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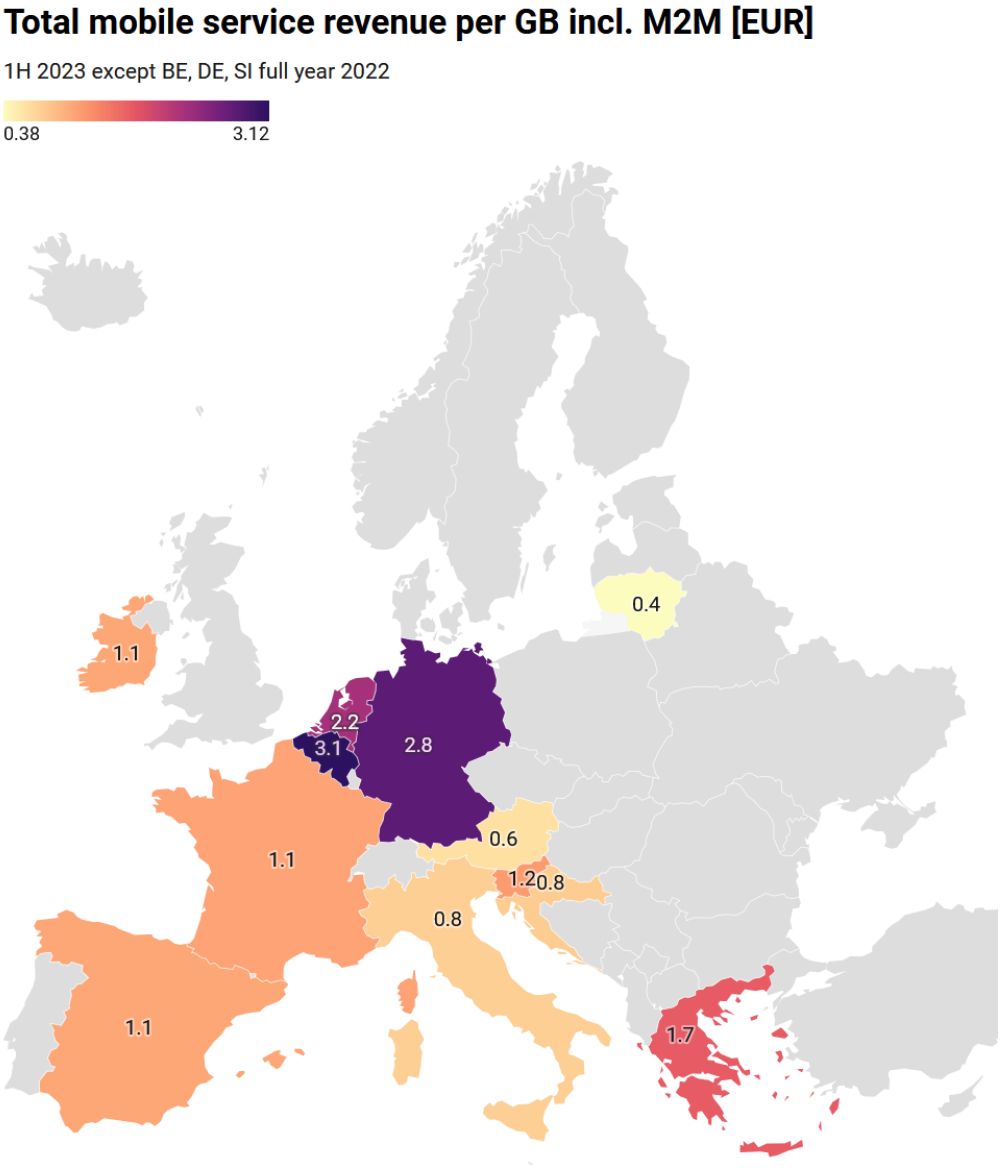
Analysis prepared for EETT, Hellenic Telecommunications & Post Commission

Assessment of Greece's mobile usage and revenue in an EU context



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Contents

1 Executive summary

This comprehensive analysis, commissioned by the Hellenic Telecommunications & Post Commission (EETT), marks a pioneering effort in comparing key mobile industry metrics, emphasising mobile revenues and data usage, across twelve Eurozone markets within the EU from 2017 to 2023. The data sources for this study are the official statistical reports from the respective national regulatory authorities (NRAs), including EETT and its counterparts.

The analysis derives its insights from actual usage patterns and revenues rather than focussing on the market's best offerings or theoretical service baskets. Careful consideration was given to selecting peer group countries to ensure robust data comparisons, minimising potential distortions such as currency fluctuations.

Revenue comparisons are meticulously conducted, both with and without adjustments for comparative price levels. Furthermore, to account for the potential influence of Machine-to-Machine (M2M) communications on the findings, comparisons are presented with and without M2M data where relevant.

Key findings highlight the following characteristics of the Greek mobile market:

- Mobile Average Revenue Per User (ARPU) is approximately on par but with a notable increase.
- Mobile data usage is low but exhibits the most significant growth.
- Voice usage is the highest among the peer group but continues to see robust growth.
- The total mobile revenue per gigabyte of mobile data is high but demonstrates a marked decrease.
- Voice revenue per mobile voice minute aligns with the median and experiences median erosion.
- In terms of value for money, Greece ranks weaker in data offerings compared to most of its peers but stronger than most in voice services.

In conclusion, Greek mobile subscribers appear to pay a standard monthly amount to their providers, although consuming relatively less data and more voice. Given that voice minutes are typically not billed per minute in today's market, the emphasis on value for money should shift towards mobile data, which remains primarily monetised per gigabyte.

Greece's value for money positioning within the peer group is among the weakest, comparable to countries like Belgium, Germany, and the Netherlands. However, Greece's trajectory shows promise, fuelled by the peer group's most rapid growth in data usage.

2 Background

This analysis is commissioned by the Hellenic Telecommunications & Post Commission, EETT, and is the first of its kind with focus on Greece.

There are mobile price benchmarks available globally but the drawback of these is that they compare the currently best available mobile plans sold to consumers online. Due to binding contracts and inertia, most mobile customers are however not on these mobile plans – but on older plans that typically are more expensive. Mobile customers may also pay extra for things like overage data, top-ups, special services and roaming – extras that are not included in the benchmarked monthly prices.

To add to it, such price benchmarks can effectively only assess the pricing on the online *consumer* market. What mobile *business* customers pay is often not public but negotiated directly between the mobile provider and the business in question. Within the consumer market, mobile providers might also have different propositions online than what they e.g. have in their stores or at retailers.

Another weak spot is that the *actual* usage of e.g. mobile data can't be benchmarked – the focus in instead on the maximum usage possible, i.e. the monthly data allowance. Mobile providers today sometimes inflate the monthly allowance to give a sense of better value for money.

To address this, this analysis is instead based on the actual usage of mobile subscribers and the actual revenues that mobile providers make.

The table below compares this analysis to a typical price benchmark.

	This analysis	Price benchmarks
Revenue/pricing	Actual retail revenues derived from mobile users	Best prices of mobile plans or baskets
Extras like top-ups and roaming	Included in actual retail revenues	Typically not included in captured prices
Segments	Consumer and business	Consumer
Channels	All	Typically online
Mobile data usage/allowance	Actual usage	Maximum monthly data allowance

Figure 1. Comparison of this analysis and price benchmarks [source: Tefficient]

As input, this analysis relies on officially reported data from twelve European national regulatory authorities (NRAs) and BEREC members:

- RTR, Austria
- BIPT, Belgium
- HAKOM, Croatia
- ARCEP, France
- Bundesnetzagentur (BNetzA), Germany
- EETT, Greece
- ComReg, Ireland
- AGCOM, Italy
- RRT, Lithuania
- ACM, the Netherlands
- AKOS, Slovenia
- CNMC, Spain

3 Peer group and methodology

Twelve EU countries, all today in the Eurozone, have been selected as the peer group for this analysis:

- Austria (AT)
- Belgium (BE)
- Croatia (HR)
- France (FR)
- Germany (DE)
- Greece (GR)
- Ireland (IE)
- Italy (IT)
- Lithuania (LT)
- Netherlands (NL)
- Slovenia (SI)
- Spain (ES)

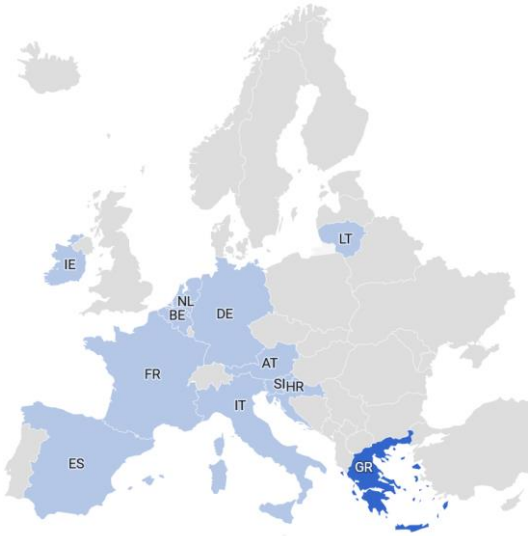

Figure 2. Peer group countries

The rationality for selecting these are:

- They are all EU countries, subject to a harmonised regulatory framework.
- They are all today[1] having the Euro as currency which eliminates the risk that currency fluctuations distort trends.
- The NRAs in these countries report the necessary statistics[2] on e.g. mobile data traffic and mobile service revenues.

[1] Croatia joined the Euro in 2023. For the 2017-2022 period, this analysis uses the average of the daily HRK-EUR exchange rate for each period as reported by ECB. Fluctuation was limited, in part because Croatia, to prepare, joined the ERM II arrangement of multilateral fixed, but adjustable, exchange rates in July 2020 [source]. During the Q1 2017-Q4 2022 non-Euro period in this analysis, the HRK-EUR fluctuation extremes were -1.9% (Q3 2019) and +0.6% (Q2 2020) [source] vs. the official conversion rate of 7.53450 EUR per HRK [source] set in July 2022 when the Council of the European Union approved Croatia's accession to the Eurozone.

The table below compares a few basic competitive and maturity indicators for our twelve peer group markets.

	Number of mobile network operators (MNOs)	Active mobile network sharing	MVNO share of mobile subscription base[3], June 2023	Share of households with 5G coverage from at least one MNO, 2022[4]
Austria (AT)	3	[5]No	n/a	92%
Belgium (BE)	3	Yes: Proximus and Orange	Dec 2022: 7%	30%
Croatia (HR)	3	No	n/a	82%
France (FR)	4	In some rural areas	n/a	89%
Germany (DE)	[6]3	In some rural areas	Dec 2022: [7]23%	93%
Greece (GR)	3	Yes: Vodafone and Nova	0%	86%
Ireland (IE)	3	No	4%	84%
Italy (IT)	[8]5	Yes: TIM and Vodafone	12%	100%
Lithuania (LT)	3	[9]No	2%	90%
Netherlands (NL)	3	No	12%	100%
Slovenia (SI)	4	No	6%	64%
Spain (ES)	[10]4	In cities with population <175k: Vodafone and Orange	10%	82%

Figure 3. Comparison of a few competitive and maturity indicators [source: DESI for 5G coverage, NRAs for MVNO base, Tefficient]

Greece has three MNOs, Cosmote, Vodafone, and Nova, but since Vodafone and Nova share mobile network, Greece just has two mobile networks. Within the peer group, only Belgium is in a similar position. The mobile network sharing agreement between Proximus and Orange in Belgium is however of much

[2] On a few occasions, NRA data with sufficient breakdown isn't available, or not available for the whole time period. If so, the graphs will leave that country out for the metric or period.
[3] Excluding M2M/IoT.
[4] Source European Commission DESI 2023 (data for 2022), rounded.
[5] The Austrian NRA TKK approved active 5G network sharing between Magenta and 3 on Jan 12th, 2024.
[6] A fourth German MNO, 1&1, opened its network for general mobile services in December 2023 past the studied period of this analysis.
[7] Includes service providers.
[8] Fastweb holds 5G frequency licenses in the 3.5 GHz and the 26 GHz bands and was declared Italy's fifth MNO by the government in 2019. Fastweb mainly relies on national roaming, though.
[9] An attempt by Tele2 and Bite to share networks in Lithuania and Latvia in 2019 did not materialise.
[10] A possible consolidation between Orange and Másmóvil is currently in process for regulatory approval in the EU. If this happens, certain frequency licenses will be taken over by Digi in Spain.

newer date[11] than that between Vodafone and Nova and much of the network integration is likely not yet done in Belgium.

Currently, there is no active mobile virtual network operator (**MVNO**) in Greece. In some of the peer group markets – Germany, Italy, the Netherlands, and Spain – MVNOs hold a 10% or higher market share of mobile subscriptions which suggest that competition stretches well beyond the facilities-based MNOs.

The final indicator in the table is the **5G household coverage**. Apart from Belgium and, to some extent, Slovenia, the EU reported DESI numbers are generally high with Greece positioned just below the median value of the peer group.

The table below shows why the remaining eight Eurozone countries in EU27 weren't selected for the peer group this time.

	NRA doesn't report the necessary statistics	Other
Cyprus	× mobile service revenue	
Estonia	× mobile service revenue	
Finland		Considered outlier: Extremely high mobile data usage[12]
Latvia		Considered outlier: Extremely high mobile data usage[13]
Luxembourg		Considered outlier: Low population, small land area
Malta		Considered outlier: Low population, small land area
Portugal	× total mobile service revenue[14]	
Slovakia	× mobile data traffic	

Figure 4. Reason to why other Euroland countries in EU27[15] weren't selected for the peer group this time [source: Tefficient]

By selecting only Eurozone countries among our peer group, we avoided the problem of currency fluctuations that have been vivid in the rest of Europe in the past two years. But although the currency, the Euro (EUR), is the same in all our twelve peer group markets, it does not mean that the purchasing power parity and **price levels** are comparable.

