MOBILE TELECOM IN EUROPE: URBAN LEGEND OR CASE STUDY IN MARKET FRAGMENTATION?

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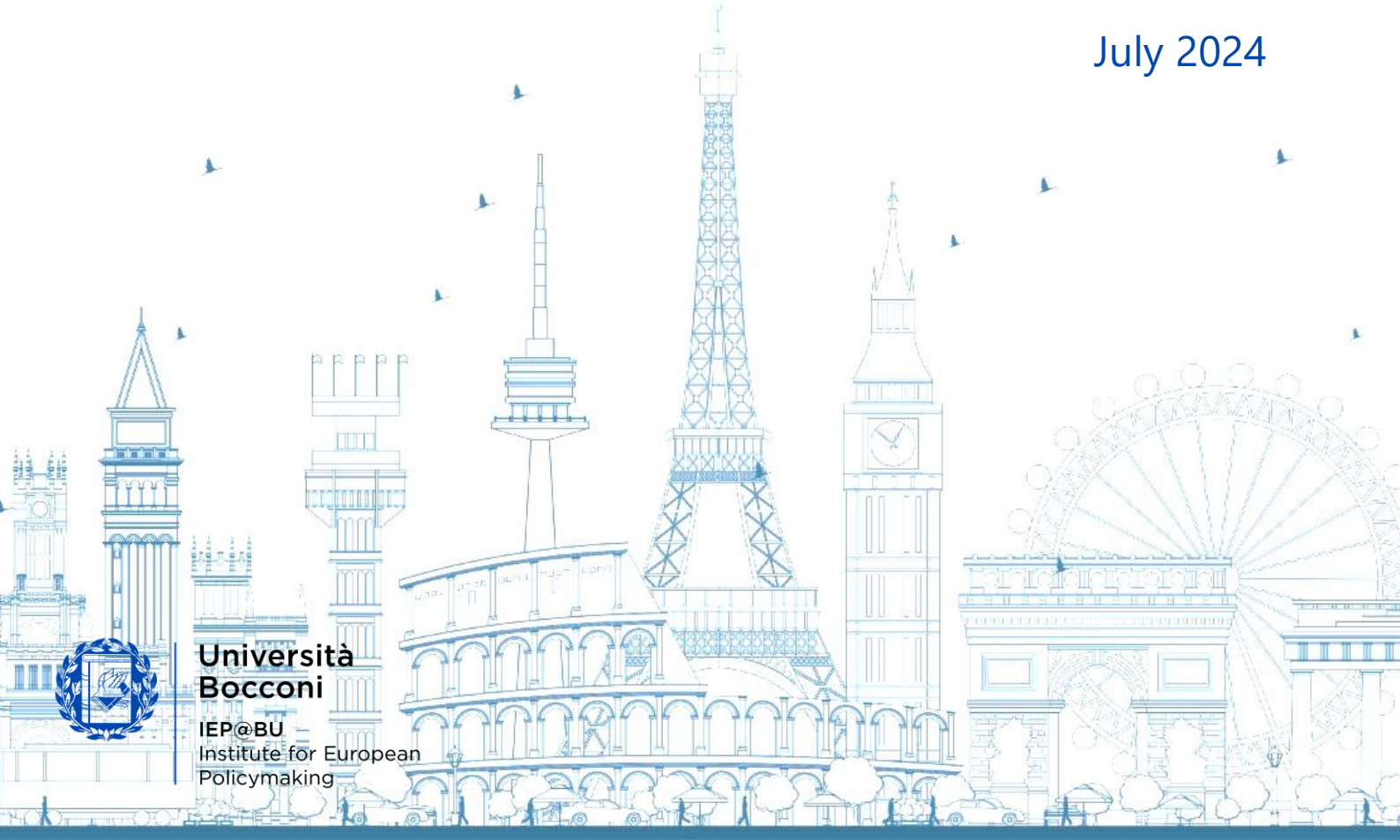

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Introduction

The mobile telecom sector is often taken as a case study of fragmentation of the single market leading to less investment and a loss of technological leadership. However, a closer examination of the data suggests that the fragmentation also implies more competition leading to lower prices for consumers in Europe.

The starting point is the observation that in Europe there are in each country about 3-5 mobile telecom operators. With 27 member countries, this means close to 100 different operators in the EU. By contrast, the US market is dominated by only 3 operators. The average European operator thus serves only 5 million subscribers compared to over 100 million in the United States (and close to 500 million in China). This seems to justify the immediate conclusion that the European mobile telecom sector is inefficient. One often cited indicator of this inefficiency is that per capita telecommunications investment in 2021 was close to €100 in Europe, much lower than the €150 in the United States (Analysys Mason, 2022 *for* ETNO[1] report, 2023; later cited by Letta report, 2024). The apparent corollary is that Europe is falling behind in this key sector. The report by former Prime Minister Letta on the Single Market argues that low investment is why Europe lost the leadership in telecoms it had during the early 2000s in favour of the United States.

However, the conclusion that the splintered mobile telecom market stifles the development of the sector in the EU is much less clear-cut than appears at first sight.

A first reason to doubt this argument is that competition is much stronger in the EU market (or rather the 27 different national markets for mobile communications) than in the highly concentrated US market with its oligopolistic structure of 3 dominant suppliers. In general competition fosters innovation. In the early 2000s Europe was ahead of the US in mobile telephony although the market was as splintered then as it is today. The European advance was due to innovative suppliers of the equipment, with competition forcing the operators to adopt early the emerging G-3 and G-4 technologies.

A second reason to doubt the prevailing narrative is that numerous studies (for instance, *Mobile and Fixed Broadband Prices in Europe in 2021*, July 2022, European Commission) have shown that the prices for mobile communications are much lower in Europe than in the US, and that according to OECD data the volume of data used by EU consumers is higher than in the US. The combination of lower prices and higher consumption is exactly what one would expect from more competition.

