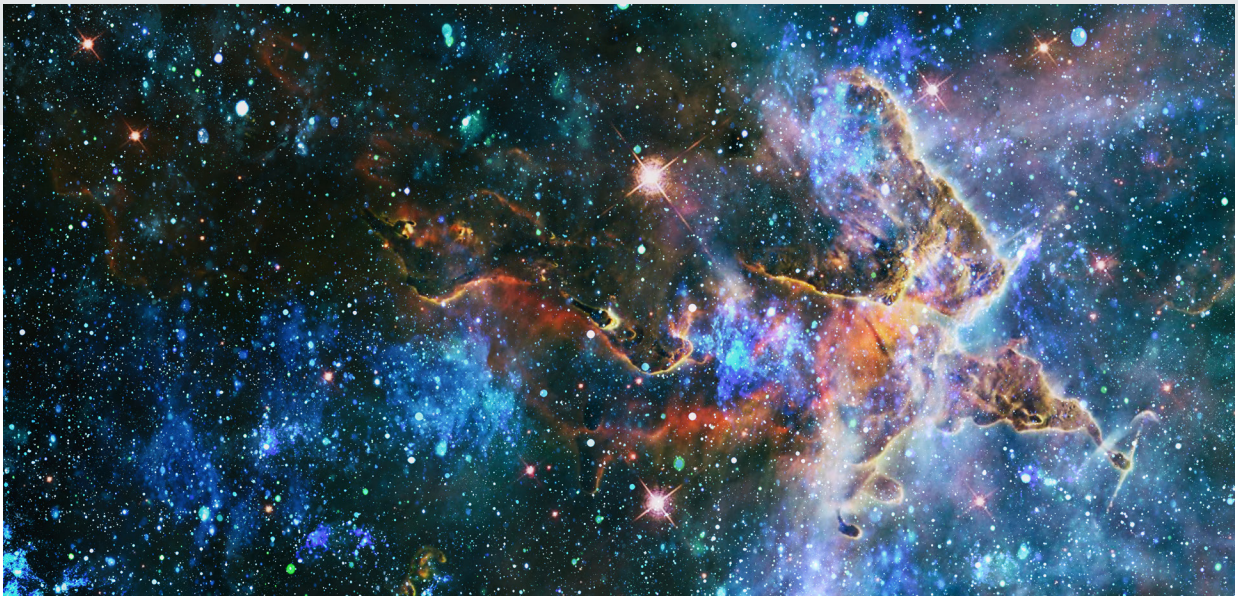
BARINGS



PUBLIC EQUITIES

Software's Big Bang

BARINGS INSIGHTS

Matthew Ward
Investment Manager,
Global Equities—Technology

Colin Moar
Investment Manager,
Global Equities—Technology

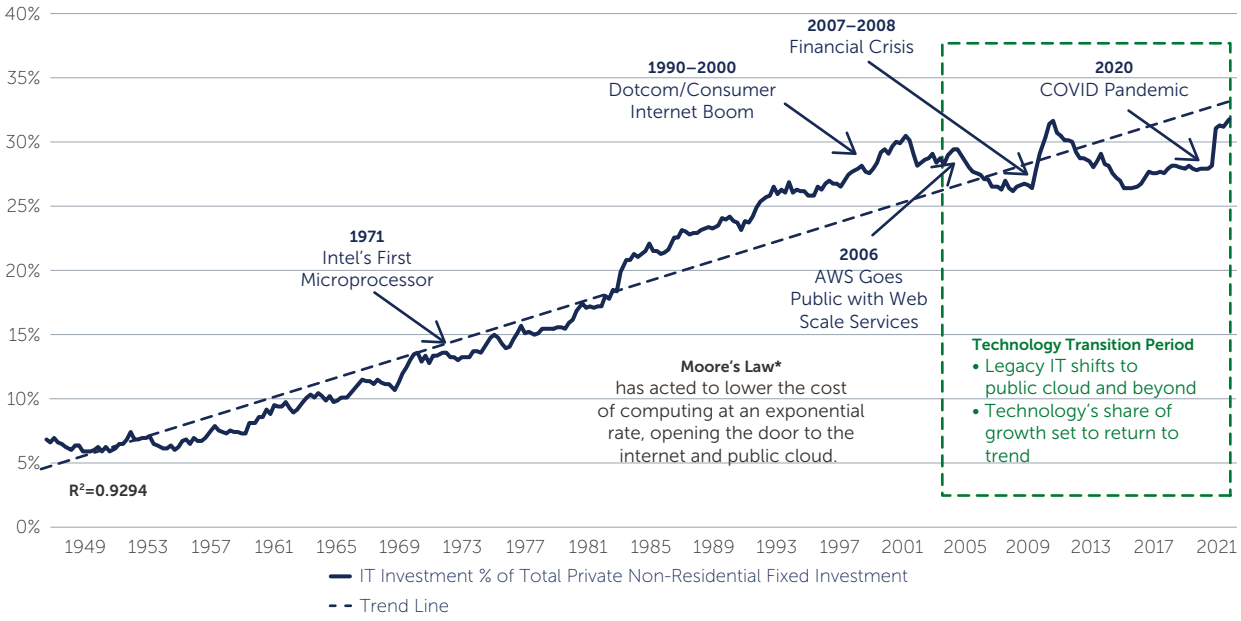
An important transformation is happening in the software industry today, which is likely to see the sector's growth continue to outpace the rest of the IT industry—and the broader economy—for many years to come.