When we in this analysis compare revenues, we will hence make two comparisons:

- In EUR *without* compensation for the general comparative price level
- In EUR *with* compensation for the general comparative price level

[11] The agreement between Proximus and Orange was signed in 2019 but the Belgian Competition Authority dismissed competitor's Telenet's complaint as late as 30 January 2023.
[12] 42.8 GB per non-M2M subscription per month in 1H 2023, 5.9 times that of Greece
[13] 36.0 GB per non-M2M subscription per month in 2022, 5.9 times that of Greece
[14] The mobile share of fixed-mobile converged revenue isn't reported.
[15] The remaining EU27 countries Bulgaria, Czechia, Denmark, Hungary, Poland, Romania, and Sweden are excluded for not being in the Eurozone.

The general comparative price levels are defined by Eurostat as:

> Comparative price levels are the ratio between Purchasing power parities (PPPs) and market exchange rate for each country. PPPs are currency conversion rates that convert economic indicators expressed in national currencies to a common currency, called Purchasing Power Standard (PPS), which equalises the purchasing power of different national currencies and thus allows meaningful comparison. The ratio is shown in relation to the EU average (EU27_2020 = 100). If the index of the comparative price levels shown for a country is higher/lower than 100, the country concerned is relatively expensive/cheap as compared with the EU average.

The compensation in this analysis is done using Eurostat's values, reported per annum.

Figure 5 compares the latest available, 2022, comparative price levels. The values shown are a ratio in relation to the EU27 average – a value of 100 would mean a comparative price level exactly as the EU27 average. Since the value for 2023 isn't available yet, the 2022 value has in this analysis been used also for the first half of 2023. The variation between two consecutive years is typically small.

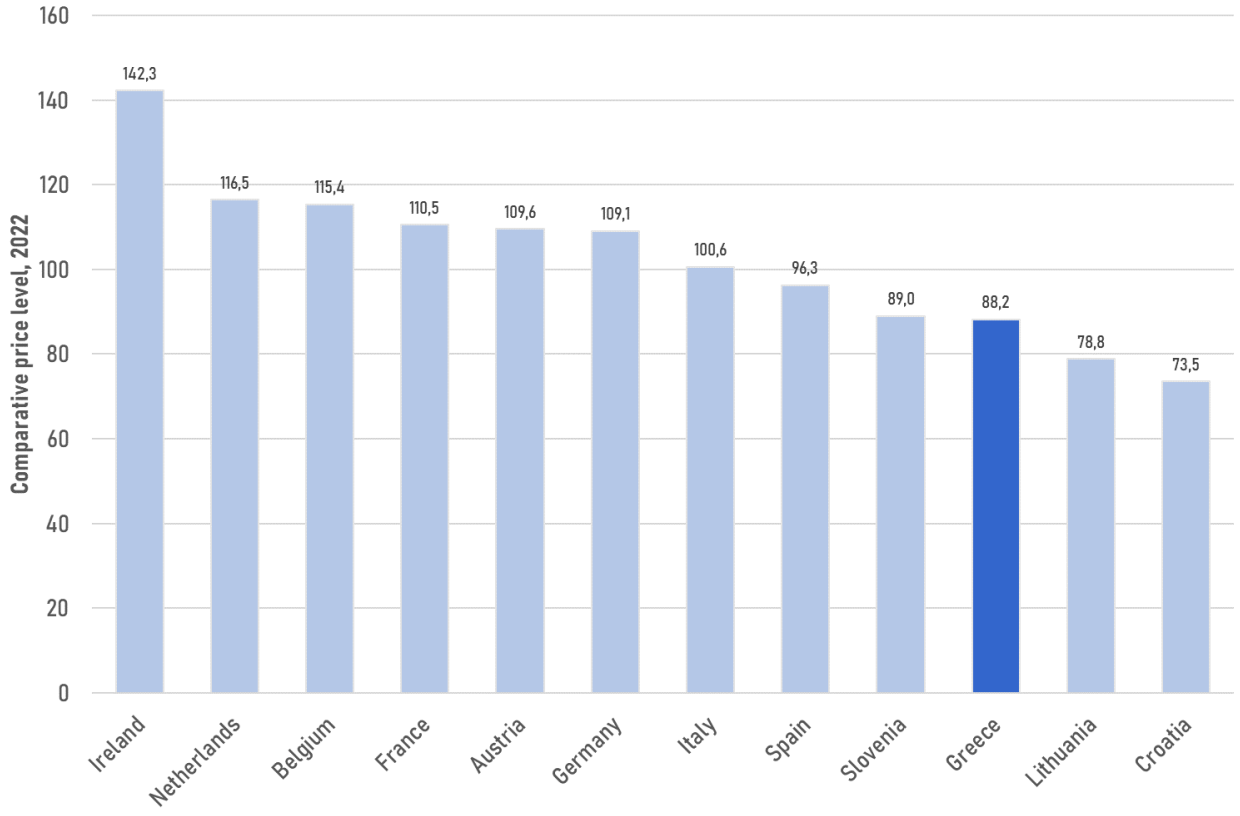

Figure 5. Comparison of the comparative price levels in 2022 for the peer group countries [source: Eurostat, 10 Jan 2024]

Greece had a comparative price level of 88.2 in 2022, meaning that Greek general prices are lower than the EU27 average of 100. Ireland had the highest comparative price level, 142.3. Two peer group countries had a lower comparative price level than Greece: Lithuania and Croatia.

The logic of compensating for the general comparative price level is to take purchasing power parities into account. In a country with high comparative price level, like Ireland, it could logically be expected that the mobile revenues would be high – since the purchasing power parity, and hence the general comparative price level, are high.

In contrast, in a country with low comparative price level, like Croatia, it could logically be expected that the mobile revenues would be low – since the purchasing power parity, and hence the comparative price level, are low.

The comparative price level is calculated on a generic basket of goods and services in a harmonised way across EU countries – but should still be regarded as indicative. Since we in this analysis always make comparisons both with and without compensation for the comparative price level, the reader can easily see what impact the adjustment has.

When interpreting Greece's outcome, the analysis most often refers to the median value among the peer group. Alternatively, averages could have been calculated, but since country outliers with very high or very low values would impact an average value significantly, we have selected the median as the baseline of this analysis.

4 Observed data issues and assumptions

4.1 Reporting of different NRAs has different frequency

In an ideal world, the reporting of official telecommunication statistics would be synchronised, but the reality is that the reporting frequency is different. The table below shows how frequently reporting happens – once a year (1), twice a year (2) or every quarter (4).

	Reporting frequency per year, subscriptions and traffic (usage)	Reporting frequency per year, revenue
Austria (AT)	4	4
Belgium (BE)	1	1
Croatia (HR)	4	4
France (FR)	4	4
Germany (DE)	1	1
Greece (GR)	2	2
Ireland (IE)	4	4
Italy (IT)	[16]4	1 – possibly 4 from Q2 2023
Lithuania (LT)	4	4
Netherlands (NL)	4	4
Slovenia (SI)	4	1
Spain (ES)	4	4

Figure 6. Comparison of the reporting frequency of NRA statistics for the peer group countries [source: Tefficient]

To make the most out of this, we have chosen to compare the **subscription and traffic (usage) metrics** for Austria, Croatia, France, Greece, Ireland, Italy, Lithuania, the Netherlands, Slovenia, and Spain **on a half-yearly basis** – whereas we can only compare Belgium and Germany **on an annual basis**.

Some countries – Slovenia and, until recently, Italy[17] – have a different frequency for the reporting of subscriptions and traffic than the reporting of revenue. This means that **revenue metrics** can't be

[16] Voice traffic is only reported annually, though.

calculated for half years even though usage metrics can. Slovenia will therefore join Belgium and Germany to only have annual values in the revenue metrics.

4.2 M2M data traffic can't be excluded from the total mobile data traffic in all countries

Among our peer group, only two national regulatory authorities (NRAs) report the M2M (sometimes referred to as IoT) data traffic: Greece and Austria[18]. Belgium did it previously but stopped it from 2021.

The remaining nine countries – Croatia, Germany, France, Ireland, Italy, Lithuania, the Netherlands, Slovenia, and Spain – are not reporting M2M data traffic. For these countries, the M2M data traffic could obviously not be excluded, and the calculated average mobile data usage per non-M2M subscription might hence be slightly overstated.

The error is likely small, though. If using Greece's figures for the first half of 2023, the average mobile data usage per non-M2M subscription was 7.26 GB per month when excluding the M2M data traffic. If not excluding it, it would be 7.28 GB per month, an exaggeration of just 0.2%. The other country among the peer group that reports M2M traffic is Austria. With its high mobile data usage, the exaggeration there would be even less: 0.02% in 1H 2023. To get a few more samples, we must temporarily leave our selected peer group: For Sweden, the exaggeration would be 0.5% and for Norway 1.1% – in both cases for the first half of 2023.

This is not an issue when calculating the mobile data usage per any subscription, including M2M.

4.3 M2M revenue can't be excluded from the total mobile revenue in all countries

Among our peer group, five NRAs report the M2M revenue: Greece, Belgium, France, Ireland, and Lithuania.

The remaining seven countries – Austria, Croatia, Germany, Italy, the Netherlands, Slovenia, and Spain – are not reporting M2M revenue. For these countries, the M2M revenue could obviously not be excluded, and the calculated revenue per non-M2M subscription might hence be slightly overstated.

The error is likely small, though. If using Greece's figures for the first half of 2023, the average revenue per non-M2M subscription was 12.24 EUR per month when excluding the M2M revenue. If not excluding it, it would be 12.37 EUR per month, an exaggeration of 1.1%. The exaggeration in Belgium would be 2.0% for 2022, for France 1.1%, for Ireland 1.7% and for Lithuania 1.1% – the three last countries for 1H 2023.

This is not an issue when calculating the revenue per any subscription, including M2M.

[17] Italy introduced quarterly reporting of mobile service revenue from 1H 2023 with an historcial value for 1H 2022. The reported half-year values however seem to be too high to match with the previous annual reporting of revenue. Tefficient will monitor this going forward; it could be that the new reporting goes beyond retail revenues to include also wholesale which this analysis strives to exclude.
[18] Since the second half of 2022.

4.4 Mobile voice revenue not reported for all countries – and is it comparable?

Among our peer group, six NRAs report mobile voice revenue on top of the voice traffic in minutes: Greece, Croatia, Ireland, Italy, Lithuania, and Spain.

Five NRAs report the voice traffic only: Austria, Belgium, Germany, France, and the Netherlands. Slovenia does not report either of the two.

This analysis contains two voice related metrics: The average voice usage per voice subscription and the voice revenue per minute. The latter will only have values from the mentioned six countries. That is already a limited peer group, but in addition we'd like to warn about reading too much into it.

Here's why: Most mobile subscriptions – at least in the postpaid domain – are in Europe today sold with an unlimited number of voice minutes (and SMSs[19]). Most often, the price-determining parameter is instead **how much mobile data** a subscription includes. Due to this, no mobile provider can today with certainty say how much of the total mobile revenue that originates from voice. The end-user most often pays a given amount per month regardless of the number of voice minutes consumed. Mobile providers can at best *estimate* what share of the total mobile revenue that comes from voice. Since the NRA statistics are dependent on the data quality of the reporting mobile providers, it's a risk that the mobile voice revenue is not reported in a comparable way between countries.

Another factor that can disturb the comparability of the voice revenue per minute metric is that much voice usage today takes place in various communication apps like e.g. WhatsApp, Messenger, and Teams. In some European markets, the usage is believed to be significant, but it's not part of the voice minutes reported by NRAs. High usage of voice apps – rather than traditional telephony – could lead to that the calculated voice revenue per minute becomes artificially high.

[19] For similar reasons as with voice, i.e. most often not monetised per unit (SMS/MMS), difficulty for providers to say how much of the revenue originates from SMS/MMS and a very high use of messaging apps rather than SMS/MMS in certain countries, this analysis does not contain a comparison of SMS/MMS usage or revenue.

5 Mobile ARPU

5.1 Unadjusted

5.1.1 Excluding M2M

This analysis has used reported official data from the respective NRAs to calculate the average service revenue per mobile subscription[20] per month – normally referred to as **ARPU** within the industry. Figure 7 below shows the ARPU in EUR including all 'human' mobile subscriptions – regular and data-only (mbb) – but excluding M2M subscriptions.

Both postpaid and prepaid subscriptions are included from both consumer and business segments. Only active prepaid subscriptions are included when reported. In Greece's case, an active prepaid subscription has generated retail or wholesale revenue in the last quarter. Other NRAs could have slightly different definitions.

