



The Fragile Exposure to Technology

Much has been discussed about the technology sector concentration of S&P 500. Although we find that the degree of concentration is not unusual, once certain myths about the largest companies are dispelled, the nature of exposure and corresponding end-market risks indicate a degree of fragility.



The concentration of the US stock market performance in the technology sector has been source for concern in the last few years. The variedly used FAAMG or FAANG acronym (alternating inclusion of either Microsoft or Netflix along with Facebook, Amazon, Apple and Google/Alphabet) has successfully taken its place next to the old favourites, such as BRICS or PIGS.

Much like the latter two sets of countries, the companies in question have more differences than commonalities and it is the underlying markets that drive the risk profile rather than the companies themselves: fortunes of Google and Microsoft are as aligned as the future performance of Brazil and India. Although there are common drivers, the specific risks are driven by underlying end-market exposures. In this issue of Risk Wire we attempt to zero in on the ultimate sources of risk with respect to the leading technology platforms, dispelling some myths on the way.

To be clear, this is not analysis of the technology sector investments in general. Rather, we attempt to evaluate the exposure of the market to the five leading companies and the underlying risks that exposure implies.



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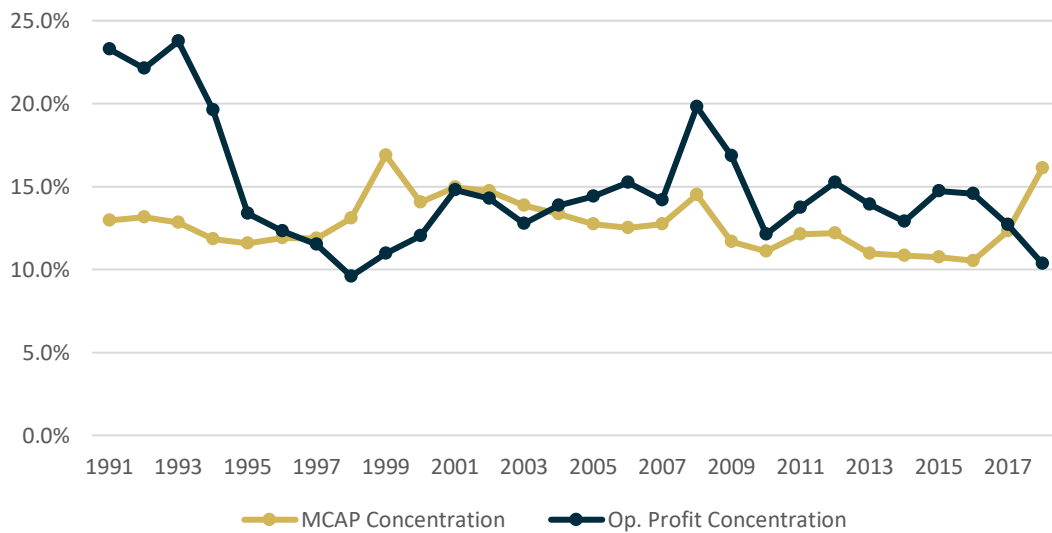
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Is There Really Unusually High Concentration?

It is remarkable to see the S&P 500 dominated by a few technology firms that only a decade ago had to invent their revenue generation models. This fact is still fresh in the memories of seasoned investors and can be the source of anxiety when it comes to the top market capitalization spots in the index. The facts, however, suggest that this concentration is only somewhat high and not very unusual. It is fair to say that the current concentration of market capitalisation of top 5 technology firms is highest since 1998 (Figure 1), however, longer datasets suggest that the level of concentration has been much higher in 1960s and 1970s.

Figure 1: Market capitalisation and operating profit of top five stocks in S&P 500 as % of total, Source: Bloomberg, LINKS calculations



The concentration of top companies in a single industry is also not very unusual. Heavy exposure to a single product - oil, in fact, was a norm in 1980s (Table 1).

