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Investing in data centres

A revolutionary technology or a bubble?

At a glance

Computing power is not a new concept but having it as centralized, large-scale infrastructure through data centres (DCs) is. With the advent of cloud technology, companies can now rent computing power from someone else instead of managing it on their own premises. Massive amounts of computing power made possible by DCs is a key foundation in generating and deploying artificial intelligence.

This trend is spurring a whole new retooling of spending, building and investment and has been reflected in higher equity prices, which have many asking whether we are in a DCs equity bubble or not?

There are real implications for all asset classes whether its real estate where DCs have been one of the best performance industry groups, or infrastructure where renewable power assets have seen significant growth, to tech giants including the Magnificent 7.

Having the foresight to see trends, future opportunities and challenges is part of the foundation of any successful investment team. Lately, there has been a lot of talk about DCs in the investment world, and for good reason.

We are at the cusp of what is set to be a huge technological infrastructure build out, boosted by the prospects of artificial intelligence (AI) and a completely new way for humans to leverage data.

The data on DCs

Before we take a deep dive into the dynamics and implications of DCs, let's setup the groundwork for what DCs are and how they have morphed into something that (while is behind the scenes) is an increasingly an important aspect of our economy.

Simply stated, DCs are a physical location that stores computing machines. It contains computing infrastructure, such as servers, data storage drives, and network equipment. They can vary considerably in size. Small DCs can be less than 5,000 square feet, while the largest hyperscalers (large scale DCs) can span 57 football fields.

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The exodus of the data

Servers were always around. They were often found in storage rooms or basements of office buildings. But this left something to be desired. Enter the cloud. With the advent of cloud technology, companies could now rent computing power from someone else instead of managing it on their own premises. This technological advancement was driven by the need for more compute and the rise of large data centre providers such as AWS, Azure and GCP and was welcome by many companies for three key reasons:



- **Flexibility** – Capacity can be tweaked higher or lower based on customer needs. This can be very helpful when evaluating whether a business wants to try a new feature but doesn't want to purchase an additional server.
- **Scalability** – A growing company can grow without having to buy new servers. An example of this is Netflix who went from 10 million to 260 million users. You can't budget for hypergrowth, and this allows you to add new capacity quickly.
- **Affordability** – Efficiencies of scale means in general things will be cheaper. The hyperscalers are able to pass on these savings to the customer.

Computing power is not new but having it as infrastructure in such large amounts is. The hyperscalers are driving efficiencies of scale and have created a whole new industry and specialization. This amount of compute never existed before because it was so decentralized but now with the

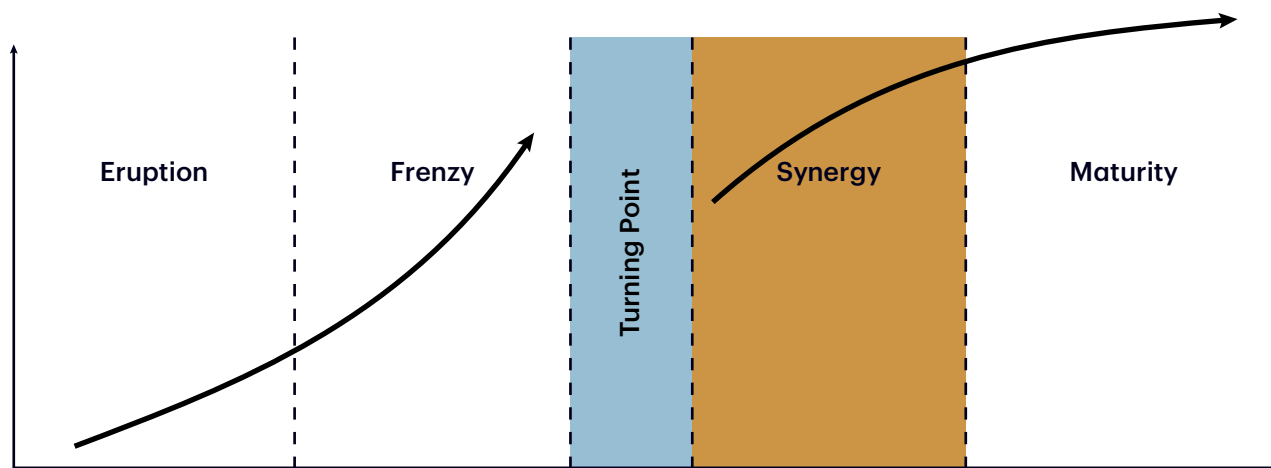
centralization of it, we have the capability to do more complex tasks, like AI. This trend is spurring a whole new retooling of spending, building and investment and has been reflected in higher equity prices, which have many asking whether we are in a DCs equity bubble or not?