A third reason to doubt the prevailing narrative is that the often-cited numbers on lower investment per subscriber are likely to be misleading. The higher US figure might be simply due to the fact that this statistic is in reality not based subscribers but on the number of (valid) SIM cards issued by the mobile telecom operators. According to operators' policies, in the US the SIM cards expire much more quickly than in Europe. This could explain why one finds higher investment per subscriber or rather SIM card in the US.

Given these (and other) transatlantic differences in counting subscribers one should rather relate

[1] European Telecommunications Network Operators' Association

investment to revenues as an indicator whether mobile telecom operators invest enough to provide high quality service, and the result suggests a different story.

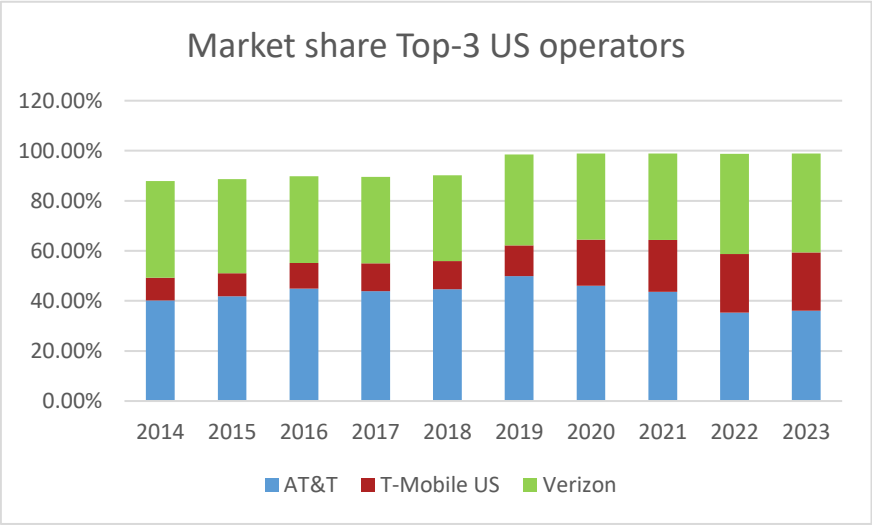
The Case Study: G3-USA and G5-Europe

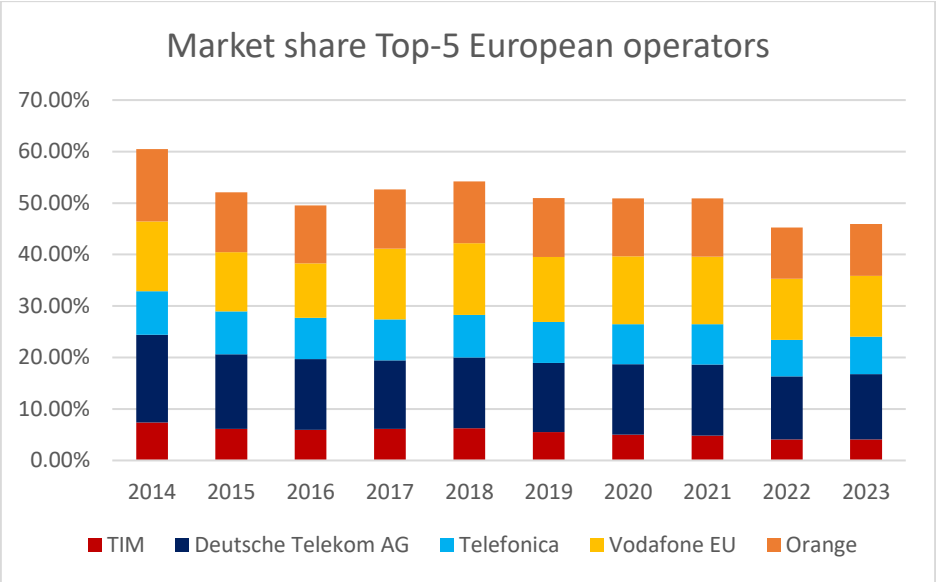
1. The sample

Our research focuses on the most important telecommunications operators on both sides of the Atlantic. We examined the financial performance and annual accounts of three major US mobile operators and five significant European counterparts over the last years. The European market is more fragmented compared to the US, where the market is dominated by a few major players. The companies included in this study are:

- US operators:
  - AT&T
  - Verizon
  - T-Mobile US
- European operators:
  - TIM
  - Telefonica
  - Deutsche Telekom AG
  - Orange
  - Vodafone

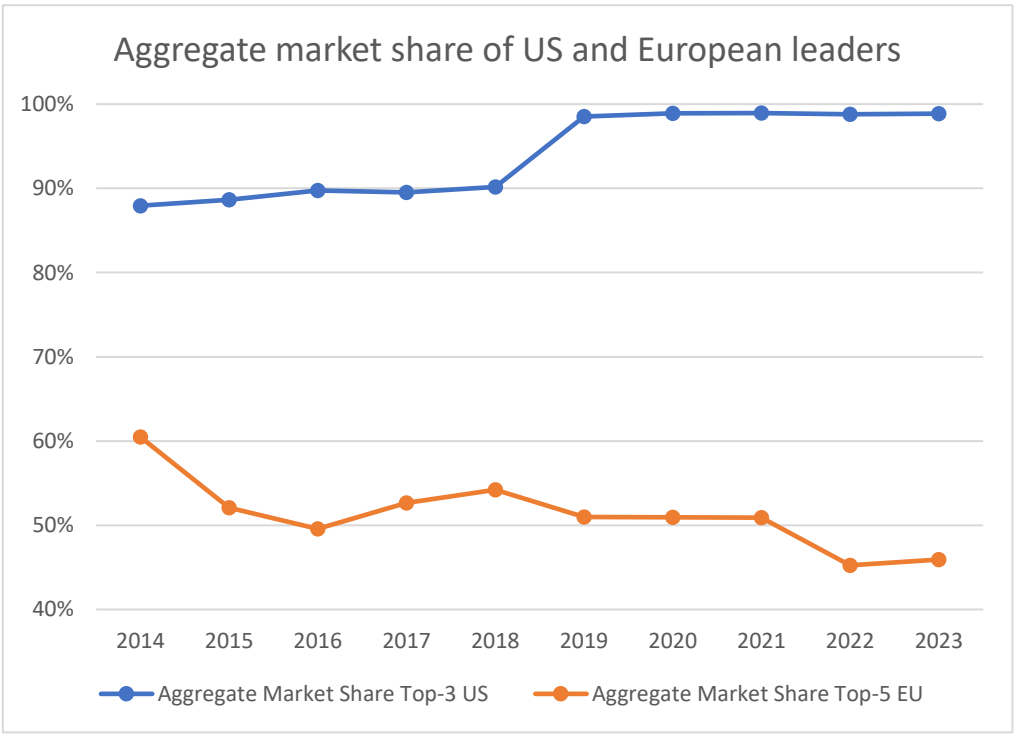
For the period analysed, these companies represented an average of 94% of the telecommunications market in the United States and 51% of the telecommunications market in the European Union.