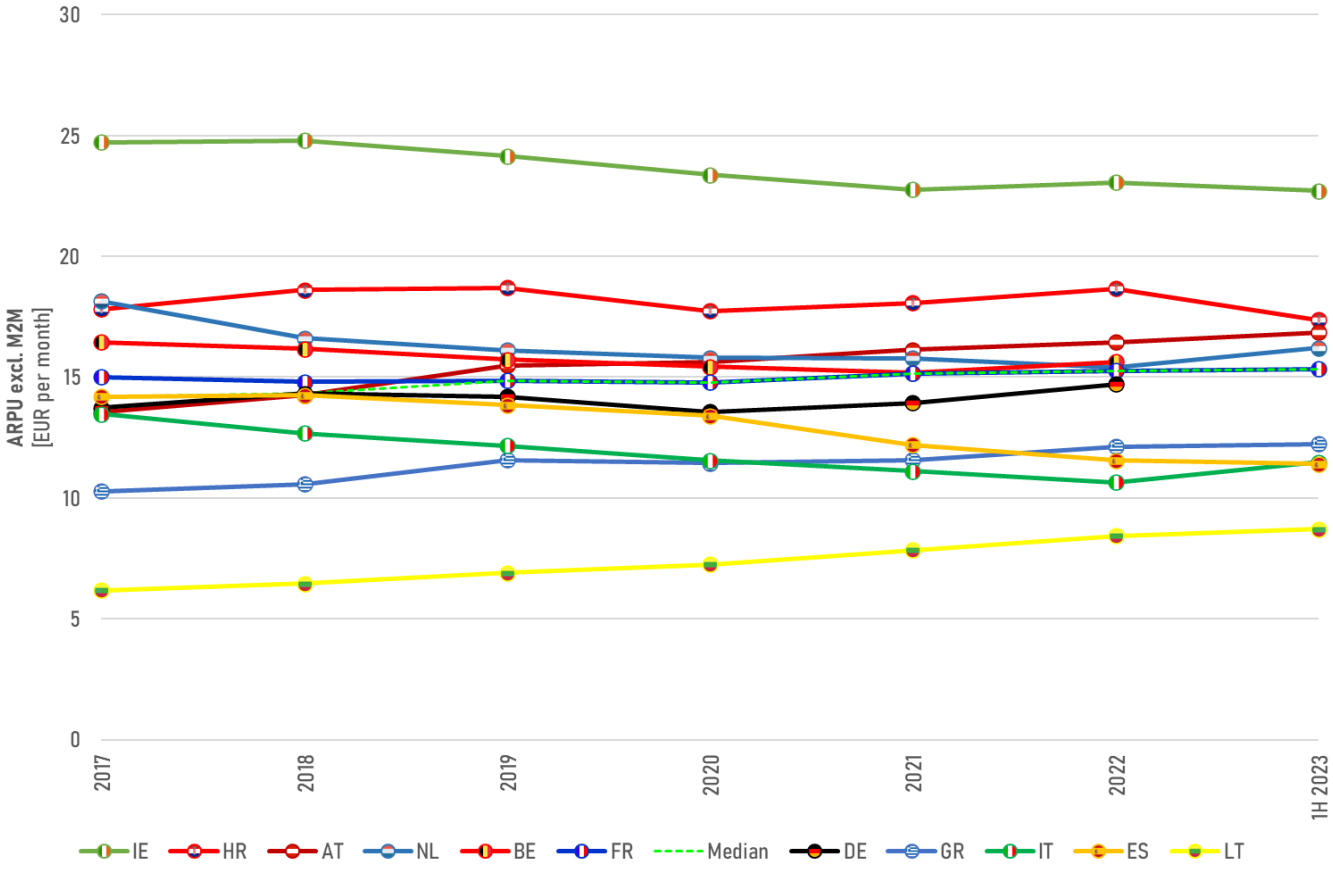

Figure 7. Comparison of mobile ARPU excl. M2M [source data: respective NRA, compiled by Tefficient].

[20] Average number of subscriptions in the period calculated as AVERAGE(number of subscriptions at the start of the period; number of subscriptions at the end of the period).

We have yet to compare the ARPU to the usage levels – see section 10 and 11 – but first point to that **Ireland** always have had the highest ARPU, 22.7 EUR in 1H 2023, when excluding M2M. Since Ireland has the highest comparative price level, see Figure 5, that position is perhaps not surprising. But that it is Croatia that features the second highest ARPU, 17.4 EUR in 1H 2023, is much more of a surprise as Croatia has the lowest comparative price level in Figure 5. When we later adjust for that, it will elevate Croatia.

The ARPU of **Greece** was 12.2 EUR in 1H 2023 which is lower than the median. Note that the last median position, for 1H 2023, is calculated based on the latest available number, here 1H 2023 for all countries – except Belgium and Germany where the latest data is for 2022. This is valid throughout the analysis and is necessary not to lose the impact from the annually reported countries.

As mentioned in section 4.1, the 1H 2023 revenue of Italy is likely overstated in comparison to how it previously was stated for the full years. Given the competitive nature of the Italian market, it's likely that the ARPU deterioration seen since 2017 would continue into 2023.

Since we have different reporting frequency for different countries, we have selected to compare the long-term trends by calculating the compound annual growth rate (CAGR) from 2017 to 2022 and for 1H 2017 to 1H 2023.

Mobile ARPU excl. M2M	AT	BE	HR	FR	DE	GR	IE	IT	LT	NL	SI	ES	Median
CAGR 2017-2022	+4%	-1%	+1%	0%	+1%	+3%	-1%	-5%	+6%	-3%	n/a	-4%	0%
CAGR 1H 2017-1H 2023	+4%	n/a	+1%	0%	n/a	+3%	-1%	n/a	+7%	-2%	n/a	-3%	+1%

Figure 8. Comparison of the CAGR for mobile ARPU excl. M2M 2017-2022 and 1H 2017-1H 2023 [source data: respective NRA, compiled by Tefficient]

Since Slovenia does not report its M2M subscription base, it's not possible to calculate metrics excluding M2M.

Greece is among the 5 countries (of 11) that had a positive 2017-2022 CAGR in its ARPU. **Lithuania** has had the best ARPU development, +6%, whereas **Italy** has had the worst, -5%.

Greece's revenue per mobile subscription excluding M2M is, before compensation for the comparative price level, below the median.

Greece had a positive CAGR in the ARPU – only Austria and Lithuania had faster growth.

5.1.2 Including M2M

Does the picture change when we include also M2M subscriptions? In some countries, the M2M base grows very quickly, and an associated problem is that M2M subscriptions might well be registered in one country but used somewhere else in the world, e.g. sitting on a shipping container or a cargo wagon.

Figure 9 below shows the ARPU in EUR including *all* mobile subscriptions – regular, data-only (mbb) and M2M subscriptions. It looks quite different compared to Figure 7.

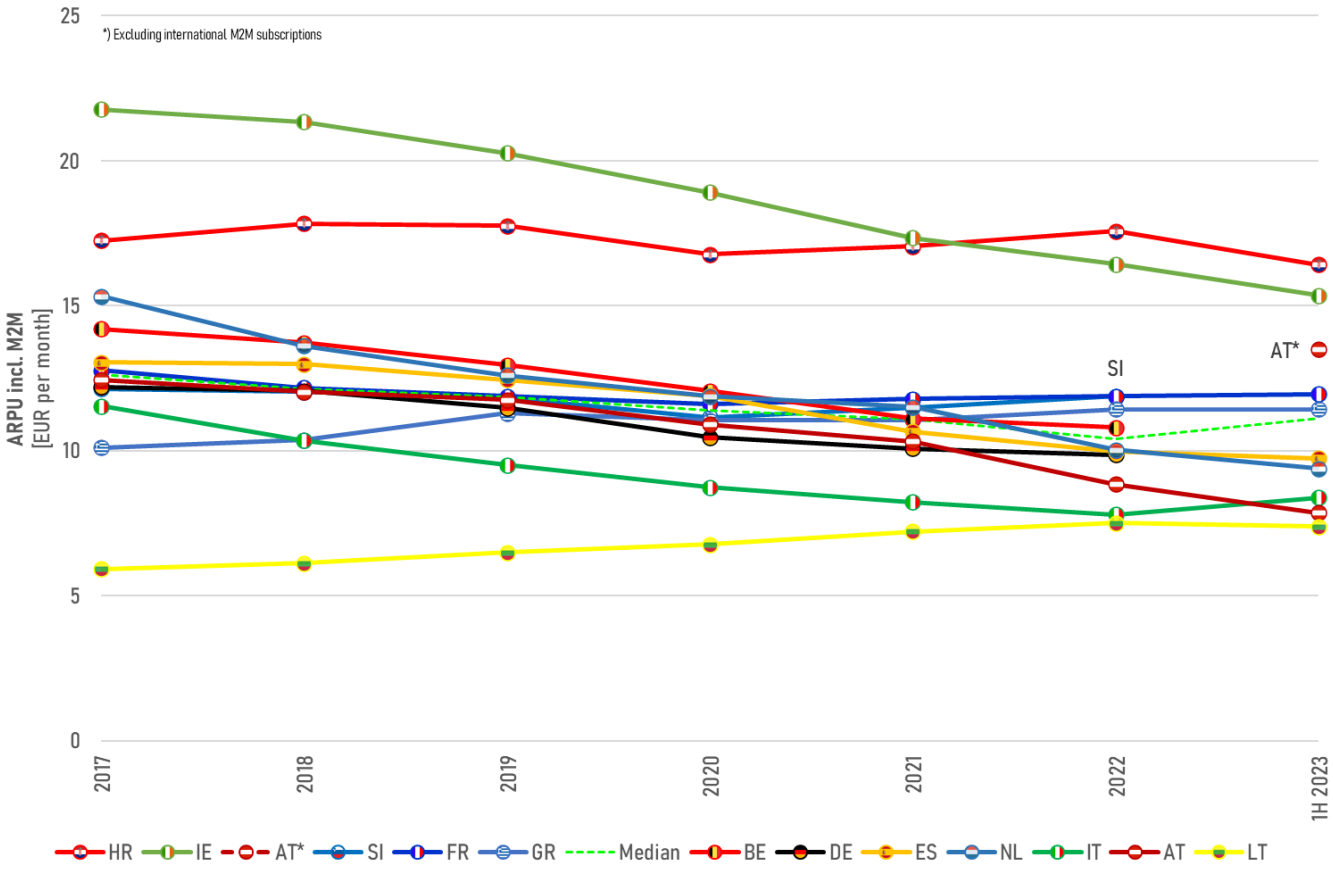

Figure 9. Comparison of mobile ARPU incl. M2M [source data: respective NRA, compiled by Tefficient].

When including M2M, it's **Croatia** that leads in ARPU with 16.4 EUR in 1H 2023. This is surprising, especially given that its Croatia that has the lowest overall comparative price level, see Figure 5. When we later adjust for that, it will elevate Croatia further.

Ireland has high ARPU level too, but its fast growth in M2M subscriptions means that the Irish ARPU has fallen quickly. Also **Austria** has experienced fast growth in its M2M subscriptions base and if including all M2M subscriptions, Austria's ARPU was the second lowest in 1H 2023, just 7.9 EUR. Since many international M2M SIMs are homebased in Austria, the local NRA, RTR, has recently started to break out how many of these that were used in Austria. The upper, AT*, position starting in 1H 2023 shows the ARPU if excluding those international M2M SIMs. Calculated that way, the Austrian ARPU was 13.5 EUR in 1H 2023.

The ARPU of **Greece** was 11.4 EUR in 1H 2023 which is slightly higher than the median[21].

As mentioned, the 1H 2023 revenue of Italy is likely overstated in comparison to how it previously has been stated for the full years. Given the competitive nature of the Italian market, it's likely that the ARPU deterioration seen since 2017 would continue into 2023.

The growth in M2M subscription bases makes the CAGR look worse compared to when excluding M2M.

Mobile ARPU incl. M2M	AT	BE	HR	FR	DE	GR	IE	IT	LT	NL	SI	ES	Me-dian
CAGR 2017-2022	-7%	-5%	0%	-1%	-4%	+2%	-5%	-8%	+5%	-8%	0%	-5%	-5%
CAGR 1H 2017-1H 2023	-8%	n/a	0%	-1%	n/a	+2%	-6%	n/a	+5%	-8%	n/a	-5%	-3%

Figure 10. Comparison of the CAGR for mobile ARPU excl. M2M 2017-2022 and 1H 2017-1H 2023 [source data: respective NRA, compiled by Tefficient]

Of the twelve countries, only two – **Lithuania and Greece** – had growth in the ARPU during 2017-2022.

Greece's revenue per mobile subscription including M2M is, before compensation for the comparative price level, slightly above the median.

Greece and Lithuania are the only two countries with positive CAGR in the ARPU during 2017 to 2022.

[21] For Austria, the value excluding international M2M subscriptions (AT*) is used in the median from 1H 2023 throughout this analysis. In 2017 to 2022, since the AT* values aren't available, the AT values (including international M2M subscriptions) have to be used as input to the median. This applies only to the graphs including M2M.

5.2 Adjusted to the comparative price level of Greece

5.2.1 Excluding M2M

Let's now adjust for the comparative overall price level as described in section 3. But before looking at the outcome, let's show how the adjustments have been made:

How the price level adjustments were calculated

Figure 5 shows that the comparative price level in Austria, relative to EU27's 100, was 109.6 in 2022. The comparative price level in Greece was 88.2. When we adjust Austria to the comparative price level of Greece, we first divide 109.6 with 88.2 and get a quota of 1.25. In other words, the comparative price level of Austria is 1.25 times that of Greece. To adjust an Austrian mobile revenue value to the overall comparative price level of Greece, we then divide with 1.25.

	AT	BE	HR	FR	DE	GR	IE	IT	LT	NL	SI	ES
Divider to Greek price level	1.25	1.30	0.82	1.25	1.24	1.00	1.66	1.14	0.89	1.33	1.03	1.10

Figure 11. Divider to Greek comparative price level, 2022 [source data: Eurostat, compiled by Tefficient]

The table shows the dividers for 2022. Previous years have slightly different values based on Eurostat's annual revision. As previously mentioned, since the 2023 values are not yet available, 2022 values have been used also for the first half of 2023.

Figure 12 below shows the outcome when differences in the comparative price levels – relative to Greece's level – have been applied to Figure 7.

The lines of the countries with a divider smaller than 1, i.e. Croatia and Lithuania, will move upwards after the adjustment whereas the countries with a divider larger than 1 will move downwards. Greece's line will not move at all as we are adjusting the other countries to the level of Greece.