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Technological revolutions and bubbles

Before we get into the merits of whether we feel we are in a technological bubble, it's important to provide some initial thoughts on the impact of a bubble, particularly a technological one. Bubbles sound bad, and often are. They can mean significant financial loss for investors and the public and can lead to recessions (even depressions). However, in cases where there is advent of productive technology, they can actually serve a purpose.

Markets follow a pattern when it comes to Transformative Innovations



Note: For Illustrative Purposes Only. The Framework is based on the research and work of Carlota Perez.

Financial bubbles are a tool for propagating and deploying new technology. They help overcome the “chicken and egg scenario” that can come with investing in new technologies. An example of this that we are seeing today is the need for electric vehicles (EV). EV charging infrastructure is required to increase EV users and market penetration, but we need EV penetration to make investments in EV charging infrastructure.

A bubble or still a long runway?

To help determine if we feel we are really in a bubble or the early stages of a massive technological build out, it's helpful to explore the various rationales and evidence available to us.

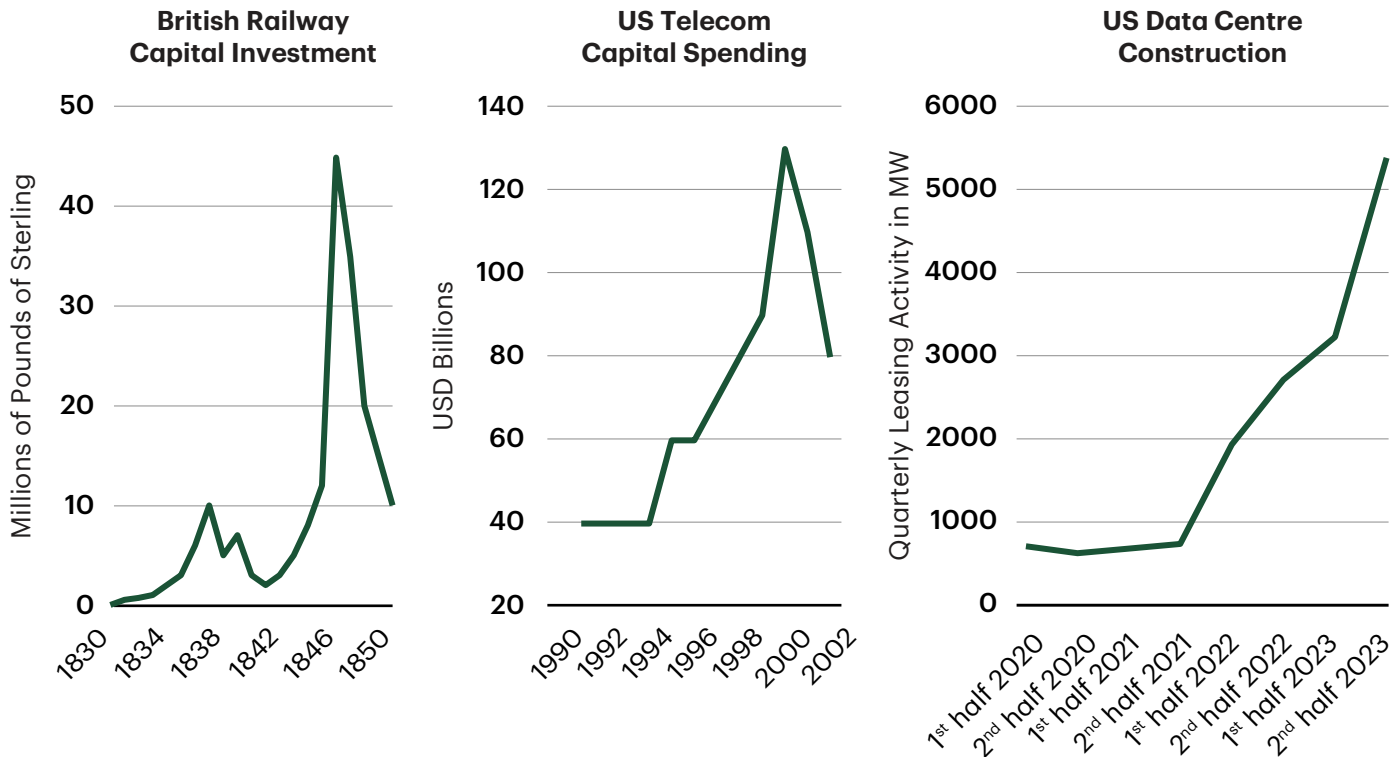
Evidence of a possible bubble:

1 A tendency to overbuild

Drawing parallels from prior bubbles can provide some useful insight from the past. For example, the railway mania in the U.K in 1840s or internet bubble in the U.S. in 1990s/2000s suggests societies tend to overbuild new technological infrastructure.