Table 1: Top 10 companies by market capitalisation, S&P 500, Source: Bloomberg

1980	1990	2000	2017
IBM	IBM	General Electric	Apple
AT&T	Exxon	Exxon	Microsoft
Exxon	General Electric	Pfizer	Amazon
Standard Oil of Indiana	Philip Morris	Citigroup	Facebook
Schlumberger	Royal Dutch	Cisco Systems	Berkshire Hathaway
Shell Oil	Bristol-Myers Squibb	Wal-Mart Stores	Johnson & Johnson
Mobil	Merck	Microsoft	JP Morgan Chase
Standard Oil of California	Wal-Mart Stores	AIG	Exxon Mobil
Atlantic Richfield	AT&T	Merck	Alphabet
General Electric	Coca-Cola	Intel	BofA

Although on the surface of it, there is not much concentration risk at least compared to the history, there are two sources of risk that are specific to technology companies and their dominance of the index only emphasises these risks:



- i. **End markets:** fragility of end-markets and existential threats to business models
- ii. **Valuation:** heightened expectations of future growth and margin expansion

A significant source of risk is the nature of products and end-markets of the FAAMG companies. It is true that S&P 500 has been even more concentrated in a single product in 1970s and 80s. But that product was oil – at the time a vital, irreplaceable commodity, with companies that had unassailable barriers to entry and many decades of simple and proven business model. When it comes to the FAAMG companies, however, despite their dominating position in respective markets, there is something fundamentally fragile about the end markets they are exposed to, their revenue generation and business models. Fragility in this context may be extended to the barriers to entry, of course, with oil and industrial conglomerates arguably having higher barriers to entry¹. ***In a more acute sense though, fragility here refers to the switching costs and relative importance of the service for end-users.***

The valuation argument is also hard to ignore: operating profit contribution of the top five companies in the index is disproportionately low (Figure 1). This is an indication of heightened expectations of future growth (companies are priced at higher P/Es) at the same time as their absolute size is at or near all-time high. The source of at least perceived risk, therefore, is not so much the concentration of the index, but rather the heightened expectations of earnings or margin growth of companies that are already very large in market capitalisation terms.

End-Market Exposure of FAAMG

The ubiquity of FAAMG brands in our daily lives often masks the business reality of how exactly these businesses generate their revenues. Filling petrol at Shell station was clear-cut: we paid for a product that was essential and that was how Shell made money. Using Facebook or Google does not provide the same level of insight into the companies' revenue generation model in part due to the convoluted nature of money flow: we receive free service in vaguely defined legal exchange of personal information. A few of the common beliefs for instance are far from the reality:

- i. "Amazon is so much more than retail"
- ii. "Facebook and Google are major diversified technology companies with many different products, including self-driving cars, smart devices, enterprise software"
- iii. "Apple provides a range of products such as PCs, mobile phones, software, tv-connected devices"

The reality of revenue generation is a lot more prosaic than this common perception leads us to believe (Table 2). The only somewhat diversified company unsurprisingly is also one of the oldest companies in the list – Microsoft. Apple's fortunes are tied to the performance of iPhone – a single product. Amazon is still largely a non-food retail company, while Google (Alphabet) and Facebook revenues outside advertising are negligible.

¹ This point is not settled though, as it could also be argued that Facebook or Google have as high barriers to entry as oil companies, given the considerable capital cost of launching, promoting and maintaining a competing infrastructure.