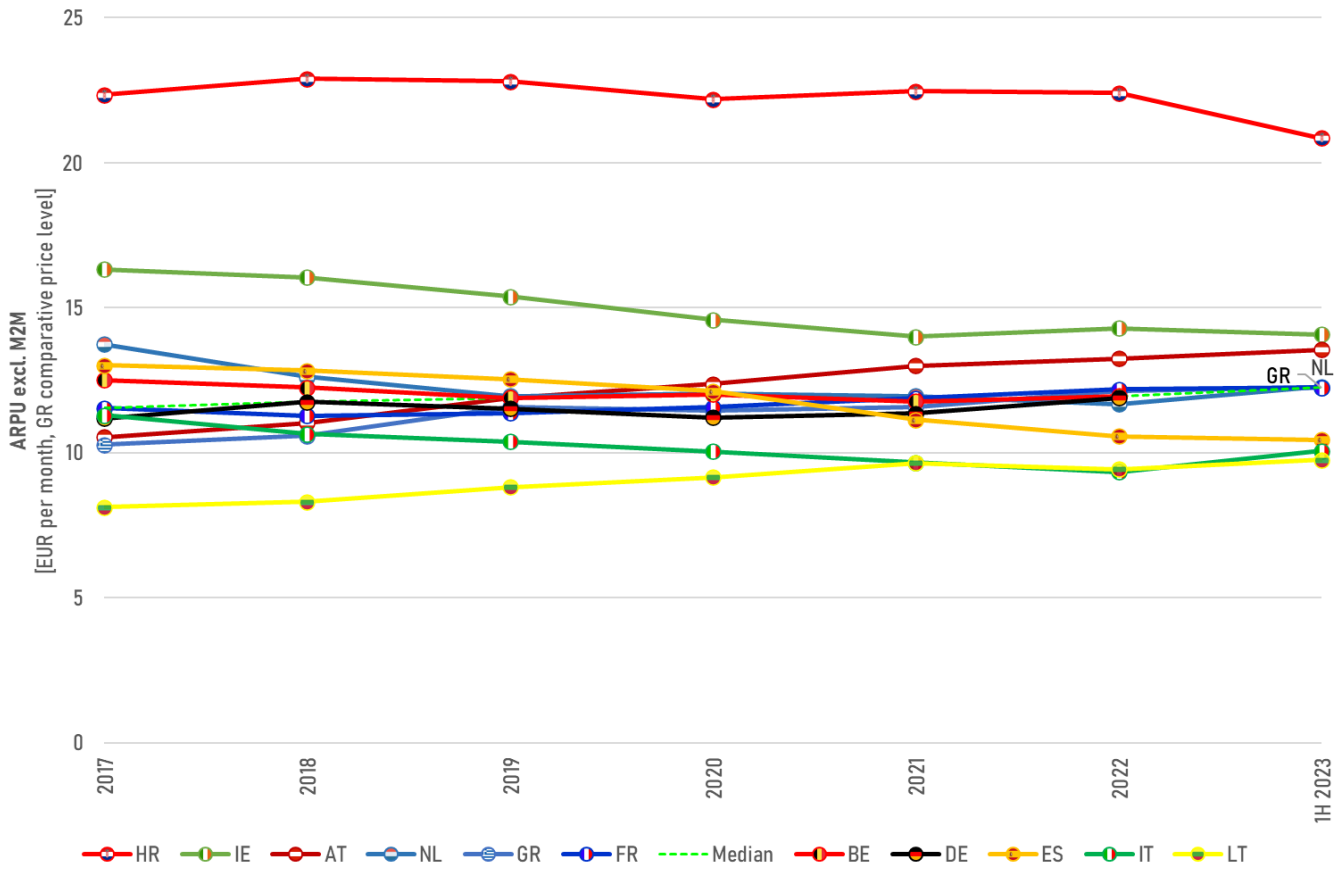

Figure 12. Comparison of mobile ARPU excl. M2M[22], adjusted for comparative price level [source data: respective NRA, Eurostat, compiled by Tefficient].

After adjustment to the comparative price level of Greece, **Croatia** got the highest ARPU whereas **Ireland**, with its high comparative price level, fell significantly compared to Figure 7.

The ARPU of **Greece** was 12.2 EUR in 1H 2023 which is just marginally higher than the median.

We do not repeat the CAGR calculations for the adjusted case as it would be affected by Eurostat's annually revised figures on comparative price level. We hence repeat the conclusion on CAGR from the unadjusted case.

Greece's revenue per mobile subscription excluding M2M is, after compensation for the comparative price level, at the median.

Greece had, alongside five other countries, a positive CAGR in the ARPU from 2017 to 2022.

[22] As mentioned in section 4.1, the 1H 2023 revenue of Italy is likely overstated in comparison to how it previously has been stated for the full years. Given the competitive nature of the Italian market, it's likely that the ARPU deterioration seen since 2017 would continue in 2023.

5.2.2 Including M2M

Figure 13 below shows the outcome when differences in the comparative price levels – relative to Greece's level – have been applied to Figure 9.

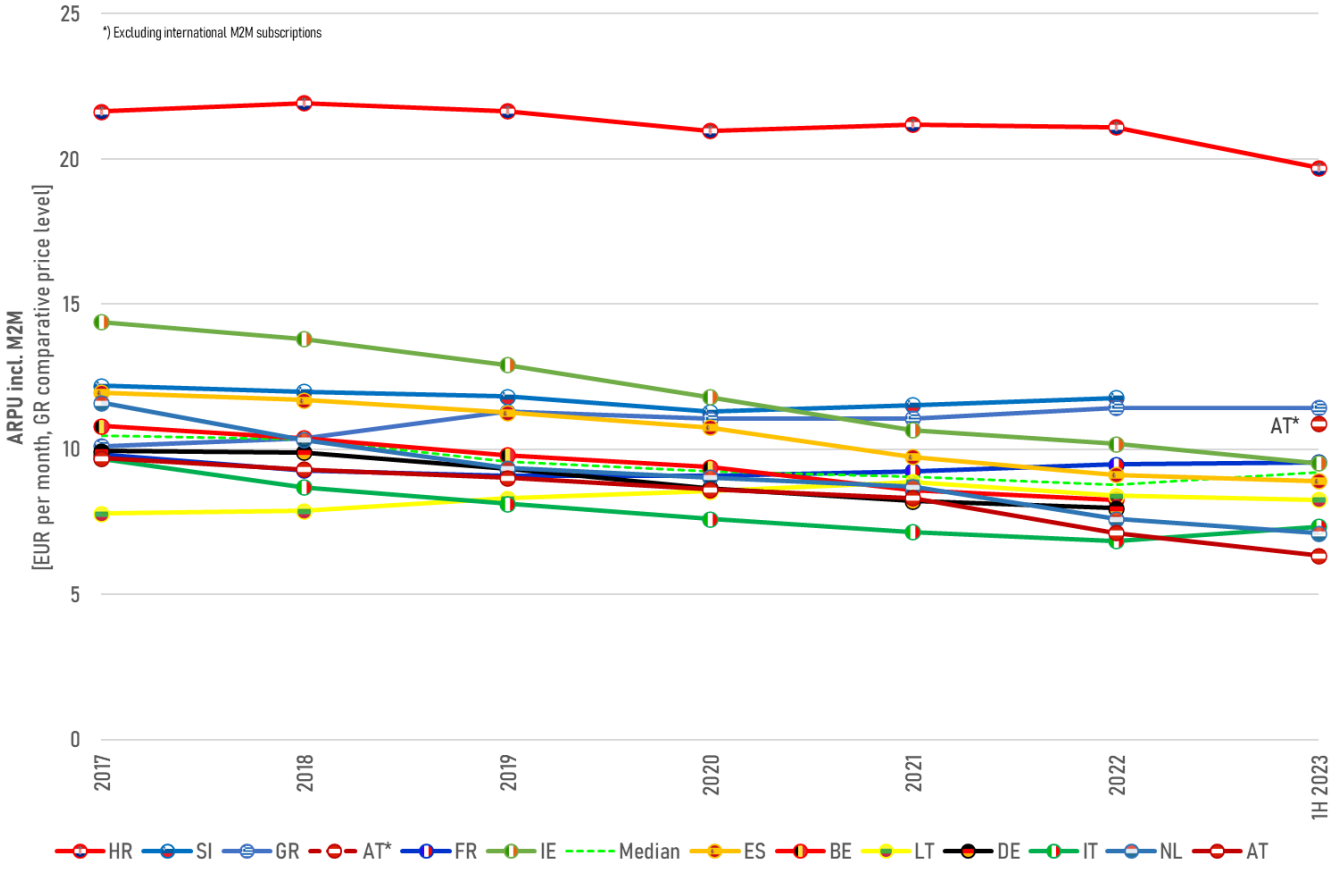

Figure 13. Comparison of mobile ARPU[23] incl. M2M, adjusted for comparative price level [source data: respective NRA, Eurostat, compiled by Tefficient].

As predicted, the adjustment elevated **Croatia**'s line significantly and its lead in ARPU is now much higher than in Figure 9.

The ARPU of **Greece** was 11.4 EUR in 1H 2023 which is higher than the median.

Also here, we do not repeat the CAGR calculations for the adjusted case as it would be affected by Eurostat's annually revised figures on comparative price level. We hence repeat the conclusion on CAGR from the unadjusted case.

[23] As mentioned, the 1H 2023 revenue of Italy is likely overstated in comparison to how it previously has been stated for the full years. Given the competitive nature of the Italian market, it's likely that the ARPU deterioration seen since 2017 would continue in 2023.

Greece's revenue per mobile subscription including M2M is, after compensation for the comparative price level, above the median.

Greece and Lithuania are the only two countries with positive CAGR in the ARPU during 2017 to 2022.

6 Mobile data usage per subscription

6.1 Excluding M2M

We have just concluded our comparison of mobile ARPU and seen significant differences between our peer group countries. Let's now start assessing what mobile users consume for that ARPU by comparing the **average mobile data usage per subscription per month**. As mentioned in section 4.4, the price of most mobile contracts in Europe are today essentially defined by the amount of inclusive data.

The differences in mobile data usage are substantial, see Figure 14.

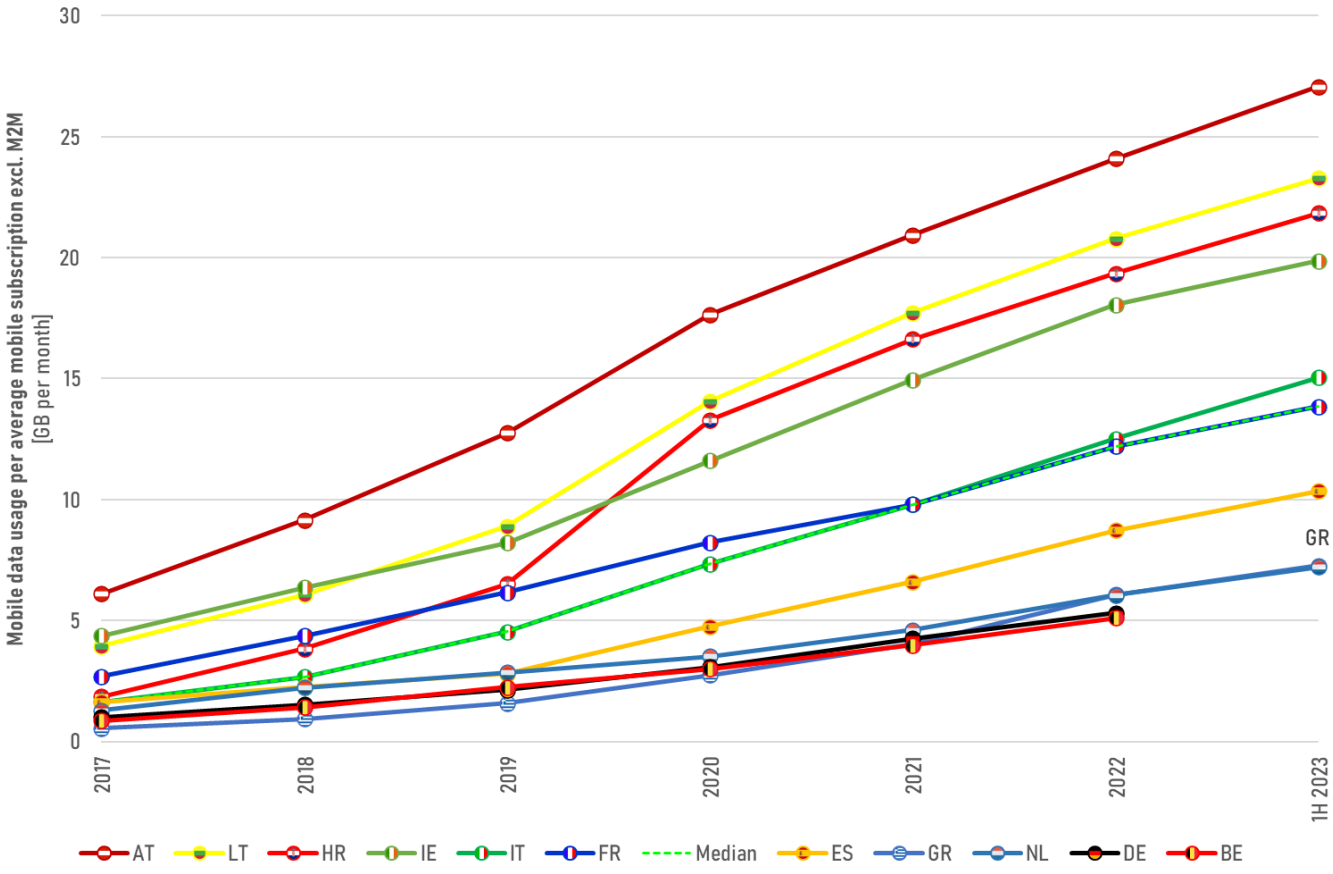

Figure 14. Comparison of the average monthly mobile data usage per subscription excl. M2M [source data: respective NRA, compiled by Tefficient].

Throughout the comparison period, **Austria** had the highest mobile data usage among the peer group. In the first half of 2023, it was 27.1 GB per non-M2M subscription per month. **Lithuania** had the second highest usage, 23.3 GB per month in 1H 2023, followed by **Croatia** with 21.8 GB.

The usage level of **Greece** is much lower, 7.3 GB per month in the first half of 2023 [in the graph hiding behind the Netherlands both for 2022 and for 1H 2023]. Until 2020, Greece had the lowest usage among the peer group, but has since overtaken Belgium, Germany, and the Netherlands.