British Railway capital expenditures (capex) roughly quadrupled over the decade between 1835 to 1845. Similarly, U.S. telecommunications companies went from spending about \$60 billion on capex in 1995 to about 130B in 2000 (charts below). That's not to say this infrastructure was not eventually put to productive use, but there was a digestion period. That's a risk as we see big jumps in data centre leasing activity and huge investment by hyperscalers.

Historically we have overbuilt



Source: 1. Andrew Odlyzko "Collective hallucinations and inefficient markets: The British Railway Mania of the 1840s";
2. "Doug O'Laughlin "Lessons from history: The Rise and Fall of the Telecom Bubble";
3. JLL "North America Data Center Report" Feb 27, 2024. <https://www.jll.ca/en/trends-and-insights/research/na-data-center-report>.



2 We may be over-valuing already

Bubbles occur when financial market reality detaches from economic reality and there may be instances where we are seeing this already. This is evidenced in companies with a very small exposure to the DCs supply chain that have been re-rated materially as a “data centre play”.

An example of this is Caterpillar. Caterpillar is mainly a construction and mining machinery company with a low single digit percentage of revenue from backup power generation (with applications for data centres). However, the stock has re-rated significantly despite an environment that normally would not be overly supportive of the stock – high interest rates and slowing construction. This stretch for finding ways for DCs exposure can be evidenced from shareholder meeting transcripts. From 2022 to 2023 the use of the words “data centre” jumped by 120%.

Caterpillar

LSD% of Revenue from Data Centres

120% increase in “Data Centre” transcript mentions from 2002 to 2023



Source: Bloomberg, TDAM.

3 We may be over-hyping AI

There is a possibility that we are overhyping AI and what the future looks like from a technological standpoint. One way we may be overhyping AI is that there hasn't been any sort of revolutionary app yet. For instance, ChatGPT initially gained a lot of popularity but growth in users has somewhat plateaued¹. We have seen over-hype by big tech before with the Metaverse investment at Meta, Amazon overbuilding warehouses during the pandemic thinking brick and mortar would never come back.

Another factor that could also put the brakes on AI includes regulation. While there is not a ton of regulation around AI yet, this is an area that is likely to be targeted by regulation to maintain security, safety and perhaps protect employment. If AI growth does not materialize to the levels many feel it reach, the need for DCs can slow.