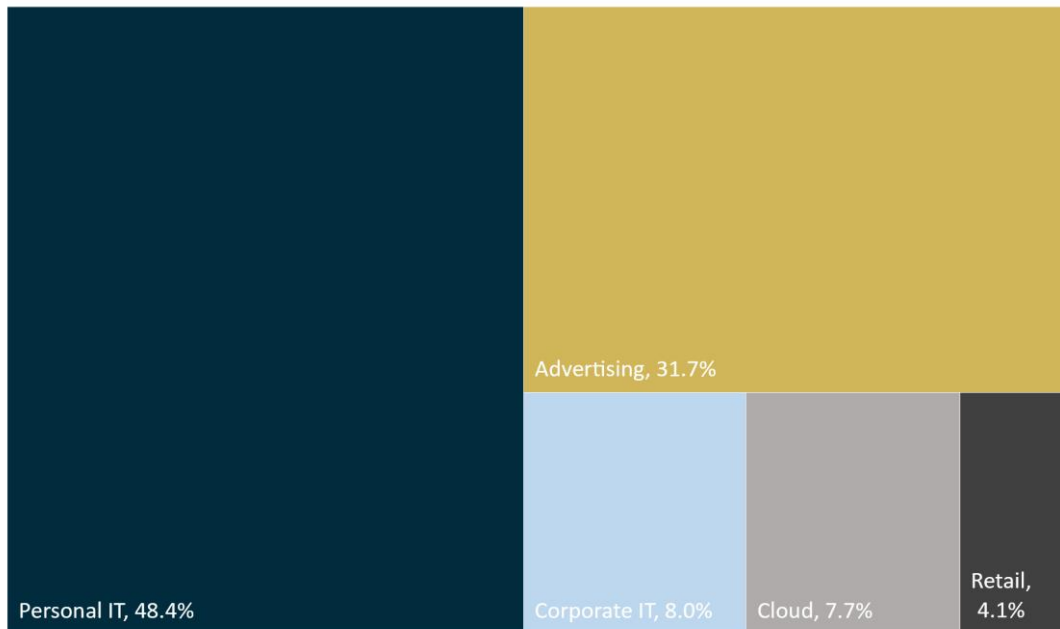


Table 2: Revenue by segment, Source: Bloomberg, company filings

Apple Inc		Microsoft		Amazon	
iPhone	62%	Personal IT	38%	Online Retail	79%
iPad	8%	Corporate IT	33%	Cloud	10%
Computers	11%	Cloud	29%		
Alphabet		Facebook			
Advertising	86%	Advertising	98%		

Moving from segments to end-markets and from revenues to profits, the FAAMG group is largely driven by Personal IT Spending and Advertising revenues (Figure 1) – the equivalent of concentration in oil back in 1980s. Despite the broad attention to cloud services, this market is still relatively small, but already highly competitive. Although retail market is very large in terms of revenues, due to poor profitability of Amazon, the operating profit exposure to this end-market is also small.

Figure 2: Operating profit exposure of FAAMG to end-markets, Source: LINKS estimates, corporate filings



The question of end-market risk is therefore linked to the health of the **personal IT spending** and **advertising** markets. It is this exposure that underpins the instinctive anxiety with respect to the fragility of revenue generation. There are plenty of reasons to be concerned about both end-markets.



Personal IT Spending

This end-market is almost exclusively driven by the number of computing devices – smartphones, tablets, laptops and desktops bought by individuals for personal use. The past decade has been marked by the rapid replacement of desktop PCs with laptops, and more recently, smartphones. As a result, smartphone sales have gradually replaced laptops and desktops. Unsurprisingly, the expected shipment growth rates of larger devices are negative (Table 3).