Is this growth reflected in the compound annual growth rate (CAGR) from 2017 to 2022?

Mobile data usage excl. M2M	AT	BE	HR	FR	DE	GR	IE	IT	LT	NL	SI	ES	Me-dian
CAGR 2017-2022	+32%	+43%	+60%	+35%	+39%	+62%	+33%	+50%	+39%	+36%	n/a	+40%	+37%
CAGR 1H 2017-1H 2023	+31%	n/a	n/a	+36%	n/a	+67%	+31%	+49%	+39%	+38%	n/a	+40%	+36%

Figure 15. Comparison of the CAGR for mobile data usage excl. M2M 2017-2022 and 1H 2017-1H 2023 [source data: respective NRA, compiled by Tefficient]

All countries[24] have experienced strong growth in the mobile data usage during 2017-2022, but it is **Greece** that had the fastest growth, **62%**. Albeit from the peer group's lowest level, but still. During 1H 2017-1H 2023 too Greece had the highest CAGR of available countries, **67%**.

Greece's mobile data usage per subscription excluding M2M is below the median.

Greece had the fastest CAGR in the mobile data usage.

One driver for high average mobile data usage is **data-only** (or mbb) subscriptions. These SIMs are typically sitting in e.g. routers, mobile hotspots, PCs, or tablets. Since they might serve a whole household with Internet – or data-hungry large screen devices as PCs and tablets – the average mobile data usage of these data-only subscriptions is typically much higher than for the voice-also subscriptions mostly used in smartphones.

Six of our peer group markets separate out the data-only traffic and the data-only subscriptions in their reporting: Austria, Belgium, France, Greece, Ireland, and Lithuania. For these, we can calculate the average mobile data usage per data-only subscription, see Figure 16.

[24] Since Slovenia does not report its M2M subscription base, it's not possible to calculate metrics excluding M2M. Since Croatia's NRA did not report mobile data traffic in 1H 2017, the 1H 2017-1H 2023 CAGR can't be calculated for Croatia.

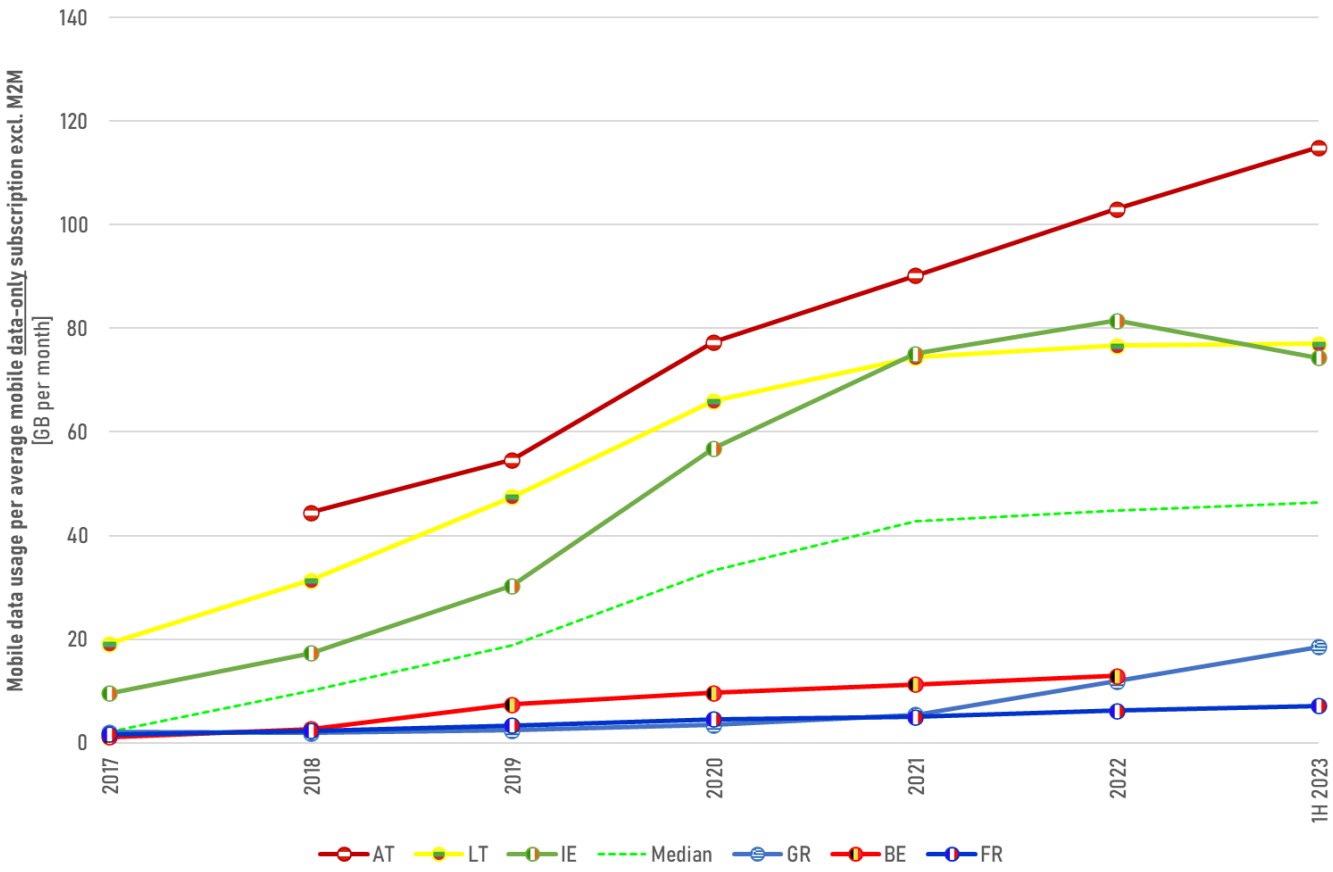

Figure 16. Comparison of the average monthly mobile data usage per data-only subscription excl. M2M [source data: respective NRA, compiled by Tefficient].

Austria's average data-only subscription consumed **115.0 GB** per month in the first half of 2023. The overall usage per any subscription, see Figure 14, was 27.1 GB. Although data-only subscriptions only represented a little less than 18% of the non-M2M subscriptions in Austria in June 2023, the data-only subscriptions have a major impact on the overall usage.

Lithuania and **Ireland** also have high average usage per data-only subscription. When it comes to overall usage, see Figure 14, Lithuania is ranked as number 2 and Ireland as number 4.

In comparison, **Greece**'s average data-only usage of **18.5 GB** per month in the first half of 2023 is much lower. Data-only subscriptions only represent less than 4% of the total non-M2M subscriptions in Greece. Data-only's 18.5 GB per month is still much higher than the overall usage of 7.3 GB, though. It also grew much faster than the overall usage in the year to June 2023 – 131% vs. 55%.

For the six peer group markets that separate out the data-only traffic and the data-only subscriptions in their reporting we could also calculate the usage per *non*-data-only subscription, i.e. per handset user. See Figure 17 below.

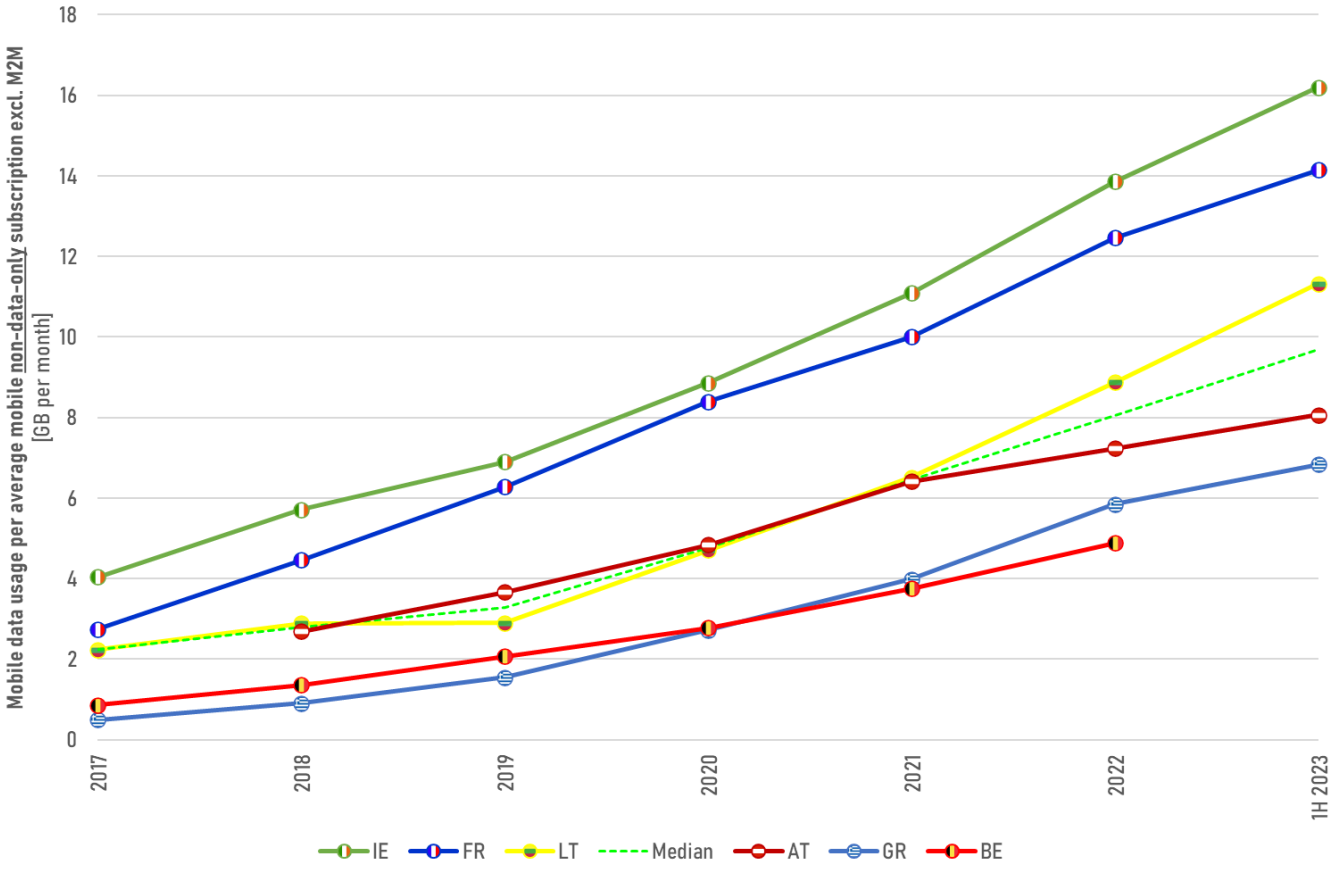

Figure 17. Comparison of the average monthly mobile data usage per *non*-data-only subscription excl. M2M [source data: respective NRA, compiled by Tefficient].

The usage levels per handset user are often much lower than per data-only user. Among our peer group, Ireland leads with **16.2 GB** per month in the first half of 2023. **Greece**'s average non-data-only usage is lower: **6.8 GB** per month in the first half of 2023.

6.2 Including M2M

When including M2M subscriptions into the calculation of average mobile data usage, it will obviously lower the figures; the data usage per M2M subscription is much lower than per 'human' subscription. To exemplify this, Greece's average M2M subscription only consumed **0.16 GB** per month in 1H 2023. The average mobile subscription, including M2M, consumed **6.7 GB**.

Also when including M2M, the differences in data usage are substantial, see Figure 18.

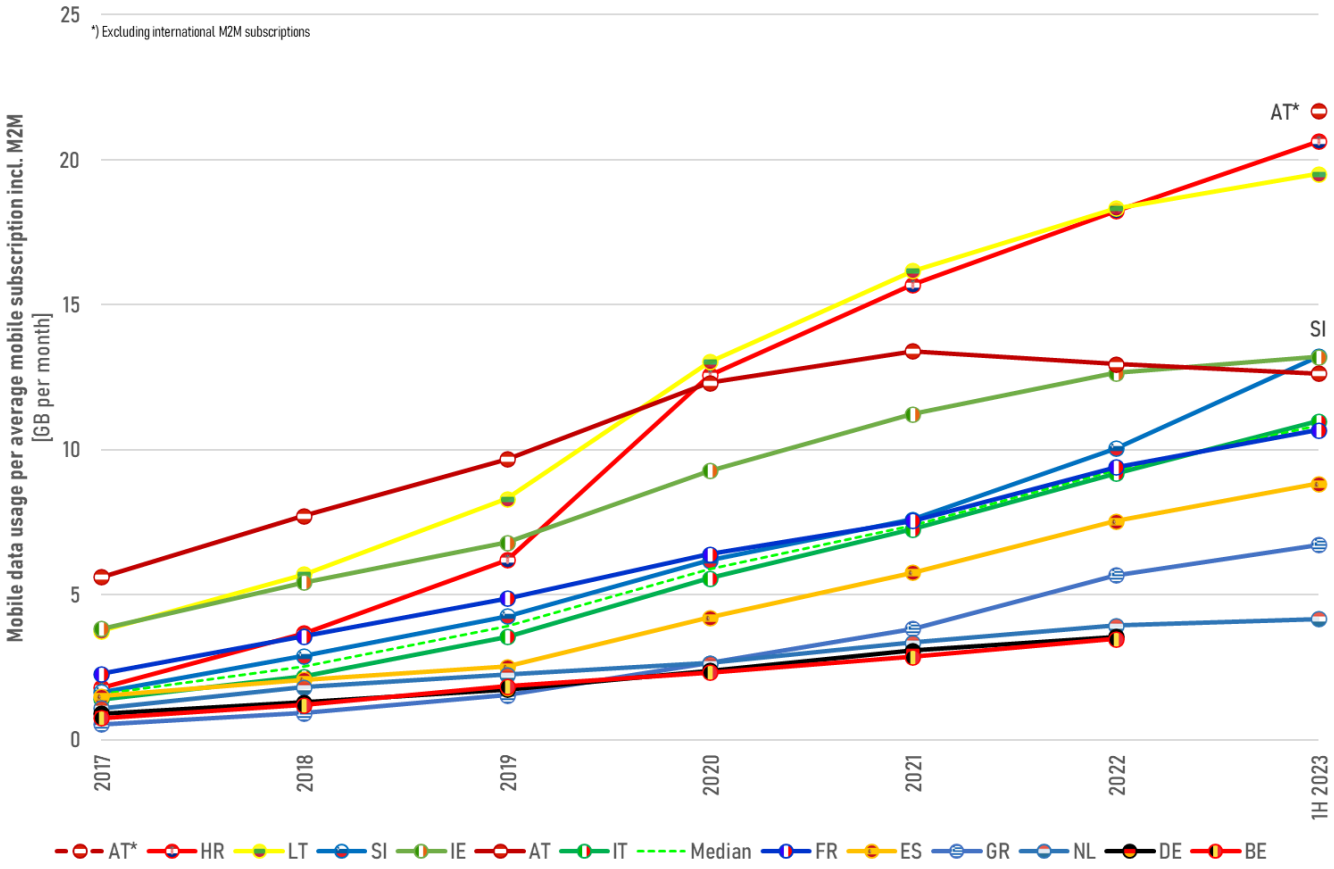

Figure 18. Comparison of the average monthly mobile data usage per subscription incl. M2M [source data: respective NRA, compiled by Tefficient].