Source: own calculations based on annual reports

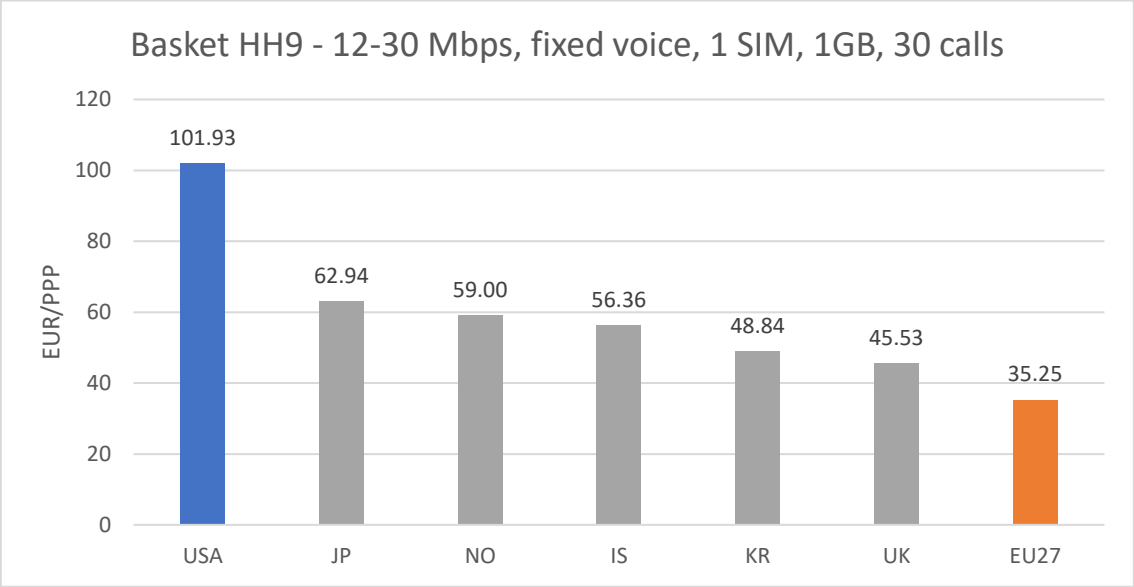
For the sake of competition analysis, it is important to note that market leaders have increased their aggregate market share in the United States, while they have reduced it in Europe.



Some of the companies in the European sample operate also outside the EU. In these cases, relevant data and information was segmented to isolate values pertinent to the EU market. The focus is on the 2018-2023 period and all amounts are in Euros (€). US values have been converted from USD using the yearly average currency exchange rates.

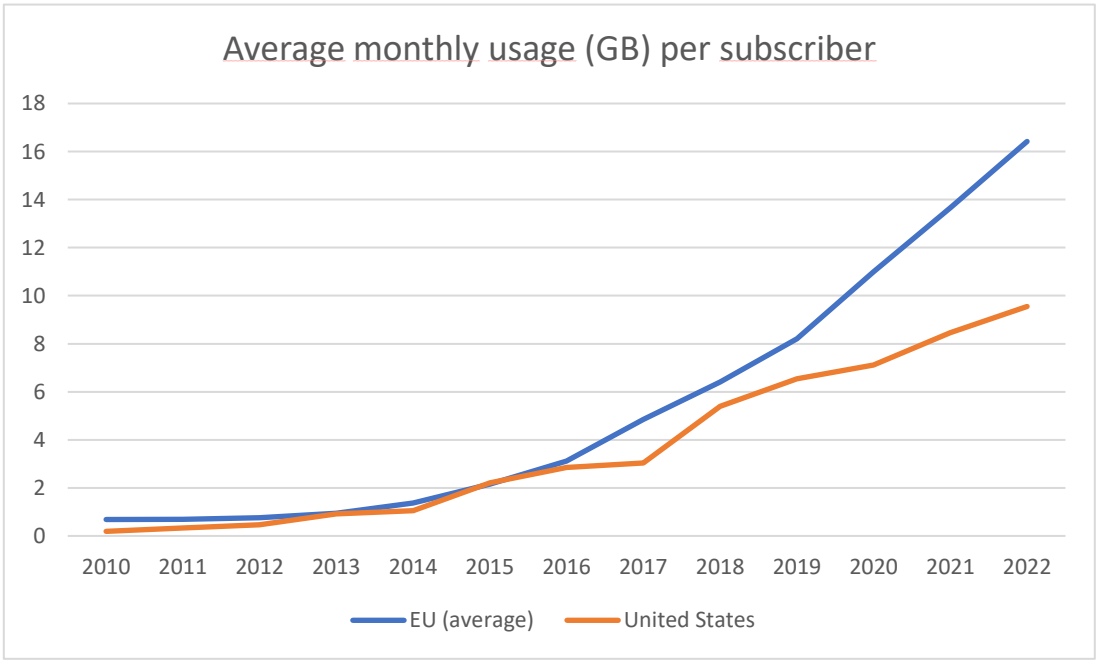
2. Transatlantic Comparisons

Prices and data volumes



Source: European Commission, Mobile and Fixed Broadband Prices in Europe 2021: The EU27 has on average the least expensive offers in this usage basket.