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Technology

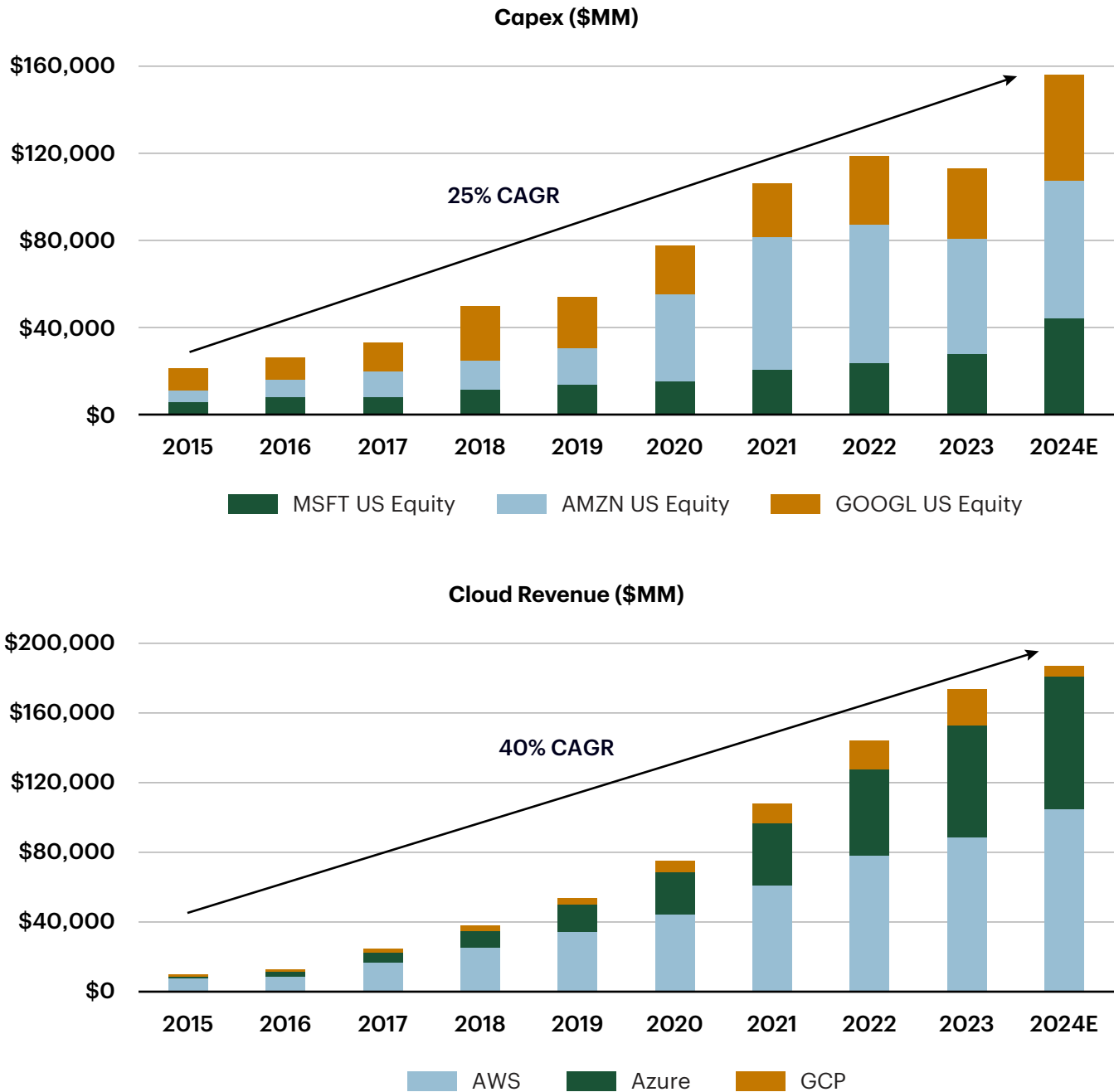
¹The Wrap, Alex Kantrowitz. "ChatGPTs Growth is Flatlining"

Not a bubble:

1 We are spending productively

Hyperscaler investment in cloud infrastructure has grown at a 25% compound annual growth rate (CAGR) since 2015 and that has contributed to cloud revenue growth at a 40% CAGR. This is clearly productive spending with a return. The charts below help illustrate this by using Microsoft, Amazon and Google as examples. These companies are already earning returns on their capital.

Hyperscalers are already earning returns on capital



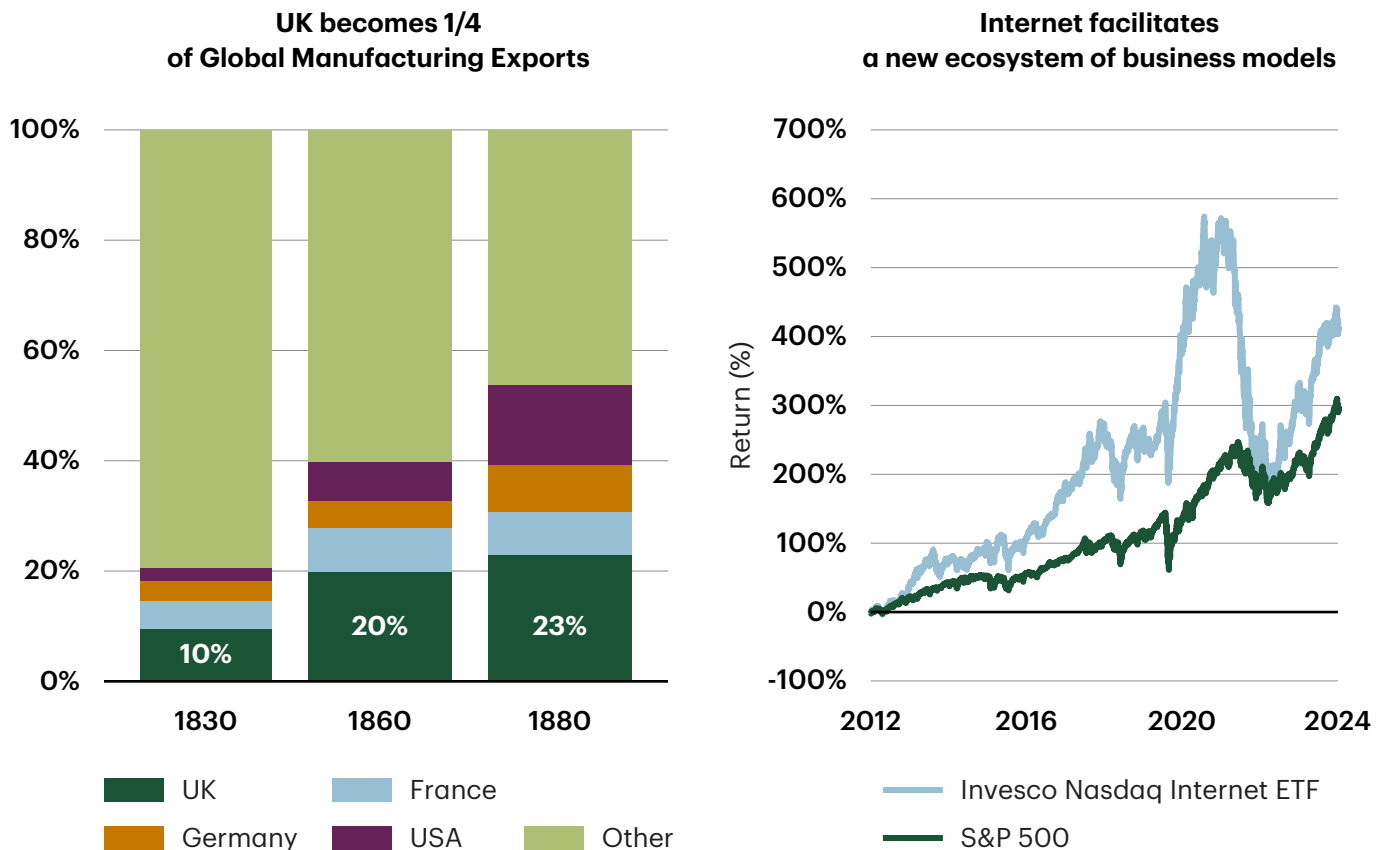
Source: Company Filings, TDAM.