When excluding international M2M subscriptions not active in the country, **Austria** has the highest usage: **21.7 GB** per month in the first half of 2023. But when including these international M2M subscriptions, Austria's average usage becomes much lower – and has even declined since 2021 since large bases of international M2M subscriptions, officially categorised as Austrian, have been added to the subscription base. It is hence misleading to include the international M2M subscriptions, but there is regretfully not yet a trend available when excluding them since RTR's reporting started in the second half of 2022.

Croatia is second-ranked with 20.6 GB with **Lithuania** close behind with its average usage of 19.5 GB per month in 1H 2023.

The usage level of **Greece** is much lower, 6.7 GB per month in 1H 2023. Until 2019, Greece had the lowest usage among the peer group, but has since overtaken Belgium, Germany, and the Netherlands.

Is this growth reflected in the compound annual growth rate (CAGR)?

Mobile data usage incl. M2M	AT	BE	HR	FR	DE	GR	IE	IT	LT	NL	SI	ES	Median
CAGR 2017-2022	+18%	+36%	+59%	+33%	+32%	+60%	+27%	+46%	+37%	+29%	+44%	+38%	+39%
CAGR 1H 2017-1H 2023	+16%	n/a	n/a	+34%	n/a	+66%	+25%	+45%	+36%	+29%	+48%	+38%	+38%

Figure 19. Comparison of the CAGR for mobile data usage incl. M2M 2017-2022 and 1H 2017-1H 2023 [source data: respective NRA, compiled by Tefficient]

All countries[25] have experienced strong growth in the mobile data usage during these years, but it is **Greece** that had the fastest growth, **60%** during 2017-2022 and **66%** during 1H 2017-1H 2023. Albeit from the peer group's lowest level, but still.

Greece's mobile data usage per subscription including M2M is below the median.

Greece had the fastest CAGR in the mobile data usage.

[25] Since Croatia's NRA did not report mobile data traffic in 1H 2017, the 1H 2017-1H 2023 CAGR can't be calculated for Croatia.

7 Mobile voice usage per voice subscription

In section 4.4 we explained that most mobile contracts in Europe today come with unlimited voice but that much voice usage – unclear how much – today takes place in communication and social apps that are excluded from the official statistics on mobile voice minutes.

The demand for traditional mobile voice is still quite good, though, see Figure 20 below. The **COVID-19 pandemic** with its associated lockdowns and restrictions led to a large lift in the average voice usage per mobile voice subscription in 2020 – across all markets. The voice usage has since declined but is in most cases still higher than in 2019, prior to the pandemic.

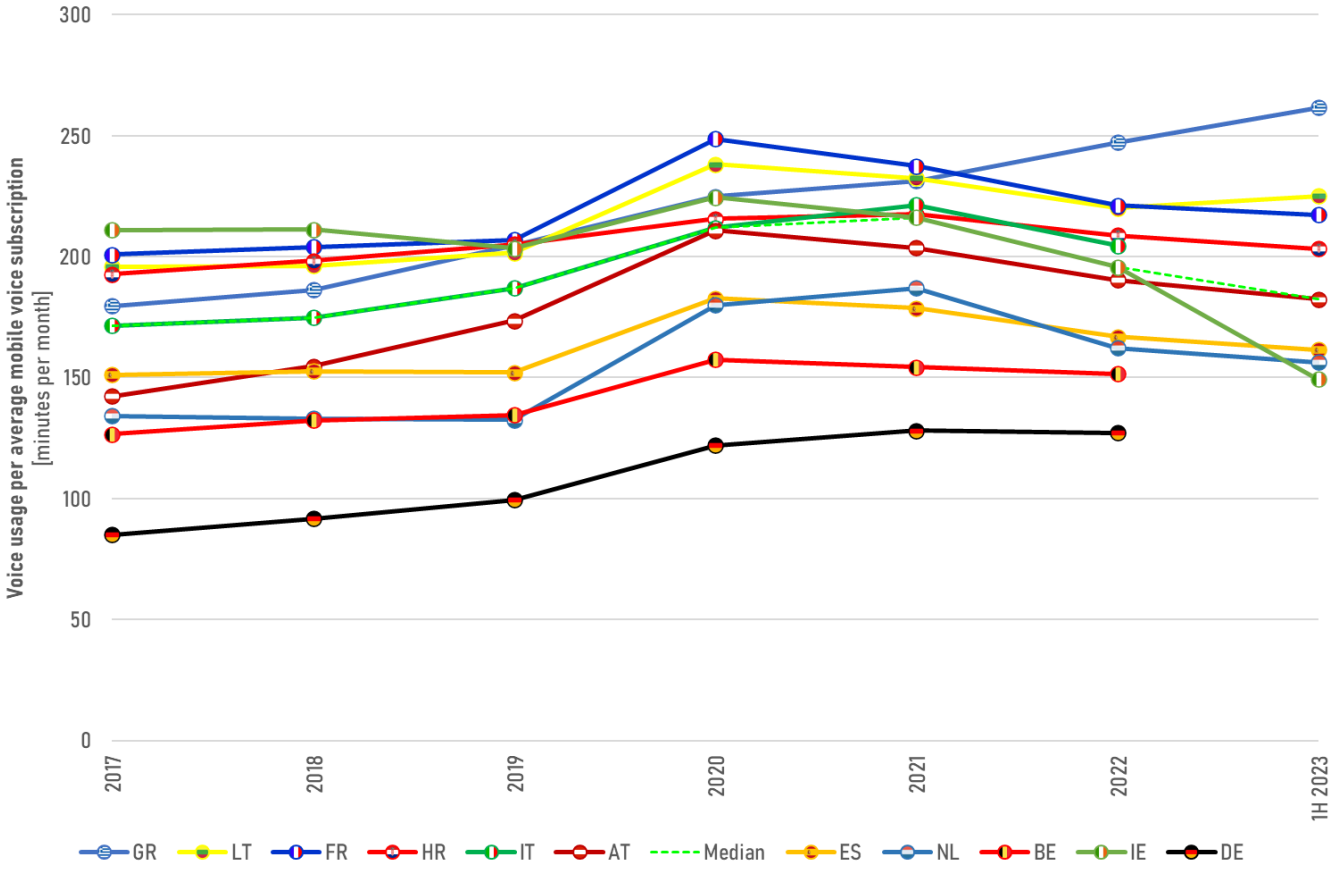

Figure 20. Comparison of the average monthly mobile voice usage per voice subscription[26] [source data: respective NRA, compiled by Tefficient].

Greece broke that trend when it continued to see an increase in the average mobile voice usage also in 2021, 2022, and 1H 2023. Since 2022, Greece has the highest average mobile voice usage among all peer group countries. The value for 1H 2023 is **262 minutes** per mobile voice subscription per month.

[26] Excluding mobile data-only subscriptions.

The reduction in the voice usage for **Ireland** in 1H 2023 looks odd but is as reported. The Irish NRA, ComReg, reported a significant drop in the voice minutes in Q1, Q2 and Q3 of 2023 compared to 2022 but it has not been commented.

Let's now compare the compound annual growth rate (CAGR) in the mobile voice usage.

Mobile voice usage	AT	BE	HR	FR	DE	GR	IE	IT	LT	NL	SI	ES	Median
CAGR 2017-2022	+6%	+4%	+2%	+2%	+8%	+7%	-2%	+4%	+2%	+4%	n/a	+2%	+4%
CAGR 1H 2017-1H 2023	+4%	n/a	+1%	+1%	n/a	+7%	-6%	n/a	+2%	+2%	n/a	+1%	+2%

Figure 21. Comparison of the CAGR for mobile voice usage 2017-2022 and 1H 2017-1H 2023 [source data: respective NRA, compiled by Tefficient]

All countries[27] except Ireland experienced some growth in the mobile voice usage during these time periods. In 2017-2022, **Germany** had the fastest growth, 8%, but **Greece** followed with 7%. In 1H 2017-1H 2023, where no data exists for Germany, Greece had the fastest growth, 7%.

Greece's mobile voice usage per voice subscription is the highest among the peer group.

Greece had the second fastest CAGR, after Germany, in the mobile voice usage from 2017 to 2022.

[27] Slovenia does not report its number of voice minutes. Italy reports voice minutes only annually.

8 Total mobile revenue per GB of mobile data

8.1 Unadjusted

8.1.1 Excluding M2M

As pointed out several times by now, mobile contracts in Europe are today essentially priced after how many GB of mobile data a user can at maximum consume during a month. In this section, we will therefore compare the total mobile retail service revenue to the number of gigabytes consumed by calculating the revenue per GB.

Like in the ARPU section, we start with the unadjusted, excluding M2M, case.

Figure 22 below shows the revenue per GB in EUR including all 'human' mobile subscriptions – regular and data-only (mbb) – but excluding M2M subscriptions.

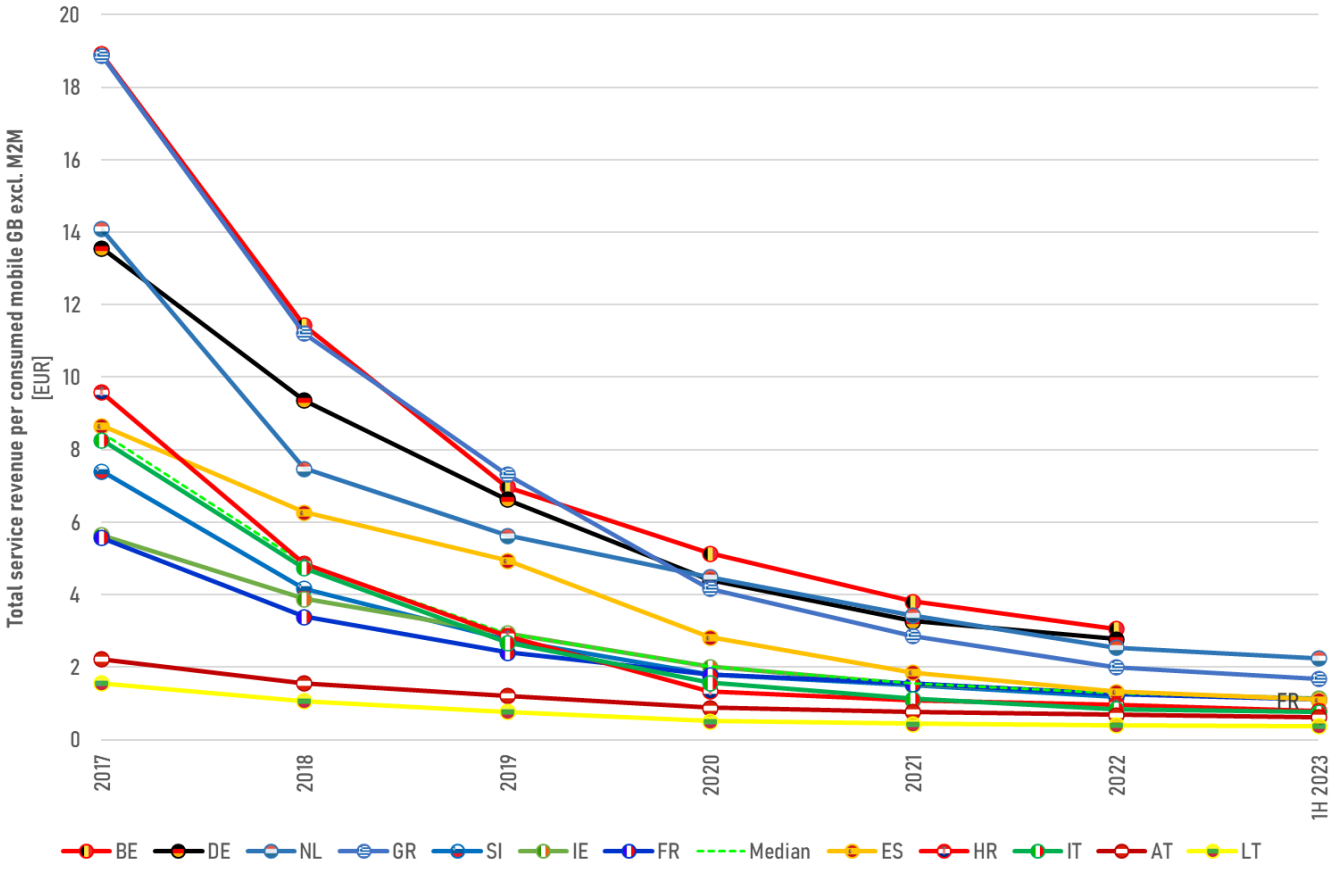

Figure 22. Comparison of total mobile service revenue[28] per GB excl. M2M [source data: respective NRA, compiled by Tefficient].