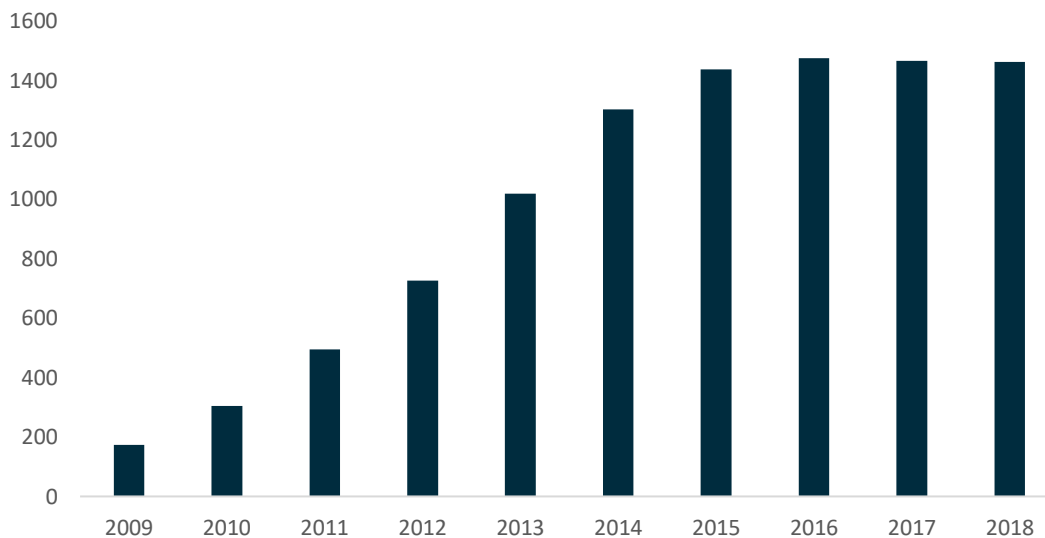
Table 3: Expected growth rates of shipment of computer devices

Form Factor	2016		2021		2016-2021
	Shipments	2016 Share	Shipments*	Share*	CAGR*
Desktop + DT & Datacenter Workstation	103.4	23.80%	86.3	21.70%	-3.50%
Notebook + Mobile Workstation	156.8	36.00%	162.1	40.70%	0.70%
Detachable Tablet	21.5	4.90%	41.9	10.50%	14.30%
Slate Tablet	153.4	35.30%	108.1	27.10%	-6.80%
Grand Total	435.1	100.00%	398.3	100.00%	-1.70%
Traditional PC	260.2	59.80%	248.4	62.40%	-0.90%
Traditional PC + Detachable	281.6	64.70%	290.3	72.90%	0.60%
Total Tablet (Slate + Detachable)	174.9	40.20%	149.9	37.60%	-3.00%

Source: IDC Worldwide Quarterly Personal Computing Device Tracker, August 24, 2017

Unfortunately, in the past few years the smartphone market has also plateaued (Figure 3), as most people already own at least one smartphone, while the improvements in value proposition for the customers are more and more marginal (e.g. the relative benefits of iPhone 6 over iPhone 5 are evident only to the most enthusiastic technology users).

Figure 3: Global smartphone shipments (million units), Source: IDC





Of course, the industry continuously attempts to reinvent itself, by introducing “the next big thing”- internet of things, virtual reality, augmented reality, bendable screens. It is conceivable that one or many of these concepts will find their way into the mainstream consumer choice, however, this will take time and many failed attempts. Moreover, the innovator will not necessarily be a listed company.

In the meantime, the personal IT spending market appears to be saturated, and as it often happens in saturated markets, cost and efficiency become more important than new features and cutting-edge technology. Just as it happened with TVs, fridges and other appliances, as lower cost manufacturers increase their production volumes in the lower priced segment, they become more competitive in terms of technology and eventually attack all segments, including the highest priced ones.

We are in the middle of the road towards marginalisation of higher cost/high-end manufacturers (Table 4). Recalling our personal consumption experience of GE household appliances and Philips TVs, it is only a matter of time for Apple and even Samsung to pose the question whether they can remain competitive in the smartphone market. Already now, most of growth in the market is in the lower-priced (under \$150) smartphones, where Apple does not compete at all.

Table 4: Worldwide smartphone market, top 5 company shipments, market share and year-over-year growth

Vendor	2Q18 Shipments	2Q18 Market Share	2Q17 Shipments	2Q17 Market Share	Year-Over-Year Change
1. Samsung	71.5	20.9%	79.8	22.9%	-10.4%
2. Huawei	54.2	15.8%	38.5	11.0%	40.9%
3. Apple	41.3	12.1%	41.0	11.8%	0.7%
4. Xiaomi	31.9	9.3%	21.4	6.2%	48.8%
5. OPPO	29.4	8.6%	28.0	8.0%	5.1%
Others	113.7	33.2%	139.5	40.1%	-18.5%
Total	342.0	100.0%	348.2	100.0%	-1.8%