Before starting with our analysis, it is pivotal to note that over the past decade European consumers tended to encounter lower prices compared to other global markets, particularly the US, for similar services and quantities; this held already true at the beginning of the century (OECD Communication Outlook, 2001). Additionally, data from the OECD indicates that average monthly data consumption is higher in Europe than in the USA. This trend exhibits a U-shaped pattern: it was true in the first decade of this century, then diminished for a certain period before reemerging consistently around 2016.



Source: own calculations based on data from OECD

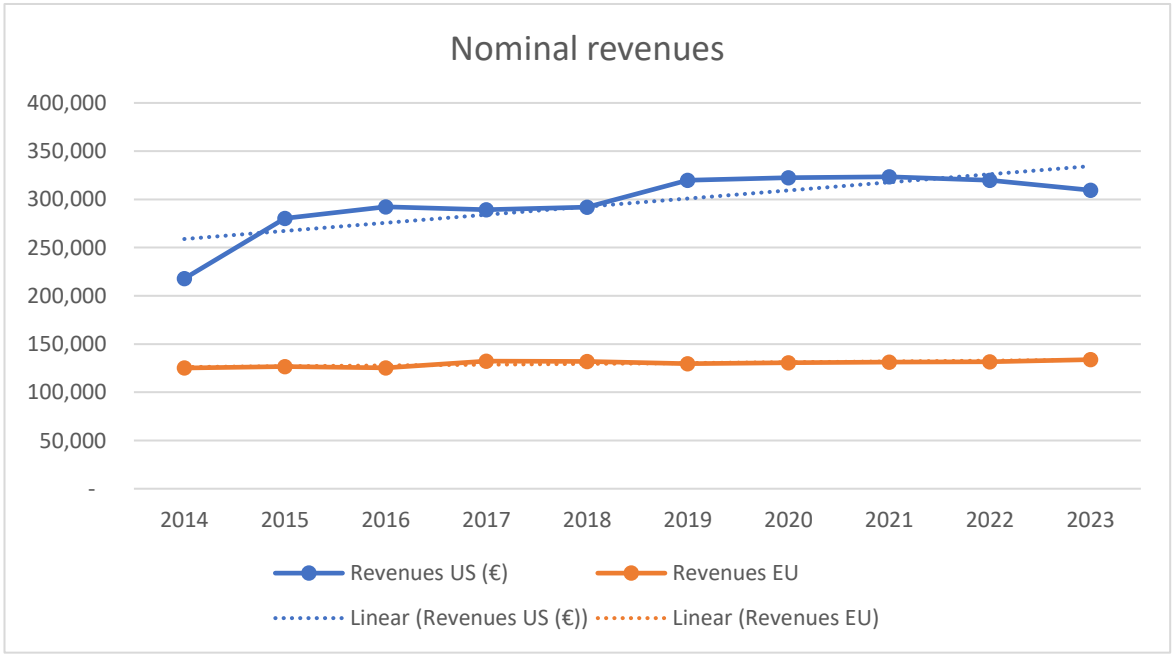
How is it possible that the myriad of small EU operators deliver lower prices and higher data volumes than the much larger US ones? The technical explanation is that there are few economies of scale in mobile telecoms as expanding coverage requires expanding the number of base stations roughly proportional to the additional market covered (Elliott et al. 2024). Operators like Vodafone or Deutsche Telekom have about 30-50 million subscribers in multiple countries and are thus large enough to exhaust any economies of scale from other aspects in this sector.

The economic explanation is competition. The leading EU operators, which are generally present in several, but by no means all, national markets, provide competition for the many national operators that otherwise might exploit their dominant position at home. Moreover, EU competition authorities have prevented the larger EU operators from acquiring a dominant position anywhere.

Consistent with this larger degree of competition in Europe we also find that the profit rate of even the largest European operators is at around 6% much lower than the 9% enjoyed by the dominant US operators.

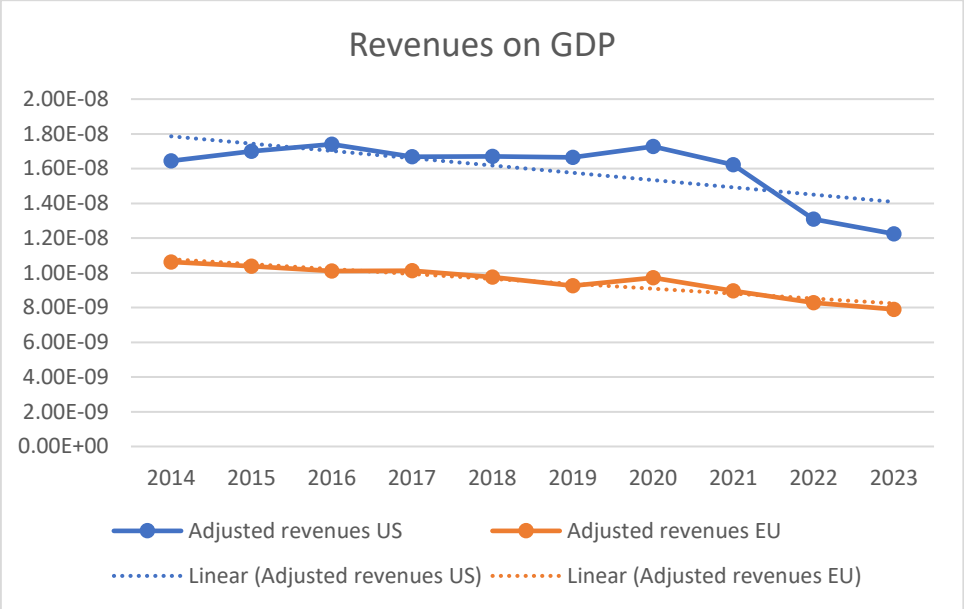
Revenues and Profits

The combined revenues of the 3 US companies have consistently been much higher than those for European companies, which is unsurprising given their larger market share and the higher prices in the US, as previously noted. The combined revenues of the 3 dominant US firms increased from €217 billion (2014) to €323 (2021), while European revenues fluctuated slightly around €125 billion to €134 during the same period. As noted above, part of this difference is due to the fact that the 3 US firms increased their market share over the observation period whereas that of the 5 EU firms fell.