The software sector has struggled to outperform the broader market over the past year, despite the COVID-induced reappraisal by businesses, which revealed just how much they need to grow their investment in their own technology resources. Fears of a rise in bond yields—and as a result, the discount rates for secular growth companies trading at high multiples—have dominated the narrative since vaccine approvals and the reopening of economies caught everyone's attention. However, the underlying growth and long-term outlook for the sector has, if anything, improved markedly, which is setting up for transformative change in the software industry in the years ahead.

Digital Disruption

In our view, the most important industry transformation happening today is in the software industry. The large, monolithic applications sold by some of the biggest software names of yesteryear, such as Oracle, SAP and IBM, have matured enough that they offer less and less in terms of incremental efficiency gains per dollar of investment. Fixed asset investment in IT in the U.S. has therefore stagnated in terms of share of investment spending since the early 2000s.

FIGURE 1: Share of Investment in Next-Gen IT Equipment and Software is Set to Accelerate

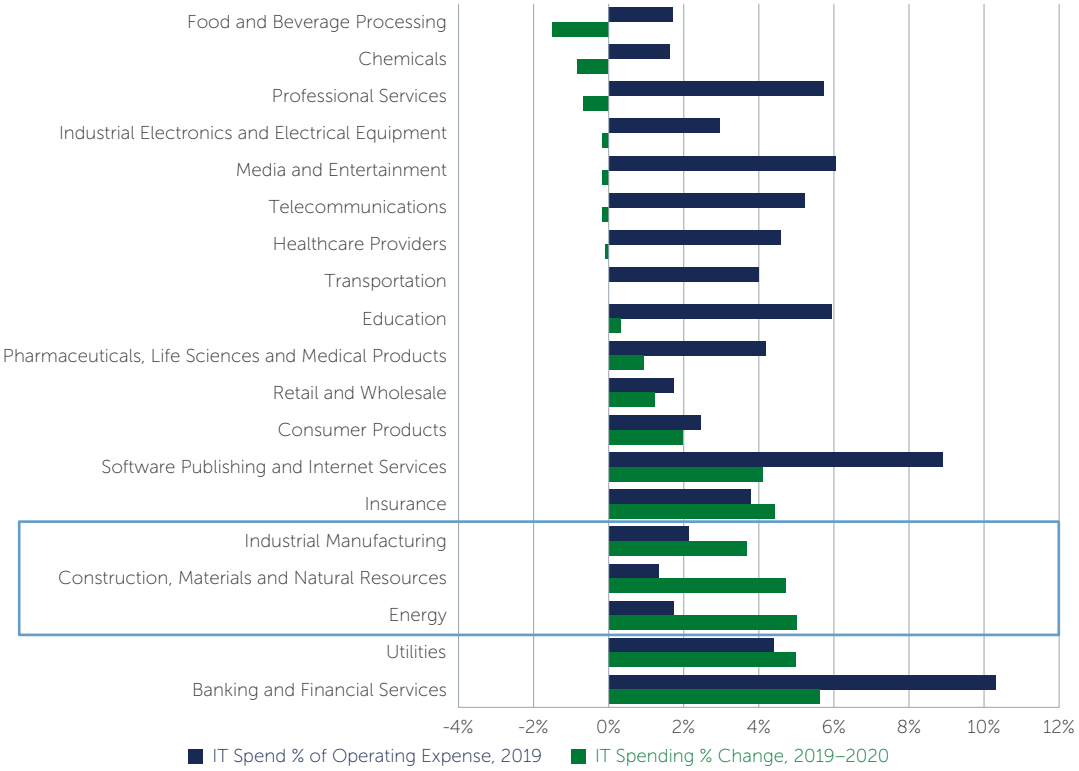


SOURCES: St Louis Federal Reserve, Barings. As of January 1, 2021. *Moore's Law refers to the perception that the number of transistors on a microchip doubles every two years, thereby increasing the speed and capability of our computers, while simultaneously cutting the cost to produce.

