$ (23)	$ (25)	$ (89)	$ (27)	$ (29)	$ (31)	$ (33)	$ (120)	$ (158)	$ (197)	$ (233)	$ (270)	$ (305)
Acquisitions	$ (5)	$ (2)	$ (2)	$ (2)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other (Purchases of Investments)	$ -	$ -	$ (177)	$ (1,082)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cash from Investing	$ (13)	$ (17)	$ (202)	$ (1,109)	$ (41)	$ (63)	$ (20)	$ (21)	$ (23)	$ (25)	$ (89)	$ (27)	$ (29)	$ (31)	$ (33)	$ (120)	$ (158)	$ (197)	$ (233)	$ (270)	$ (305)

Cash from Financing	FY17	FY18	FY19	FY20	FY21	FY22	Q1FY23	Q2FY23	Q3FY23	Q4FY23	FY23	Q1FY24	Q2FY24	Q3FY24	Q4FY24	FY24	FY25	FY26	FY27	FY28	FY29
Equity Issuance (Repurchase)	$ -	$ -	$ 706	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Debt Issuance (Repayment)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (748)	$ -	$ -	$ -	$ -
Other (Exercise of stock options, capped call trans	$ 0	$ 8	$ 8	$ (76)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cash from Financing	$ 0	$ 8	$ 714	$ (76)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (748)	$ -	$ -	$ -	$ -
Change in Cash	$ 2	$ 1	$ 536	$ (1,075)	$ (149)	$ 61	$ 46	$ 63	$ 80	$ 97	$ 287	$ 104	$ 125	$ 145	$ 166	$ 540	$ 97	$ 1,471	$ 1,936	$ 2,431	$ 2,952
Free Cash Flow to Equity	$ 6	$ (5)	$ 1	$ 85	$ (149)	$ 61	$ 46	$ 63	$ 80	$ 97	$ 287	$ 104	$ 125	$ 145	$ 166	$ 540	$ 844	$ 1,471	$ 1,936	$ 2,431	$ 2,952
% margin	6.0%	-2.5%	0.2%	14.0%	-14.4%	3.9%	9.3%	11.9%	13.9%	15.6%	12.9%	15.5%	17.2%	18.7%	20.0%	18.0%	21.3%	29.9%	33.2%	36.0%	38.7%

Exhibit 23: Datadog Pro-Forma Cash Flow Statement

Reinvestment Metrics

ROIC is difficult to measure for any software company. As a potential investor in Datadog, I see R&D and Marketing as the two main drivers of future NOPAT (R&D creates new products to sell and Marketing is an investment in customer acquisition). I do not amortize this spend over any useful life. In 2029, I find the company reinvests 28% of revenue into net capex, R&D, and marketing for an ROIC of 30%.

ROIC	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Capital Expenditures	$ 2	$ 16	$ 23	$ 25	$ 41	$ 63	$ 89	$ 120	$ 158	$ 197	$ 233	$ 270	$ 305
Depreciation	$ -	$ 5	$ 12	$ 15	$ 31	$ 55	$ 89	$ 120	$ 158	$ 197	$ 233	$ 270	$ 305
Research & Development	$ 25	$ 55	$ 111	$ 197	$ 318	$ 460	$ 615	$ 784	$ 968	$ 1,122	$ 1,238	$ 1,323	$ 1,374
Marketing	$ 44	$ 89	$ 147	$ 214	$ 664	$ 734	$ 815	$ 913	$ 1,041	$ 805	$ 806	$ 797	$ 774
Net Reinvestment	$ 71	$ 155	$ 269	$ 421	$ 992	$ 1,202	$ 1,430	$ 1,697	$ 2,008	$ 1,927	$ 2,044	$ 2,120	$ 2,148
% revenue	*70.8%*	*78.0%*	*74.2%*	*69.3%*	*96.4%*	*76.5%*	*64.3%*	*56.4%*	*50.7%*	*39.2%*	*35.0%*	*31.4%*	*28.1%*
Total Capital Invested	$ 487	$ 566	$ 703	$ 929	$ 1,434	$ 2,046	$ 2,773	$ 3,635	$ 4,655	$ 5,632	$ 6,666	$ 7,737	$ 8,821
NOP	$ (3)	$ (11)	$ (20)	$ 11	$ (263)	$ (92)	$ 135	$ 428	$ 799	$ 1,572	$ 2,125	$ 2,719	$ 3,348
% tax rate	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%
NOPAT	$ (2)	$ (9)	$ (16)	$ 9	$ (208)	$ (73)	$ 107	$ 338	$ 631	$ 1,242	$ 1,679	$ 2,148	$ 2,645
ROIC	-0.48%	-1.54%	-2.26%	0.95%	-14.49%	-3.55%	3.86%	9.31%	13.56%	22.05%	25.18%	27.76%	29.99%

Exhibit 24: Datadog Reinvestment & ROIC

Valuation

I value the Datadog utilizing both an EBITDA multiple and FCF perpetuity calculation for FY2029. I use an 18 multiple for EBITDA and a 5% divisor for the FCF perpetuity (8% WACC – 3% terminal growth) to arrive at an enterprise value. I then subtracted the net debt in Q4FY2029 to arrive at an equity value. Lastly, I divided this equity value by my estimate for the Q4FY2029 share count to get a share price. Then, I take an IRR back to today's share price to get an expected return. For Datadog, I expect to receive a yearly return of 6.2% from today's share price ($107 as of this writing) for the EBITDA method and a 5% return for the FCF method.