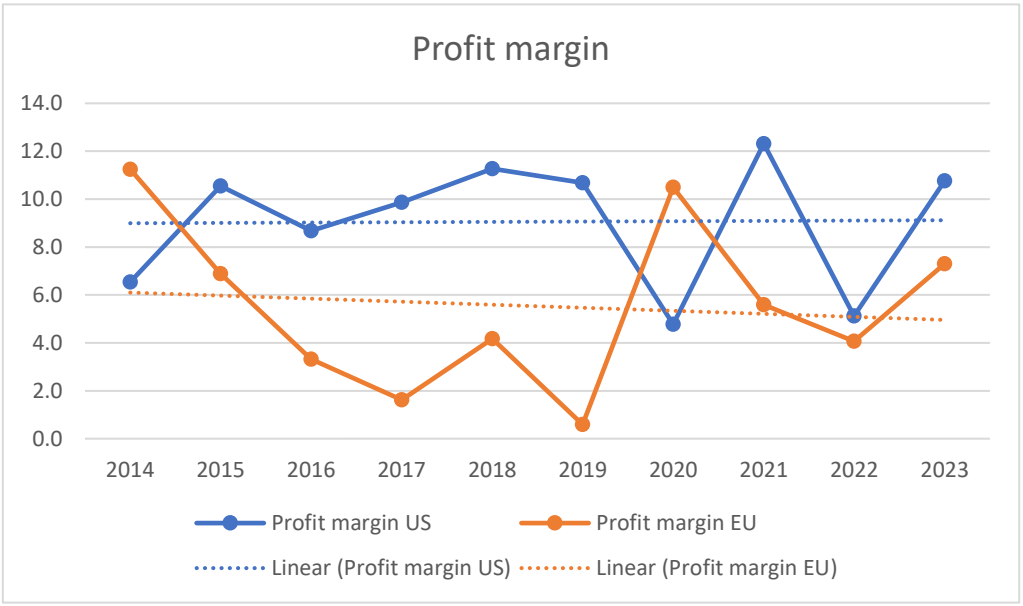
Source: own calculations based on annual reports

The mobile telecommunication is not a growth market as revenues have shown minimal growth (in nominal terms) in the mature markets on both sides of the Atlantic over the last ten years. This means that they have fallen if deflated by GDP. This holds true especially for the US, due to the stronger increase in nominal GDP.



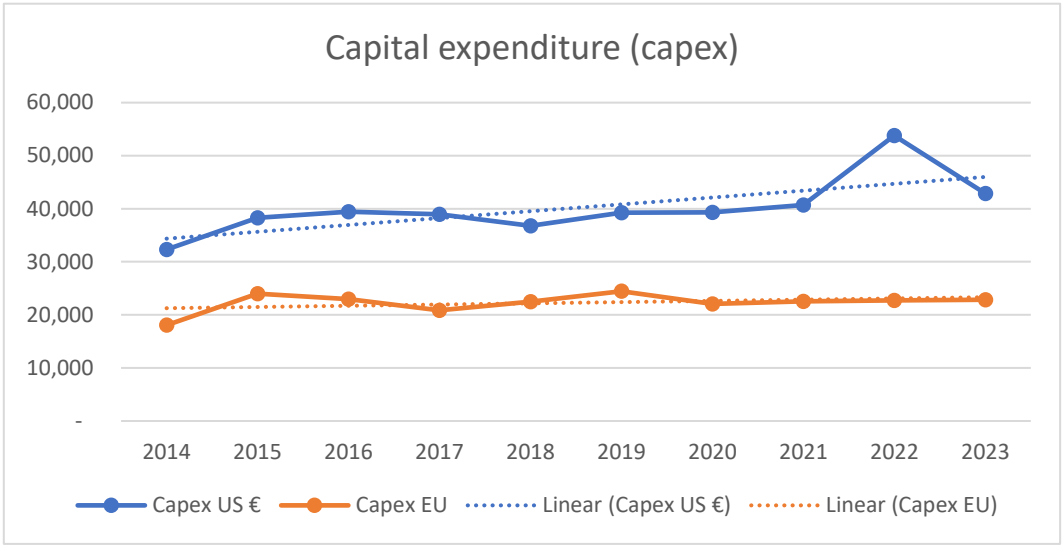
Source: own calculations based on annual reports

US operators have similarly achieved higher total nominal profits, associated with higher and more stable profit margins (profits relative to revenues) compared to their European counterparts. Overall, profit margins have shown considerable variance over time in both regions without a clear trend, though it is clear that in Europe they have generally been lower than in the US.