Source: IDC Worldwide Quarterly Mobile Phone Tracker, July 31, 2018

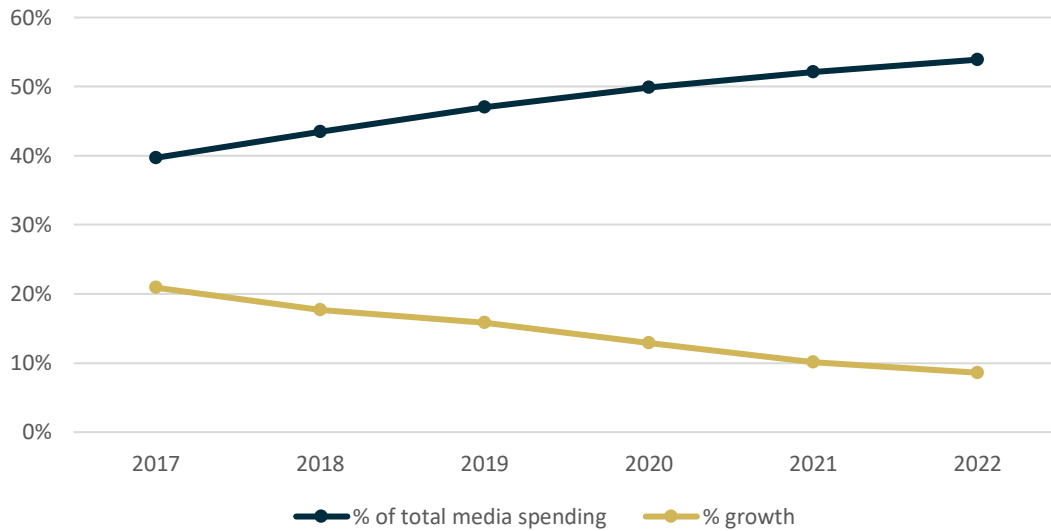
This process may take a while of course, however, one thing is clear – in the absence of “the next best thing”, the personal IT spending end market will not grow fast.



Advertising

Migration of traditional advertising spending to digital channels is still a major driver for FAAMG companies, particularly for Facebook and Google, but increasingly also for Amazon and Microsoft. Growth rates of digital advertising spending are still impressive, albeit expected to fall (Figure 4).

Figure 4: Expected digital ad spending worldwide, Source: eMarketer, March 2018



Digital advertising as practiced by Google and Facebook, opened great opportunities for individualised targeted messaging for advertisers, at least in theory. The fast progress in migration from analogue to digital, however, exposed also serious issues with the business model. Some of these issues may turn out to pose existential threat to targeted advertising.

Problem 1: *Ad models too short-lived, requiring constant innovation*

In theory, digital ad spending is significantly more accurate and effective than the traditional TV and print advertising, as we can measure the consumer response more effectively (in the past there was no way to find out whether the viewer watched the add or flipped the channel). There was an old wisdom attributed to John Wanamaker: “Half the money I spend on advertising is wasted, the trouble is I don’t know which half”. The question is, now that digital tools are more effective at figuring out which half of advertising is wasted, what stops advertisers from halving their budgets?

Consumers too grow more impatient, selective and intolerant of intrusion. Google and Facebook must reinvent the way they bring advertising content to consumers continuously. Any mistakes threaten to alienate consumers and drive them to a different platform. Clearly, the fragility of this business model is a far cry from oil companies of 1970s.