Inputs	
Today's Share Price	$ 107.00
FY2029 EBITDA	$ 3,654
FY2029 FCF	$ 2,952
SS EBITDA Mult	18
SS TV Divisior	5%
FY2029 Net Debt	$ (11,143)
FY2029 Share Count	444.392

EBITDA Method Share Price	
Enterprise Value	$ 65,766
Net Debt	$ (11,143)
Equity Value	$ 76,909
2029 Share Price	$ 173.06
Implied IRR	6.19%

FCF Method Share Price	
Enterprise Value	$ 59,040
Net Debt	$ (11,143)
Equity Value	$ 70,183
2029 Share Price	$ 157.93
Implied IRR	4.99%

Exhibit 25: Datadog Expected IRR

Conclusion: Challenges in Valuing I/P/SaaS

Datadog Conclusions

This analysis of Datadog includes many rough inputs. Due to my bullish view on the story, I tried to incorporate very bullish metrics into my model (when available data was sparse) while remaining as honest as possible.

My bullish sentiments are reflected in the fact that this IRR accounts for the company having 44% EBIT margins and over $7.6bn in revenue in 9 years – an impressive feat if they can do so. I believe my multiples to be reasonable (I trust my FCF multiple more). Of note: the implied EV/Sales multiple for FY2029 is 8.62x for the EBITDA method and 7.73x for the FCF method.

Given the IRR output implies that I would expect a lower return on this than the average yearly performance of the market, I come to two conclusions: either my assumptions are low and the market as a whole has more complete assumptions; or, it is so difficult to value these names that market participants are willing to bid up these names solely on their narrative. Additionally, this valuation does not consider risk factors such as price commoditization stemming from new integrated solutions offered by incumbents. Considering these uncertainties in market pricing of the company and general company risks, I require an IRR closer to 15% (~$57/share) to feel comfortable with the investment.

The Unknown – and rates of change of the unknown

As I have discussed in detail throughout this paper, the metrics that go into deriving a fair value for a usage based I/P/SaaS company rapidly developing new products is impossible. Industries change and customers change through time. In going through this exercise, I wished to use and

apply methods for identifying bottom-up assumptions that drive the financials. Once we have these tools in place, we can toggle our assumptions to back into an acceptable IRR.

Implications in using Bottom-Up Builds for Valuation

Deciding on an investment solely based on any valuation model is useless regardless of confidence in inputs. Take a hypothetical case where a portfolio manager or research analyst had all of the available information to draw near perfect conclusions on various scale metrics and drivers, customer counts, and how that would flow through into the income statement and cash flow statement. On the long side, they could find easily find attractive opportunities where they have long-term edge. However, shorting against stocks with great narratives and positive incremental news on its side is extremely difficult despite valuation. The idea that I may have more granularity in my assumptions than others in the market which leads to long term profits is an imprudent assumption at best. At the end of the day, these models best help us understand the fundamentals of the business and how changes in certain aspects of the business should affect the financial statements – in which case, they are extremely useful in comparison to boiler-plate DCFs. Any conclusion drawn exclusively from the valuation output is meaningless. As mentioned in the introduction, good investments (I am speaking of a basic multi-year equity strategy here) are ones that – over the long term – have great qualitative attributes. Ultimately, these will be reflected in the financials and the market's resulting pricing of that company.

Behavioral Factors

Much has been written recently on valuations in the technology space. This paper is not meant to make a call one way or the other (as drivers of these valuations are too difficult to predict). However, it does warrant looking at the Petersburg Paradox (paper: http://csinvesting.org/wp-content/uploads/2012/10/Growth-Stocks-and-the-Petersburg-Paradox.pdf; analysis here: https://mbi-deepdives.com/is-valuing-saas-stocks-a-special-form-of-the-petersburg-paradox/) and its application to growth stocks. Through the lens of survivorship bias, we can always find names that were valued at extreme multiples and have outperformed the market. Still, those either bullish or bearish on specific valuations with long-term holding periods should take the time to analyze what expectations are baked into future returns.

Feel free to email me at jb@sandbrookcap.com with any questions or comments to improve this paper.