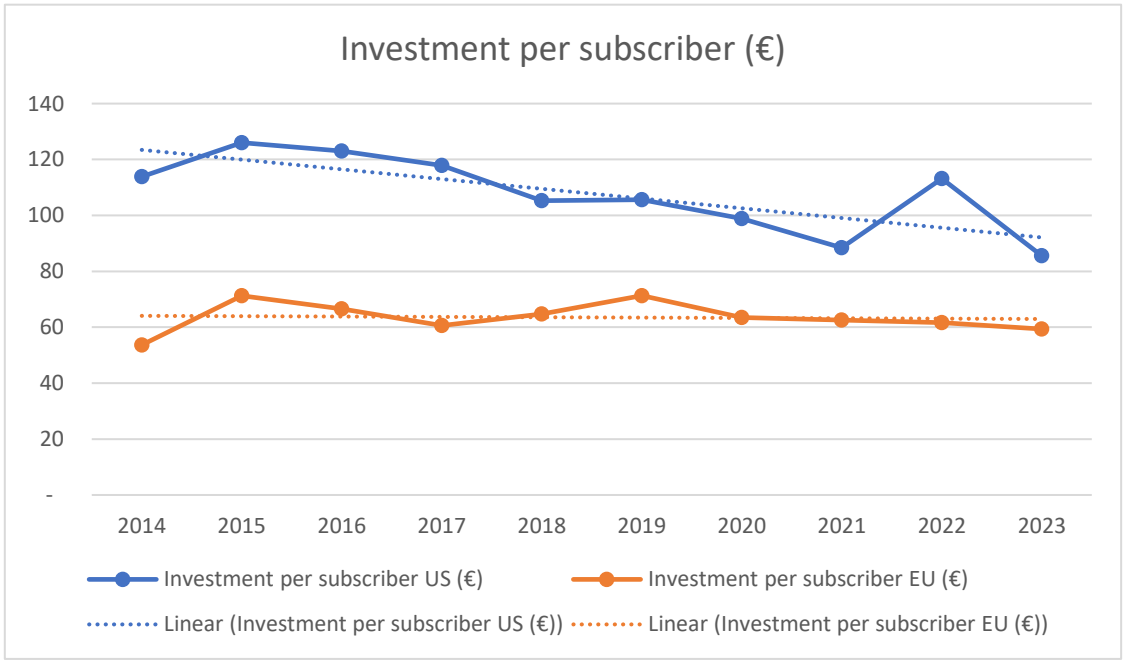
Source: own calculations based on annual reports

Investments and Capital Expenditure



Source: own calculations based on annual reports

A commonly discussed point, highlighted in the Letta report, is the significantly higher investment per user in the US compared to the EU. The ultimate source of this assertion that US firms invest more is the ETNO report (2023), based on elaborations by Analysys Mason on data from 2021, even before the Letta report. This perspective moves beyond the simple nominal value of Capex, which, as expected, has consistently been higher for US companies over the past decade due to the differing market sizes and profit levels. Instead, the focus is on "investment per subscriber." At first sight, our data corroborate their conclusions, showing an average expenditure per mobile subscriber of approximately €63.5 in the EU compared to €107.8 in the US.



Source: own calculations based on annual reports

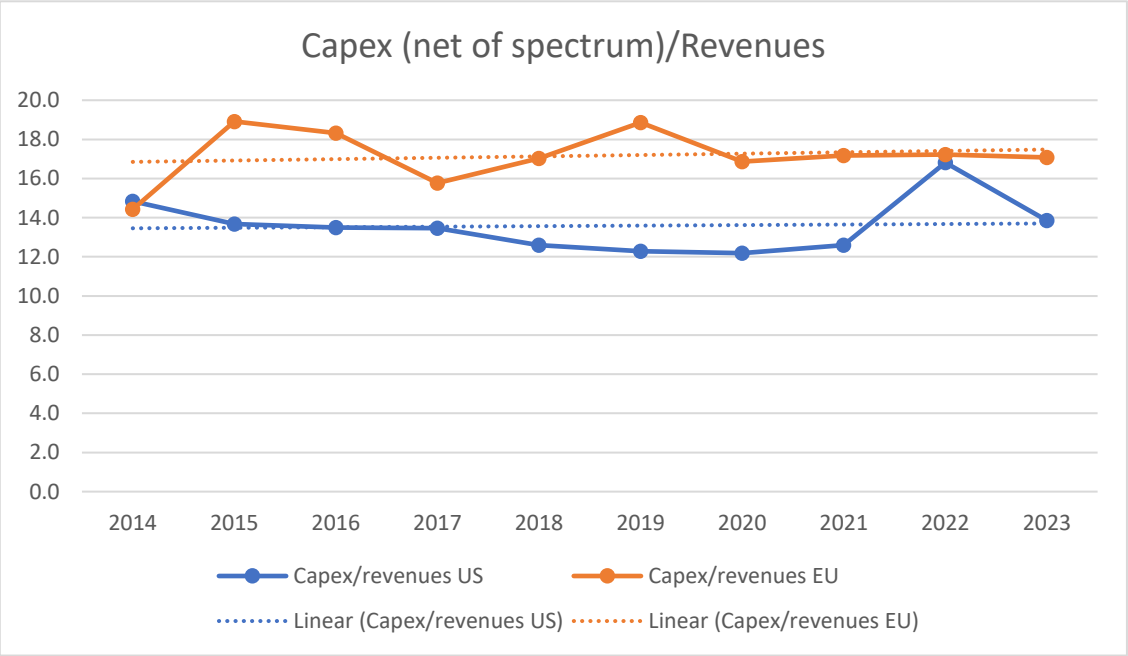
However, a considerable problem with this measure is how "subscribers" are defined. Operators across countries use various metrics to gauge their audience, such as accesses, connections, customers, or subscribers, each with nuanced meanings and measurement criteria. For our analysis, we focused on retrieving the number of "mobile subscriptions" from annual reports, defined as the number of active SIM cards.