[28] As mentioned in section 4.1, the 1H 2023 revenue of Italy is likely overstated in comparison to how it previously has been stated for the full years.

It is obvious that the revenue per GB has come down a lot since 2017. This is primarily due to the fast increase in the mobile data usage, Figure 8 shows that the ARPU generally has not decreased. But one could establish that mobile users today can consume much more mobile data without paying more per month.

The revenue per GB is the highest in **Belgium**, 3.1 EUR in 2022. **Germany** had the second highest revenue per GB, 2.8 EUR in 2022. The **Netherlands** stood at 2.2 EUR in 1H 2023 whereas **Greece** is fourth-ranked with 1.7 EUR in 1H 2023. In 2019, Greece had the highest revenue per GB, but Greece has fallen below Belgium, Germany, and the Netherlands since.

At the other end of the spectrum, we find **Lithuania** with just 0.4 EUR per GB in 1H 2023.

Just by looking at Figure 22 it becomes clear that the compound annual growth rate (CAGR) will be negative for all countries.

Total mobile revenue per GB excl. M2M	AT	BE	HR	FR	DE	GR	IE	IT	LT	NL	SI	ES	Me-dian
CAGR 2017-2022	-21%	-30%	-37%	-26%	-27%	-36%	-26%	-37%	-24%	-29%	-31%	-31%	-30%
CAGR 1H 2017-1H 2023	-21%	n/a	n/a	-26%	n/a	-38%	-25%	n/a	-23%	-29%	n/a	-31%	-26%

Figure 23. Comparison of the CAGR for total mobile service revenue per GB excl. M2M 2017-2022 and 1H 2017-1H 2023 [source data: respective NRA, compiled by Tefficient]

During 2017-2022, the erosion in the revenue per GB was the fastest in **Croatia** and **Italy**, 37%, but **Greece** had the third fastest revenue erosion with 36%. During 1H 2017-1H 2023, Greece had the fastest revenue erosion of reporting countries[29], 38%.

Greece's total mobile revenue per GB excluding M2M is, before compensation for the comparative price level, above the median.

Greece had the third fastest erosion in the revenue per GB from 2017 to 2022.

[29] Since Croatia's NRA did not report mobile data traffic in 1H 2017, the 1H 2017-1H 2023 CAGR can't be calculated for Croatia.

8.1.2 Including M2M

With few countries breaking out the M2M data traffic and the M2M revenues, see sections 4.2 and 4.3, Figure 24 will resemble Figure 22 a lot. The conclusions are identical and are thus not repeated.

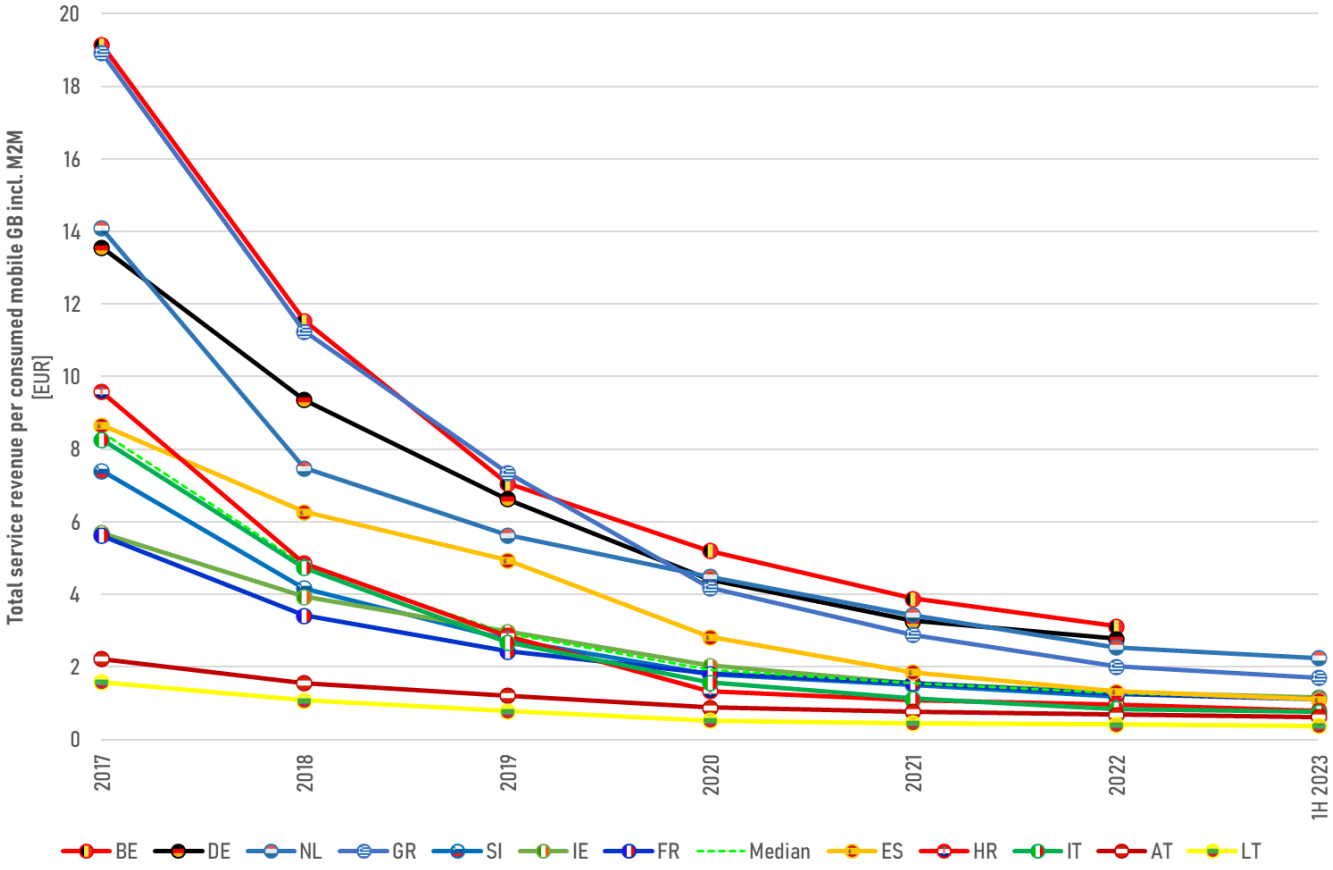

Figure 24. Comparison of total mobile service revenue per GB incl. M2M [source data: respective NRA, compiled by Tefficient].

8.2 Adjusted to the comparative price level of Greece

8.2.1 Excluding M2M

It's time to again adjust for the comparative overall price level as described in section 3.

Figure 25 below shows the outcome when differences in the comparative price levels – relative to Greece's level – have been applied to Figure 22.

The lines of the countries with a divider smaller than 1, i.e. Croatia and Lithuania, will move upwards after the adjustment whereas the countries with a divider larger than 1 will move downwards. Greece's line will not move at all as we are adjusting the other countries to the level of Greece.

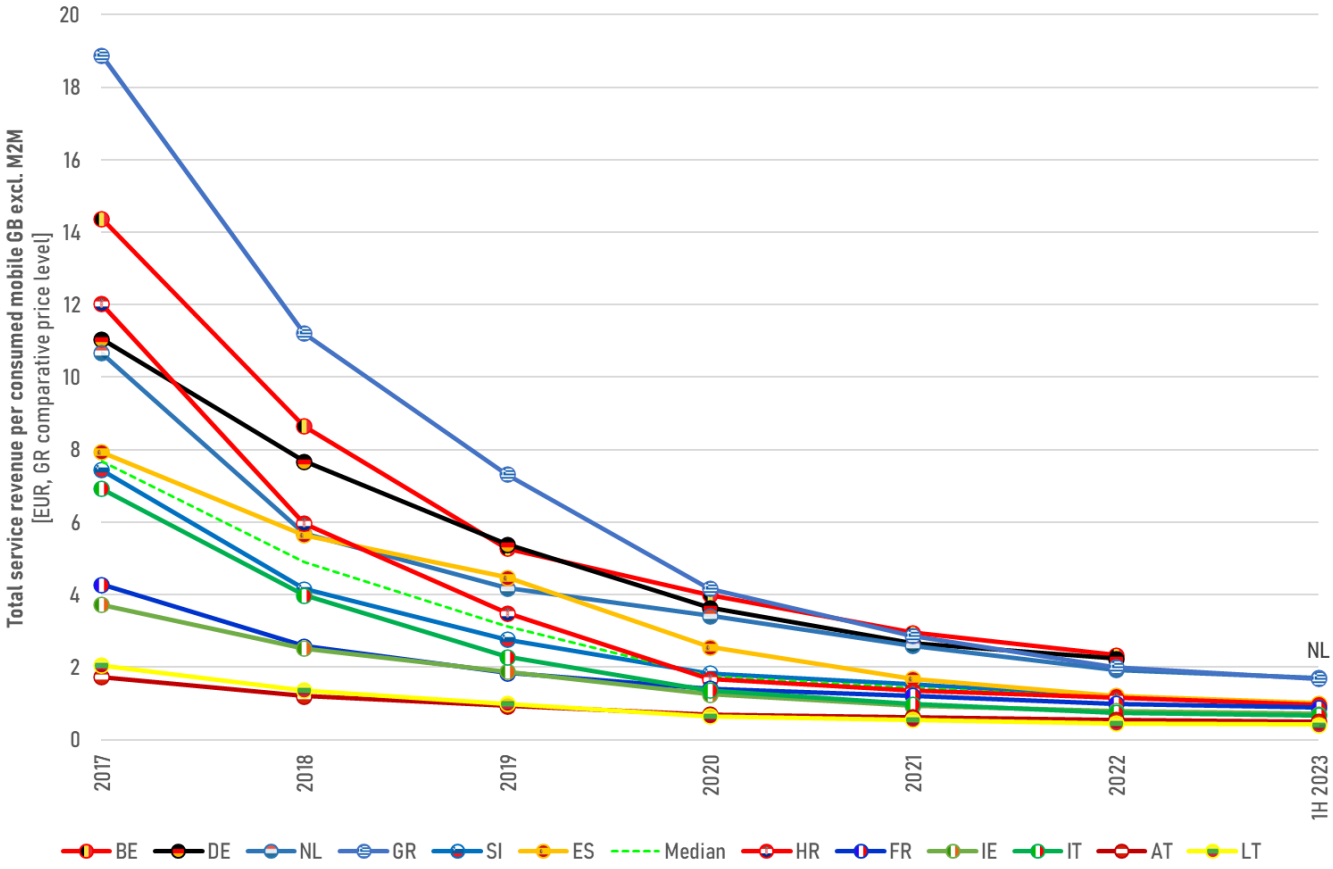

Figure 25. Comparison of total mobile service revenue[30] per GB excl. M2M, adjusted for comparative price level [source data: respective NRA, Eurostat, compiled by Tefficient].

After adjustment to the comparative price level of Greece, **Belgium** still got the highest revenue per GB and **Germany** is still second highest. The Netherlands is still third in Figure 25, just above **Greece**.

[30] As mentioned in section 4.1, the 1H 2023 revenue of Italy is likely overstated in comparison to how it previously has been stated for the full years.

We do not repeat the CAGR calculations for the adjusted case as it would be affected by Eurostat's annually revised figures on comparative price level. We hence repeat the conclusion on CAGR from the unadjusted case.

Greece's total mobile revenue per GB excluding M2M is, after compensation for the comparative price level, above the median.

Greece had the third fastest erosion in the revenue per GB from 2017 to 2022.

8.2.2 Including M2M

With few countries breaking out the M2M data traffic and the M2M revenues, see sections 4.2 and 4.3, Figure 26 will resemble Figure 25 a lot. The conclusions are identical and are thus not repeated.

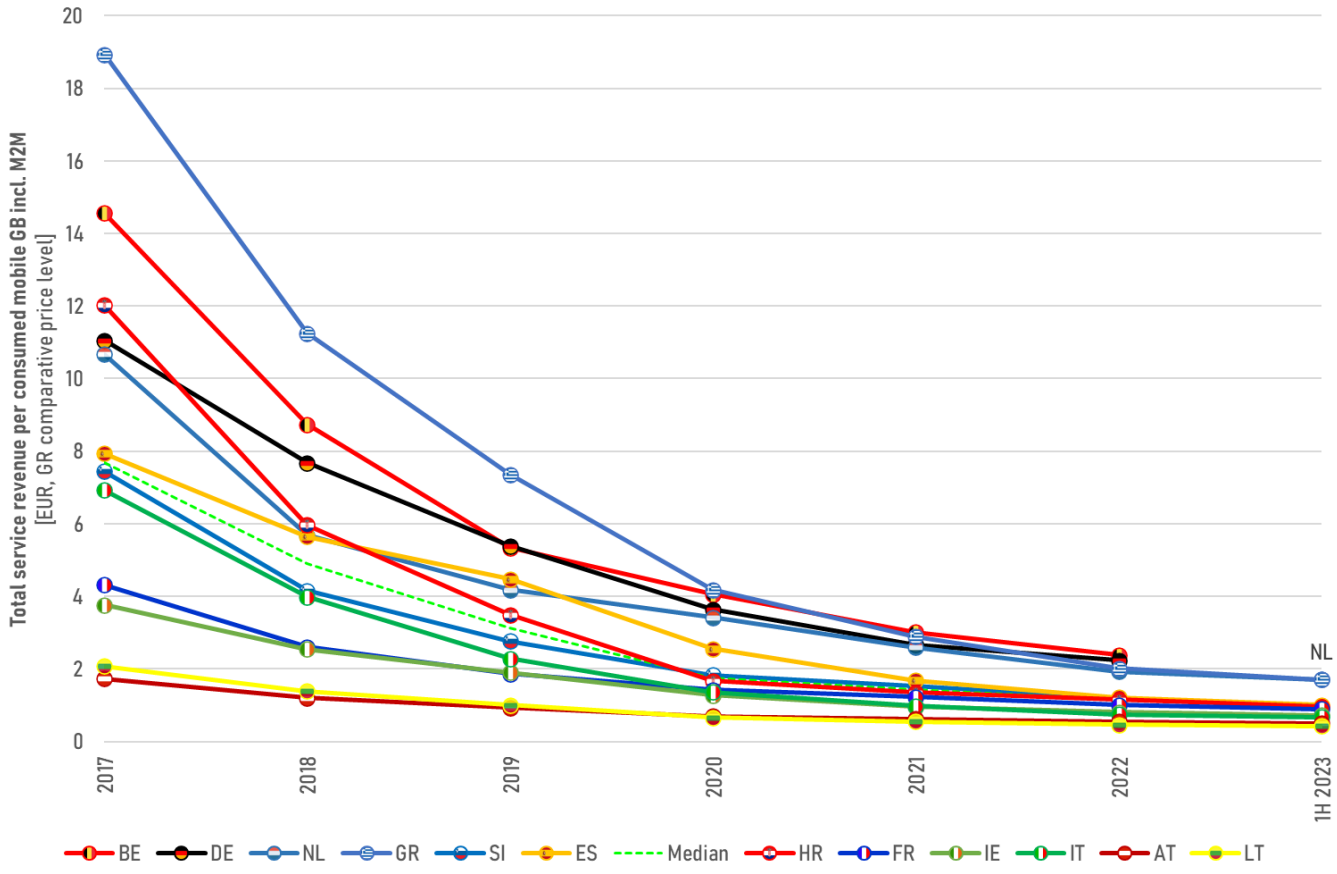

Figure 26. Comparison of total mobile service revenue per GB incl. M2M, adjusted for comparative price level [source data: respective NRA, Eurostat, compiled by Tefficient].