The most significant applications control critical business functions including finance, supply chain management and customer relations, and have dominated the IT budgets of enterprises for decades. Competitive pressures in a global economy are forcing a search for new and innovative solutions to drive business growth and profitability.

In response, we see an explosion of new, more agile applications that either do a better job of solving current business problems, or are addressing new problems that have arisen from the share gains of the digital economy over the physical economy. While still very early in the adoption cycle, we expect cloud-delivered software to grow to be larger and more profitable than the prior, on-premise software industry. Indeed, industries such as banking and software development continue to lead in terms of investing in IT—but the digitization revolution is helping accelerate the broadening out of IT spending into industry verticals such as energy or construction that traditionally have not relied on technology as much.

FIGURE 2: Digitization Extends to More Industrial Sectors That Traditionally Spend Less on IT



SOURCE: Gartner. As of December 18, 2020.

Lighting the Fuse

The catalyst for this "Big Bang" was the emergence of public clouds, which were initiated in 2002 when Amazon Web Services (AWS) was formed—as they were unleashed by the falling costs of computing infrastructure and semiconductors. A tipping point in cost and capability has now been reached—in other words, building enormous datacenters and renting capacity to multiple tenants is a way of lowering IT costs to customers.

However, lower costs are only a small part of the story. The bigger change is that the tools and processes, which make the public clouds work effectively, also necessitate the abstraction of the software away from the hardware upon which the application will run. All of a sudden, the software developer is no longer constrained by the customer's choice of underlying IT infrastructure. That means the possibilities to innovate and build completely new applications are essentially endless.

Salesforce.com pioneered the Software-as-a-Service (SaaS) model that sells applications on a subscription basis to customers, instead of large upfront license payments. The software is delivered either from a public cloud or a cloud owned by the application vendor—in fact, Salesforce utilizes both approaches. Either way, the application is no longer hosted on IT infrastructure that is directly controlled by the end customer. This creates a whole new set of challenges for customers operating and securing their applications and data—and therefore creates new and large markets for mission critical software built for the cloud.

Evolving from "Innovators" to "Early Adopters"

To extend the Big Bang metaphor, the initial chaos of the explosion in new ways of building, delivering and consuming software added little value to most existing businesses. However, the meteoric rise of new businesses including Uber, Airbnb and Netflix owe their success to the capabilities offered from marrying public cloud infrastructure with the access to customers through the internet and smartphones.

As the earliest cloud business models are maturing and best practices for building large and sustainable cloud native companies become clearer, we see the overall level of market adoption of such businesses moving toward the "early adopters" phase. Indeed, for the most evolved companies, new "solar systems" are already coalescing around these "stars". Life in these systems has begun to evolve, adapting to and eventually thriving in these new environments. Exciting innovations are emerging from the technology platforms built by the early innovators. The acceleration we have seen in software M&A activity this year is in part down to vendors broadening their offering beyond their core competency, and ensuring that the ecosystem around their applications remains vibrant and supportive.

FIGURE 3: Examples of Recently Completed Software M&A Transactions

Announcement Date	Acquirer Name	Target Name	Announced Total Value
December 1, 2020	Salesforce.com Inc	Slack Technologies Inc	$25.8 billion
September 21, 2020	Microsoft Corp	ZeniMax Media Inc	$7.5 billion
July 29, 2020	Clarivate PLC	CPA Global Ltd	$6.8 billion
March 3, 2021	Okta Inc	Auth0 Inc	$5.9 billion
October 12, 2020	Twilio Inc	Segment.io Inc	$3.2 billion
November 19, 2020	Nasdaq Inc	Verafin Inc	$2.8 billion
March 29, 2021	Broadridge Financial Solutions Inc	Itiviti AB	$2.5 billion
May 7, 2021	Bill.com Holdings Inc	DivvyPay Inc	$2.5 billion
February 10, 2021	Tyler Technologies Inc	NIC Inc	$2.1 billion
July 27, 2020	Black Knight Inc	Optimal Blue LLC	$1.8 billion
November 2, 2020	Coupa Software Inc	LLamasoft Inc	$1.5 billion
November 9, 2020	Adobe Inc	Workfront Inc	$1.5 billion
March 11, 2021	Bentley Systems Inc	Seequent Ltd	$1 billion
November 30, 2020	Facebook Inc	Kustomer Inc	$1 billion
February 24, 2021	Autodesk Inc	Innovyze Inc	$1 billion

SOURCE: Bloomberg. As of February 2021.