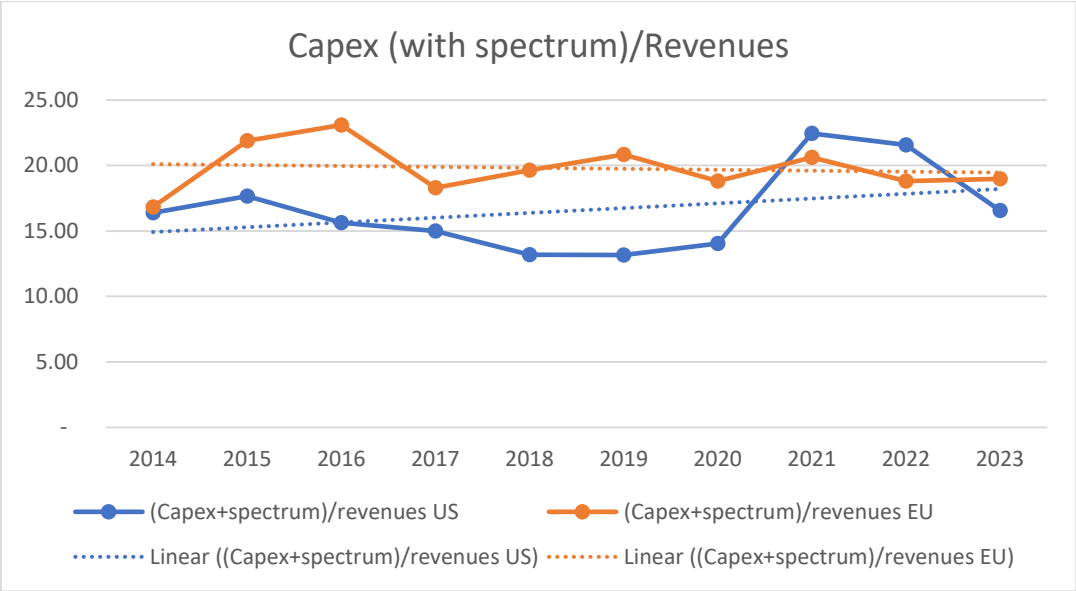
It is important to note that, as evidenced by the operator contracts terms, SIM cards in the US tend to expire sooner, typically after 3 months on average, compared to 6-12 months in Europe. This difference could inflate the count of "subscribers" in the EU, yielding a comparably higher number of SIM cards – and, consequently, more users – and resulting in a lower denominator in the investment per subscriber ratio.

Furthermore, lower mobile contract costs may encourage individuals to have multiple SIM cards, such as for personal tablets and other devices. This hypothesis is substantiated by a negative correlation between the mobile penetration rate and the cost of Internet (World Bank 2023 and Cable.co.uk 2023).

Lastly, the higher prevalence of Wi-Fi networks in public spaces in the United States compared to Europe (WiGLE 2024, World Economic Forum 2023) allows for additional personal devices to connect without requiring a SIM card.

Therefore, we prefer to focus on a different measure of investment, which is capital expenditure over revenues.

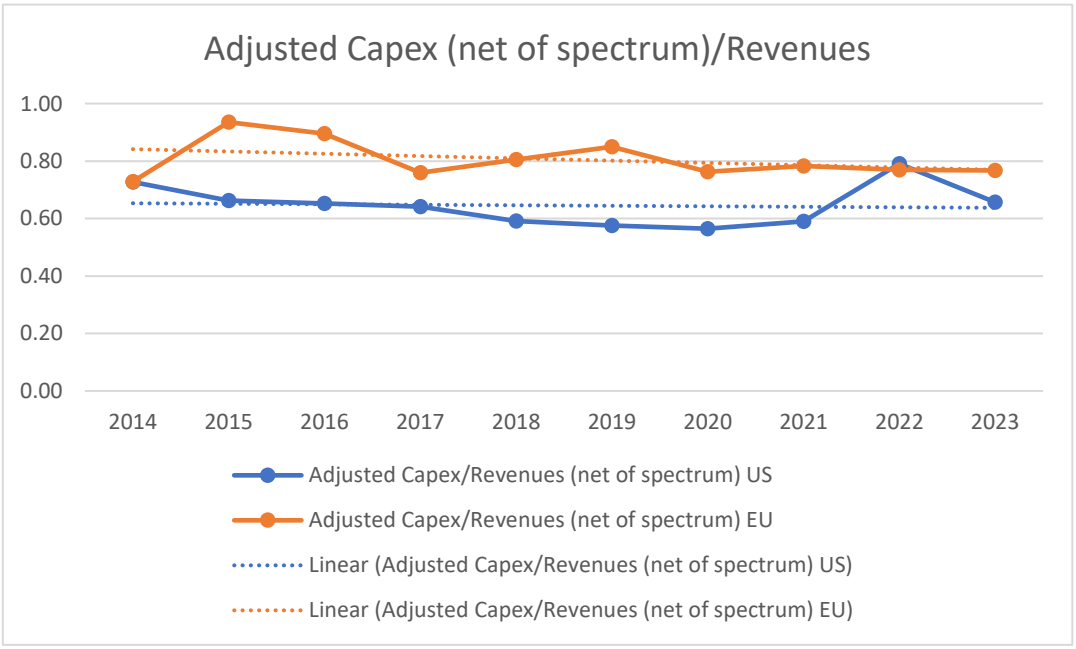




Source: own calculations based on annual reports

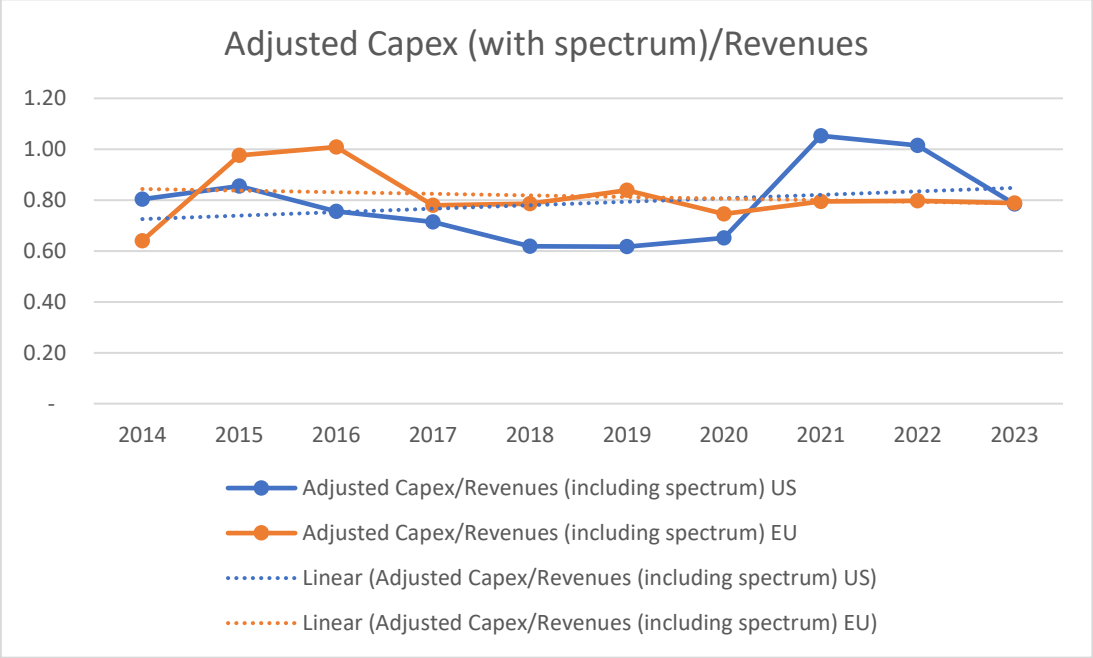
Contrary to mainstream thought, we found that European companies invest more than their US counterparts in terms of investment relative to revenues. This result is consistent in both scenarios: when expenditures for licenses and spectrum are included, and when net of these expenditures. Only in recent years has the US matched the European proportion, driven by a higher level of spectrum acquisitions. On average, capital expenditure as a percentage of revenues was 17.2% in Europe and 13.6% in the United States. When including expenses for licenses and spectrum, these percentages reached 19.8% and 16.6%, respectively.