2 We underestimate the potential of new technologies

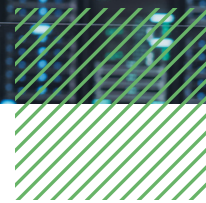
Society often underestimates the potential externalities of new, revolutionary technologies like AI. Again, using rail and internet as examples (charts below), it was not conceivable in the early days of rail and early days of internet that externalities would extend well beyond the intended use case. Rail resulted in improved manufacturing output (UK became ~25% of global exports, doubling over 50 years and cementing the country as a global economic powerhouse), but also allowed for a national postal service, faster communication, a boom in leisure travel.

The internet resulted in better and faster access to information and communication but also paved the way for entirely new business models including Amazon, Facebook, Google. The sharing economy was made possible by the invention of internet. Today, you no longer need to own an asset to use it – Uber, Airbnb, Netflix (charts below).

Externalities of revolutionary infrastructure drive broad economic change



Source: 1. Azar Gat, "War in Human Civilization: Unbound and Bound Prometheus: Machine Age War"; 2. Bloomberg, TDAM.



3 We are limited by bottlenecks

Demand for DCs is currently outstripping supply and there are bottlenecks in the supply chain that limit explosive growth and overinvestment. Some of these bottlenecks include labour, electrical equipment, power, permits and environmental permits. Examples of this can be found at two large corporations within this space: Eaton (electrical supplies, equipment, and products) and Quanta Services (construction engineering). Eaton has a work backlog has doubled in since 2020. With Quanta Services, skilled labour is the bottleneck because since experienced engineers are not exactly easy to come by².

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Investment implications

DCs are generational infrastructure and are the backbone to the AI buildout. Investments in DCs tend to be already profitable and tend to be providing good returns. With this, it's hard to feel like we are in a bubble. From an investing standpoint, there are real implications for all asset classes whether its real estate where data centres have been one of the best performance industry groups, or infrastructure where our teams own renewable power assets that stand to benefit from growing demands on the grid. There is a broad range of sectors and business models that stand to benefit from this trend.

Thorough fundamental analysis can uncover underappreciated stocks that stand to benefit beyond just mega cap tech. For example, the Magnificent 7 stocks catch all the attention of outperformance related to this trend, however there are several DCs equities across the supply chain have kept pace or even outperformed the Magnificent 7 with less attention. Important for investors to pay attention to broad themes that touch many aspects of the economy. For DCs, this theme encompass companies in technology and semiconductors but also industrials, real estate, utilities, energy and materials. ■

²Eaton and Quanta Services company filings, TD Asset Management Inc.

Data Centres

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