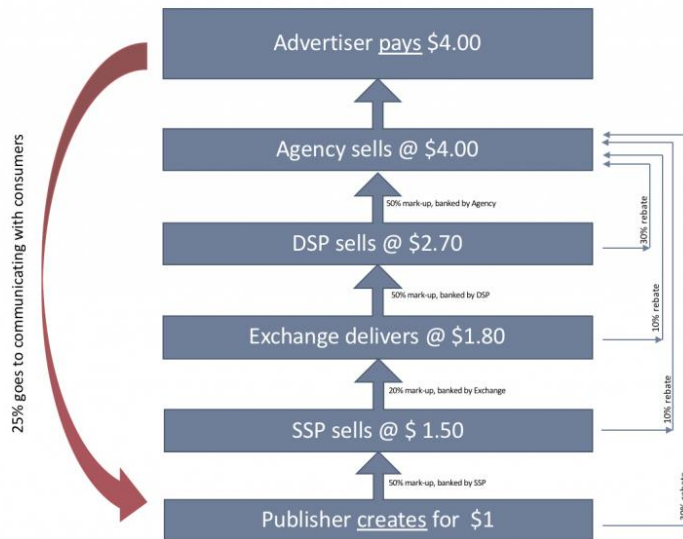
Problem 2: *Advertising supply chains disrupted and in disarray*

For every \$4 spent by advertisers today only \$1 ends up at the publisher (including Google, Facebook), with the rest distributed in the supply chain (Figure 5). As growth rates of digital advertising slow down, the supply chain will have to consolidate and reinvent itself – something



that always poses a risk for all the participants. Furthermore, changing regulatory framework – net neutrality rules add an additional layer to the supply chain – the internet service providers (ISP’s), who undoubtedly will like to participate in the distribution of the advertising revenue pie.

Figure 5: Revenue stacking in the ad supply chain, Source: Ashley MacKenzie, Fenestra



Problem 3: Control over content, regulation, data protection, brand safety

Digital advertising is based on very specific personal data, including likes/dislikes, location, age, gender etc. Regulation governing the ownership of such data, consumer rights to control the accessibility and the repercussions if the rules are broken, is very much in development. Very public exposure of controversies such as the use of platforms to meddle in local elections, spread disinformation and false advertisement is still to be tackled by the companies and law makers. Furthermore, advertisers have limited control over the association of their brands; as an example, many brands were unaware of being associated with ultra-right websites in the US and had to scramble to control the damage. All of the above suggests that the business models are still fragile and unstable.

Problem 4: Self-reporting of ad effectiveness

Most of ad-effectiveness measures on Google and Facebook are self-reported. There have been many examples of incorrect calculations exposed on both platforms. Companies have fixed many of the errors, but this still leaves the question of credibility and self-reporting unanswered.

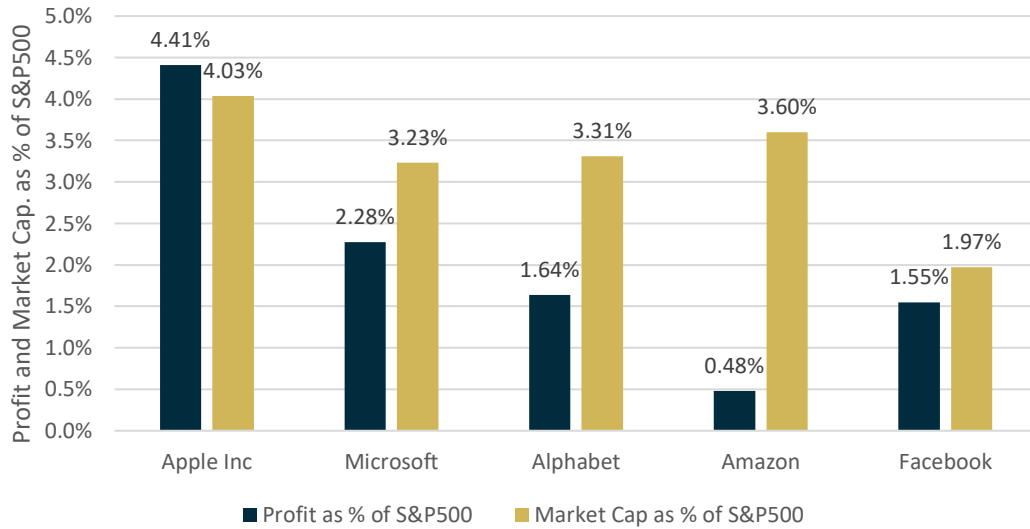
In summary, although transition towards digital advertising still provides good growth rates for this end-market, the growth rates are expected to slow to single-digit in the next few years and there are still several existential issues for the companies fully exposed to the advertising end market. Both advertising and personal IT spending end-markets are nearing the end of their above-average growth period, which would otherwise be fine if it were not for high growth expectations implied by disproportionately high valuation. In this respect, one company – Amazon, stands out in terms of exceptionally high growth implied by the valuation.