Interestingly, these results remain valid even when revenues are deflated using GDP and capital expenditures are adjusted based on the annual level of Gross Fixed Capital Formation (GFCF): the adjusted ratio of Capex over Revenues remains higher in Europe compared to the United States.



Source: own calculations based on annual reports

This difference diminishes in the last year, favouring the United States, when the adjustment includes spectrum investments in the computation of capital expenditures. As previously mentioned, spectrum investments were comparably higher in the U.S. during recent periods.



Source: own calculations based on annual reports

Overall, except for the last observation, one explanation for this result that contradicts mainstream thinking is that higher competition may drive greater investment to maintain competitiveness, whereas operators in larger markets with less competitive pressure have lower incentives to invest.

3. Is mobile telecoms high tech?

The data on revenues shown so far already suggest that it would be a mistake to cite the mobile telecom sector as an example of a high-tech market with a high growth potential. Growth has been lacklustre. Moreover, the telecom operators themselves do not innovate. They do not undertake almost any research and development activities. Innovation (e.g. from G-4 to G-5) is provided by the manufacturers of equipment and phones. But the equipment makers sell on a global market. The fragmented EU market for the operators is thus irrelevant for the future of the few European suppliers of mobile communications equipment. The production of mobile phones has long disappeared from Europe.

Therefore, calling for European champions in mobile telecommunications would end up letting them dominate an oligopolistic market, while the necessity is of global champions that can compete on innovation in the area where there is rapid progress (equipment and software). We will delve deeper into these controversial aspects by focusing on the investing activities of the operators.

Conclusions

The data challenge the narrative that market fragmentation inherently stifles the mobile telecom sector in Europe. Instead, the evidence suggests that stronger competition in the fragmented European market leads not only to lower prices and higher data usage, benefiting consumers. Contrary to perceived wisdom, EU companies invest more than their US peers if one looks at the capex-to-revenue ratio, which is higher in Europe than in the US. The widely publicised data on investment per subscriber is misleading because of differences in market and the definitions of subscriber.

The broad conclusion is that it would be wrong to call for European champions in mobile telecommunications. These champions would end up dominating an oligopolistic market. Instead, Europe needs global champions that can compete on innovation in the area where there is rapid progress, namely the equipment for mobile telecommunications and the corresponding software.

Europe's focus should be on fostering global champions in mobile telecommunications equipment and software innovation, rather than consolidating operators into a few dominant entities.

Appendix

Mobile versus fixed telecommunication

A crucial factor to consider when analysing the telecommunications sector is the intrinsic difference between mobile and fixed telephony.

Fixed telephony exhibits pronounced economies of scale due to its infrastructure-intensive nature. Establishing a fixed-line network involves significant upfront capital expenditures on physical assets such as cables, telephone exchanges, and maintenance facilities. Once this infrastructure is in place, the cost of servicing additional customers is relatively low compared to the initial investment. This characteristic means that a single provider can spread the high fixed costs over a larger number of users, reducing the average cost per user and achieving substantial economies of scale. Consequently, it is often economically unfeasible for multiple providers to build duplicate networks in the same area, leading to a natural monopoly where one provider dominates the market. Furthermore, fixed telephony gains significant economies of scope because operators can offer multiple services using the same infrastructure, such as voice and broadband services over the same copper access network, reducing the overhead contribution from each individual service. These factors explain why, particularly in Europe, fixed telecommunications have long been dominated by state-owned companies.

In contrast, mobile telephony operates under different economies of scale due to its reliance on wireless technology. Mobile networks are composed of cell towers, base stations, and spectrum licenses, which involve substantial investment, but not with the same extensive physical infrastructure as fixed telephony: this infrastructure can be shared/rented, further reducing fixed costs, and allowing operators to serve more customers efficiently. The marginal cost of adding new customers to an existing mobile network is relatively low because the same network resources, such as cell towers and radio frequencies, can support many users, which allows multiple mobile operators to compete within the same geographic area, driving down costs and encouraging innovation; however, as the access network is not dedicated to individual subscribers, an increase in traffic on mobile networks may require further investment in the towers and frequencies network, partially reducing the economies of scale. Mobile operators buy licenses to use specific frequencies, and such licenses can be auctioned and traded.

Overall, the relative ease of entering the market and the ability to scale up the presence with lower fixed investments contribute to a competitive market environment in mobile telephony – supported by liberalizing regulation starting from the 90s, as the Commission Directive 96/19/EC of 13 March 1996 for the implementation of full competition in telecommunications markets – in contrast to the fixed telephony sector's natural monopoly due to its high infrastructure costs and the inefficiencies of multiple networks serving the same geographic area.

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