New Solutions for New Problems

In the good old days of on-premise technology, IT engineers typically had very good visibility of the performance of their physical infrastructure and the applications that ran on it. The migration of existing applications to the cloud, and the accelerating adoption of new cloud native applications, have pulled the rug out from under the old approaches and opened the door to new entrants that can address performance monitoring needs of cloud native applications and infrastructure.

The problems faced are even more difficult when taking into account the sheer volume of data being generated by digital infrastructure and applications. In our view, the only viable approach is to adopt automated tools that incorporate artificial intelligence approaches to analyzing data and providing insights to behavior within the expanded IT environment.

Beyond the Event Horizon

The event horizon for companies that still own their IT infrastructure and host their most important applications on-premise is the cyber security firewall. On-premise applications operate within the network perimeter and therefore benefit from the protection of a network firewall. However, SaaS applications are hosted and accessed outside of the firewall and therefore lack this protection. This simple change has dramatic implications for the entire software stack that is required to keep an application functioning, and for the business to protect itself from cyber attacks.

The main issue with the traditional castle and drawbridge approach deployed by security firewalls is that once you are inside the walls, it is assumed that you are "friendly". Very little effort has been made to check the behavior of "trusted" insiders—and we believe this is an obvious vulnerability that hackers would try to exploit. Now, being able to monitor the performance of the firewall is redundant if the hacker is attacking systems that sit outside of the firewall. In response to this challenge, the "Zero Trust" approach to cyber security has emerged. Any attempt to access an application or database triggers a requirement to identify yourself and receive verification that access is permitted.

To make Zero Trust solutions an easier purchase in a world where all applications interact with other systems and users, the fastest growing new vendors such as Okta have pre-built integrations with many other inter-related systems and applications. Security based on identity of the user is therefore built in from the start and there is little friction in the use of the application even when it is hosted in a distant data center.

Distributed Intelligence

The network connection is another point of vulnerability. In the on-premise world, companies purchase dedicated, high bandwidth secure connections from vendors such as Cisco in order to protect sensitive flows of data and application requests between branch offices and headquarters. While this model was already under threat from users accessing SaaS applications over the public internet, the COVID-19 pandemic and exodus from the office to a work-from-home setup has intensified pressure on what has been a lucrative segment of the networking market.

Once again, new companies are re-imagining the network, and how businesses will deploy and consume software applications to remote locations. Cloudflare, for instance, has built out an expansive network footprint that looks to solve the needs of applications deployed at the edge of the network, rather than in the headquarters' central datacenter. Security is central to the needs of such customers and Cloudflare has been innovating at a rapid pace[1] to build Zero Trust approaches into their platform and make it easier for customers to build businesses on their platform.

Software, the Final Frontier

The emergence of the public cloud as the fastest growing infrastructure solution to building the next generation of software applications has proven to be the spark that ignited software's Big Bang. The IT ecosystems supporting business functions are changing beyond recognition and leading to a dynamic and vibrant group of companies solving the problems of consuming applications and data securely from the public cloud.

AWS' public cloud is designed to offer software developers the most basic building blocks to allow them to build any type of solution they may need. As more customers take advantage of these innovation engines, the result is likely to be an exponential growth in digital data being created. Artificial intelligence tools offered by the clouds democratize access to these powerful systems that can turbo charge the power of cloud-based applications—and a virtuous circle is emerging as the adoption of these tools encourages more investment in cloud infrastructure. The scale economics of the public clouds subsequently work to reduce the operating costs for the next user, and so on.

This freedom to innovate and take advantage of the near limitless capabilities in a digital world gives us confidence that the growth in the software industry will continue to outpace the rest of the IT industry, and certainly the broader economy, for many years to come—which will likely create a number of attractive, long-term investment opportunities in software companies.

1. 100 new products and capabilities were announced or launched in Q1 2021 alone.

Barings is a $382+ billion global investment manager sourcing differentiated opportunities and building long-term portfolios across public and private fixed income, real estate and specialist equity markets. With investment professionals based in North America, Europe and Asia Pacific, the firm, a subsidiary of MassMutual, aims to serve its clients, communities and employees, and is committed to sustainable practices and responsible investment.*

LEARN MORE AT **BARINGS.COM**

**As of June 30, 2021*

21-1747786