Valuation

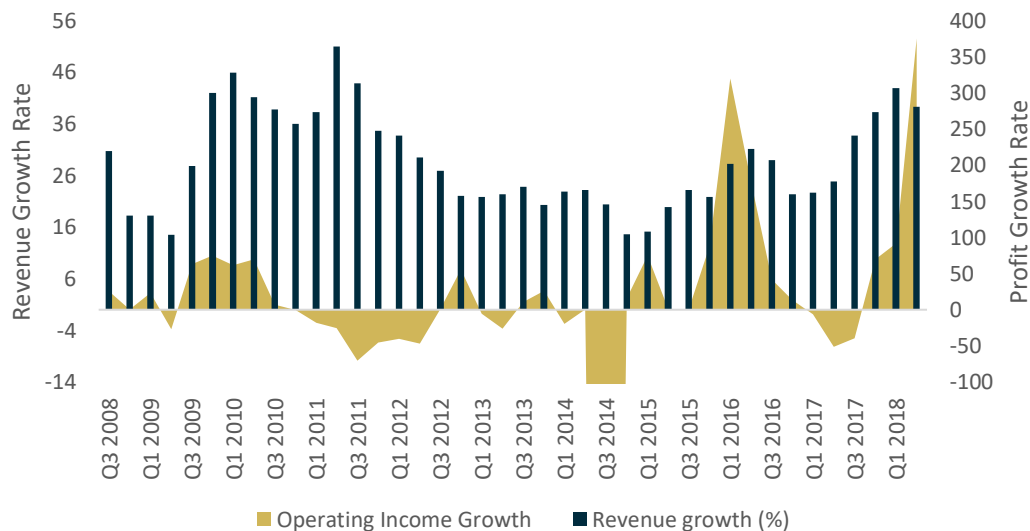
Generally, FAAMG companies have greater market capitalisation proportion of the index compared to their profit contribution to the index (Figure 6). This reflects their higher-than-market valuation (in terms of P/E), which in turn means the market expectation of higher than average growth. Amazon clearly is in a league of its own in terms of the excessive pricing, which prompts a separate look at Amazon’s valuation: what type of growth is expected from the company to justify such a valuation?

Figure 6: Market cap and profit contribution of FAAMG companies to S&P 500, Source: LINKS calculations



Current Price-to-earnings (P/E) ratio of Amazon based on most optimistic earnings numbers is near 157, which is somewhat higher than the S&P 500 P/E of 21. Clearly, there would be no point for anyone to pay such a high price for earnings unless there is an expectation of much higher growth in the future. Historically, Amazon has been very successful at generating double-digit growth of revenues. Less so, when profits are concerned (Figure 7).

Figure 7: Revenue and profit y-o-y growth rates, Amazon, Source: Bloomberg, LINKS calculations





