

If Technological Progress Accelerates Exponentially – Which Companies Are the Winners?

No one doubts today that attractive returns can be achieved with big tech companies such as Alphabet, Amazon or Apple. They are growing fast – sometimes at seemingly exponential rates. But will this continue? And which companies are benefitting from the progress made?

A notable factor is the reduction in cost for many of these innovations, meaning that, for example, storage devices now are smaller, yet, can hold more than was conceivable or affordable even 10 years ago. This created one of the prerequisites for smartphones and big data that are spurring economic growth today.

Will Moore's Law continue to spur economic growth?

A central tenet from the world of IT is Moore's Law. It is based on the observation made by Gordon Moore in 1965 that the number of transistors in a dense integrated circuit doubles approx. every two years and, consequently, also the processing power. At the same time, the price drops. In recent years, Moore's Law has slowed as the ever higher density in integrated circuits is starting to push the limits of physics.

Does this mean innovation and tech companies' growth will now start to decrease? Kurzweil says no. Quite on the contrary, he argued in 2001 that the pace of technological change overall is bound to accelerate. According to him, Moore's Law needs to be extended. He posits that when barriers in technological developments are hit, new inventions allow us to overcome them. In his Law of Accelerating Returns (LOAR) he holds that once the driver fuelling innovation is information (such as in AI, robotics and 3D printing), its performance also begins to double approx. every year. The synergies between the different layers further multiply the pace of acceleration.¹

Who benefits from decreasing costs?

While performance increases, production costs decrease, which further accelerates the possibilities of progress. The advances in GB storage devices are one of the reasons we can now store more on our phone than we could on a much bigger desktop 15 years ago. The same is taking place for many other innovations such as electric car batteries or 3D printing (see table below), whose development and utilisation are only starting to take off.

¹ <http://www.kurzweilai.net/the-law-of-accelerating-returns>

Average Costs	Earlier	Today	Scale Factor
1 GB Storage Space	2,000,000 US\$ 1957	0.02 US\$ 2017	100,000,000 x in 60 years
Solar Power (per kWh)	30 US\$ 1984	0.002 US\$ 2018	1,200 x in 34 years
Electric Car Batteries (per kWh Capacity)	1,300 US\$ 2005	209 US\$ 2017	6 x in 12 years
3D-Printing	40,000 US\$ 2007	100 US\$ 2014	400 x in 7 years
Biotech (DNA-profile of a human)	10,000,000 US\$ 2007	100 US\$ 2018	100,000 x in 11 years
Drones	100,000 US\$ 2007	100 US\$ 2017	1,000 x in 10 years
Industrial Robots	500,000 US\$ 2008	1,000 US\$ 2017	500 x in 9 years
Sensors (notably 3D- Lidar)*	20,000 US\$ 2009	3.50 US\$* 2017	5,000 x in 8 years

Source: MainFirst, Ismail et al, 2014, *Exponential Organizations*, *MainFirst estimate

So, while users benefit from ever more powerful smartphones, the companies enabling these capabilities are benefitting as well. One well positioned company in this field is Applied Materials, the world's largest supplier to the semiconductor industry (including e.g. Samsung, Intel and TSMC) that powers many of these technological advances. Applied's revenues grew by 19 percent YoY, boosted especially by record revenues in their training and services division. The strong double-digit growth is expected to continue given the high demand for Applied's products. New research results that will help to continue to power the accelerating data needs in the era of artificial intelligence and the Internet of Things should ensure further growth over the long term.

The manufacturer of graphics cards Nvidia is also benefitting, especially from the large data requirements of big data and AI. In its Q2 financial results Nvidia reported record growth on all its platforms. Overall revenue was up by 40 percent YoY to 3.12bn USD. A large part of this came from the datacentre division where revenue grew by 83 percent YoY to 760mn USD. Its latest development should ensure continued growth. The new graphics card sports deep learning based Turing architecture. The new GPU completes the Nvidia RTX platform that offers a new hybrid rendering graphics approach combining rasterization, ray tracing, computing and AI to enable real-time ray tracing. It is almost sure to be used in many applications such as gaming, artificial intelligence and autonomous driving. In addition, its



capabilities mean that it may also be employed in medical diagnostics such as in biophotonics, which should enable the earlier detection of cancer.²

Frank Schwarz and his team, who manage the [MainFirst Global Equities Fund](#), identified the potential of Nvidia already in 2015 and count it among their most successful investments to date. The fund managers specialise in identifying such structural growth trends as the current technological advances and the companies developing them. This, among other things, has allowed them to achieve an annual performance of 19.4 percent over the last 5 years in the fund (as at 31 August 2018, ISIN LU0864710602).

² <https://www.forbes.com/sites/investor/2018/08/29/are-you-a-member-of-the-nvidia-fan-club/#46bc2bd665e3>