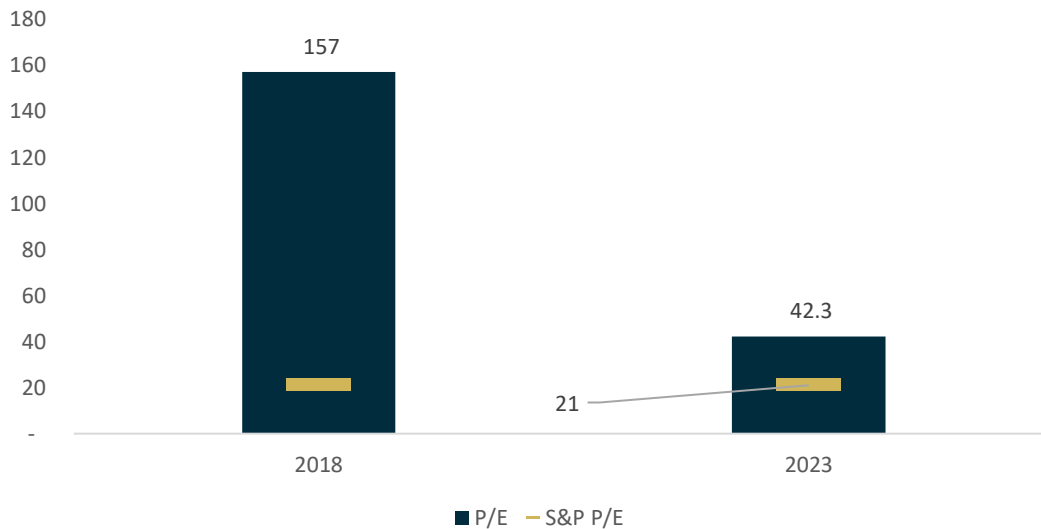
It appears that 20-30% revenue growth rates are not out of ordinary for Amazon. The question is, how far forward can this growth continue given the limited size of the market? The nearest competitor of Amazon is Walmart, which has grown to dominate the US groceries and general retail market. The comparison of the two companies, other than growth, is not flattering for Amazon (Table 5). Walmart achieves higher margin and return on invested capital than Amazon, despite Amazon being the “digital” alternative that is supposed to be more scalable and cheaper to run.

Table 5: Operating metrics, Amazon vs. Walmart, Source: Bloomberg

	Amazon	Walmart
Sales (\$ bln)	210	510
Operating Income(\$ bln)	7.38	28.245
Operating Margin	3.5%	5.5%
Return on Invested Capital	5.85%	11.25%

Of course, in theory Amazon may outgrow Walmart, but in practice the size of Walmart is a good indication of how much of the retail market a single company can dominate². Growing at 30% a year Amazon will reach the revenues of Walmart by 2023 and has a P/E at that point of 42.3, which is still twice higher than the S&P 500 P/E of 21 (Figure 8), which means a fair price of Amazon should be half of its current value, which would bring it closer to its FAAMG peers³.

Figure 8: Amazon current and expected P/E, Source: LINKS calculations, Bloomberg



The question of Amazon’s valuation, of course, misses the tremendous scope for innovation in the company, its leading position in cloud services (AWS), its potential in AI and the rest of developing technology markets. However, all these markets are still nascent in their scale and may or may not grow to contribute to Amazon’s profitability. None of this would matter, had Amazon been a mid-cap stock with tremendous growth opportunities.

² There are many simplifications in this argument, including the differences in focus, competitive environment, global vs. local expansion possibilities etc. This argument is made here in broad sense.

³ A more rigorous valuation exercise using three-stage DCF for Amazon carried out by LINKS yields similar results.



Conclusion

The concentration of technology stocks in S&P 500, although somewhat high, is not extraordinary in historic terms. However, the riskiness of this concentration may be higher than any time in the history, given the underlying excessive growth expectations and fragility of end-markets of FAAMG companies.

At different times S&P 500 has been dominated by integrated oil companies, industrial conglomerates or banks. All these industries had several features in common: extremely high barriers to entry, stable established cash generation, end-markets that were stable and valuations that were in-line with the overall index. The FAAMG companies, in contrast, are overexposed to advertising and personal IT expenditure markets – two markets that are maturing very quickly, with inherent existential threats (e.g. low-cost manufacturing, collapsing supply chains, regulation of data protection etc.). Furthermore, current valuation implies growth expectations that will be increasingly difficult to sustain.

The fragility of the current concentration of S&P 500 does not stem from the absolute level, but rather the nature of this concentrated exposure.



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