9 Voice revenue per minute of mobile voice

9.1 Unadjusted

We remind that mobile contracts in Europe today essentially are priced after how many GB of mobile data a user can at maximum consume during a month – whereas voice and messaging most often is unlimited. As laid out in section 4.4, we therefore have doubts about the comparability of mobile voice revenue between countries. Furthermore, mobile voice revenue isn't reported by all countries in our peer group.

In this section, we will anyhow compare the retail voice retail service revenue to the number of voice minutes consumed by calculating the voice revenue per minute.

Like in the previous section, we start with the unadjusted case.

Figure 27 below shows the voice revenue per voice minute in EUR. Data is currently only available for six of the peer group countries [in 2017 also for Austria].

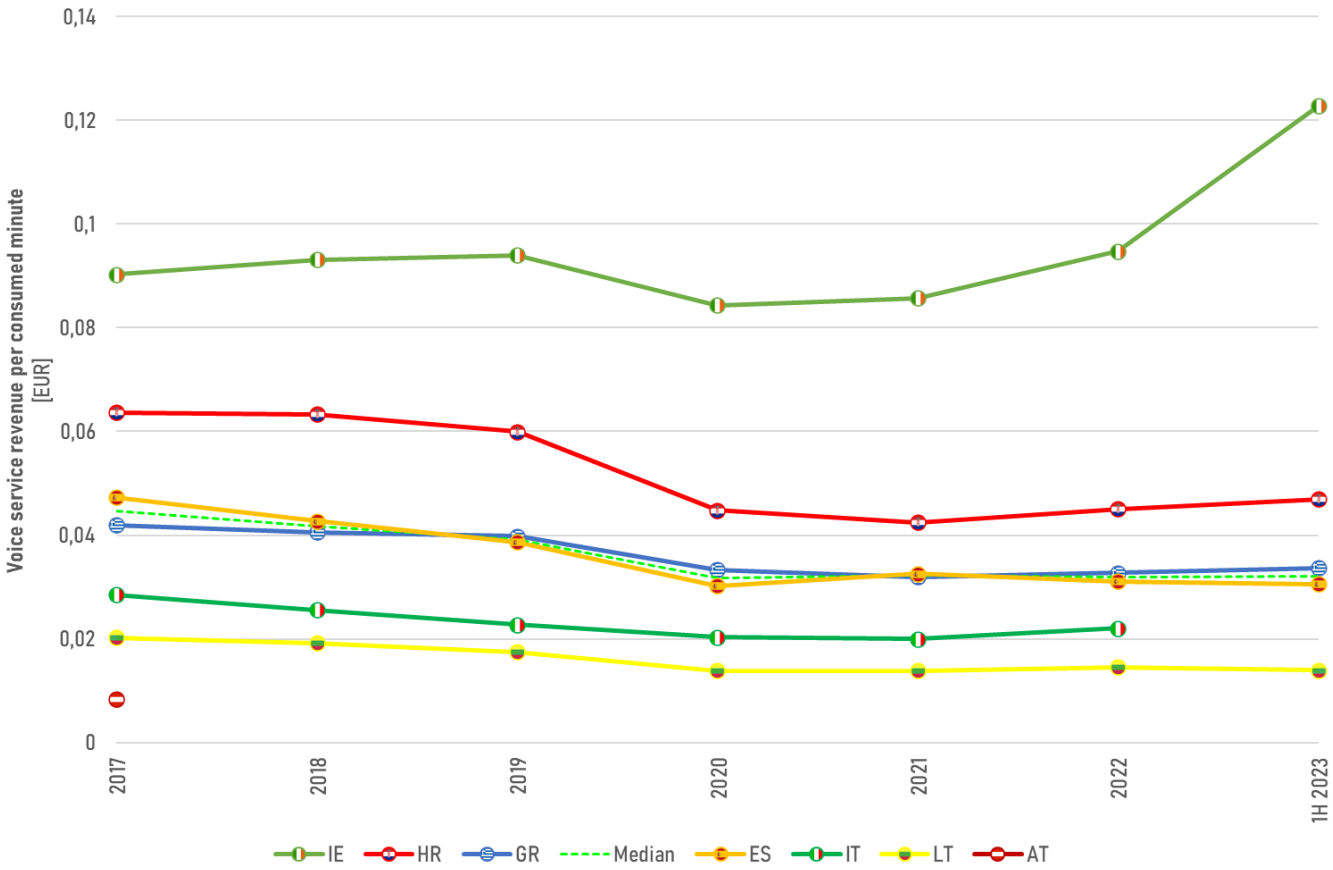

Figure 27. Comparison of voice service revenue per voice minute [source data: respective NRA, compiled by Tefficient].

Mobile voice is an older service than mobile data and it has not experienced the same erosion in unit revenue. With all the provisions we have done with regards to voice revenue comparability in mind, it's **Ireland** that holds the position with the highest voice revenue per minute. Due to the reported strong reduction in the voice volume in 2023, it even increased further.

Greece is close to the median among this limited peer group. **Lithuania** has the lowest voice revenue per minute, a position the country also has when it came to the total revenue per GB.

Calculating the compound annual growth rate (CAGR) for the reporting countries will give us Figure 28.

Voice revenue per minute	AT	BE	HR	FR	DE	GR	IE	IT	LT	NL	SI	ES	Me-dian
CAGR 2017-2022	n/a	n/a	-7%	n/a	n/a	-5%	+1%	-5%	-6%	n/a	n/a	-8%	-6%
CAGR 1H 2017-1H 2023	n/a	n/a	-4%	n/a	n/a	-4%	+6%	n/a	-6%	n/a	n/a	-7%	-4%

Figure 28. Comparison of the CAGR for voice service revenue per voice minute 2017-2022 and 1H 2017-1H 2023 [source data: respective NRA, compiled by Tefficient]

During 2017-2022 of the six available peer group countries, the erosion in the voice revenue per minute was the fastest in **Spain**, 8%. **Greece** had an erosion of 5%. Only **Ireland** experienced an increase, 1%.

Greece's voice revenue per voice minute is, before compensation for the comparative price level, close to the median of a limited peer group.

Greece had a relatively typical erosion, 5%, in the revenue per minute from 2017 to 2022.

9.2 Adjusted to the comparative price level of Greece

To complete this section, we now adjust for the comparative overall price level as described in section 3.

Figure 29 below shows the outcome when the differences in the comparative price levels – relative to Greece's level – have been applied to Figure 27.

The lines of the countries with a divider smaller than 1, i.e. Croatia and Lithuania, will move upwards after the adjustment whereas the countries with a divider larger than 1 will move downwards. Greece's line will not move at all as we are adjusting the other countries to the level of Greece.

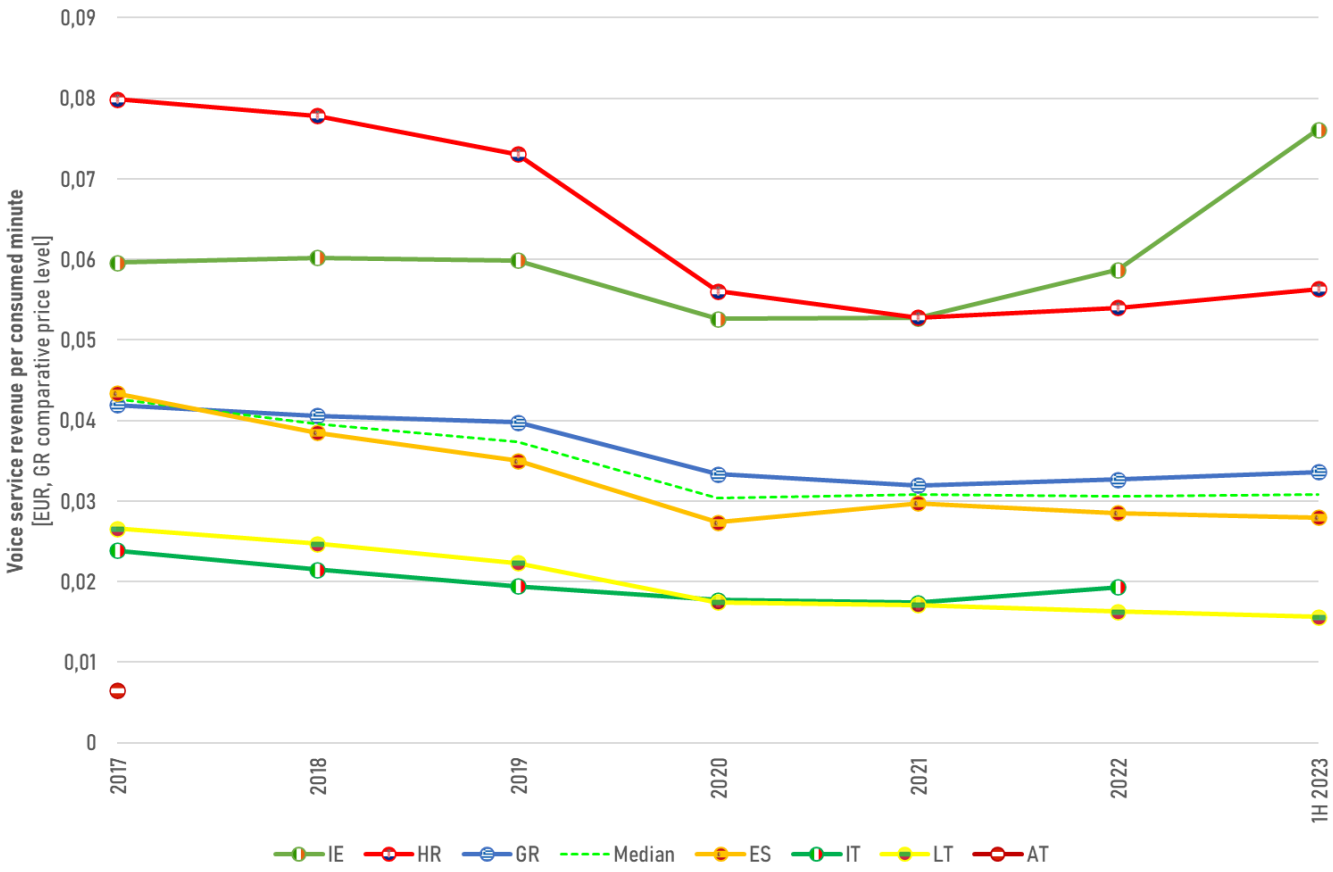

Figure 29. Comparison of voice service revenue per voice minute, adjusted for comparative price level [source data: respective NRA, Eurostat, compiled by Tefficient].

After adjustment to the comparative price level of Greece, **Ireland** still got the highest revenue per minute and **Croatia** is still second.

Greece is close to the median of this limited peer group. **Lithuania** has the lowest voice revenue per minute, a position the country also has when it came to the total revenue per GB.

We do not repeat the CAGR calculations for the adjusted case as it would be affected by Eurostat's annually revised figures on comparative price level. We hence repeat the conclusion on CAGR from the unadjusted case.

Greece's voice revenue per voice minute is, after compensation for the comparative price level, close to the median of a limited peer group.

Greece had a relatively typical erosion, 5%, in the revenue per minute from 2017 to 2022.

10 Correlation between mobile ARPU and mobile data usage

10.1 Unadjusted

10.1.1 Excluding M2M

Value for money will mean different things to different people. A mobile subscription of today typically contains a multitude of services, such as:

- Mobile data, typically capped by gigabytes – or by speed if having unlimited data volume
- SMS/MMS, typically unlimited nationally
- Mobile voice, typically unlimited nationally
- Roaming data, SMS and voice
- Inclusive or discounted subscriptions for family members or data-only devices
- Inclusive or discounted 3rd party services such as streaming services or cyber security

Based on how mobile contracts are priced today in Europe, it seems that the volume of inclusive mobile data is the parameter that mainly sets the monthly price for a mobile package.

Greece is no exception. Mobile data is the only price defining parameter on all postpaid mobile plans offered online by Cosmote, Vodafone, and Nova, see the figure below. Voice is unlimited and SMSs are either unlimited or fixed at maximum 2000 or 6000 per month.

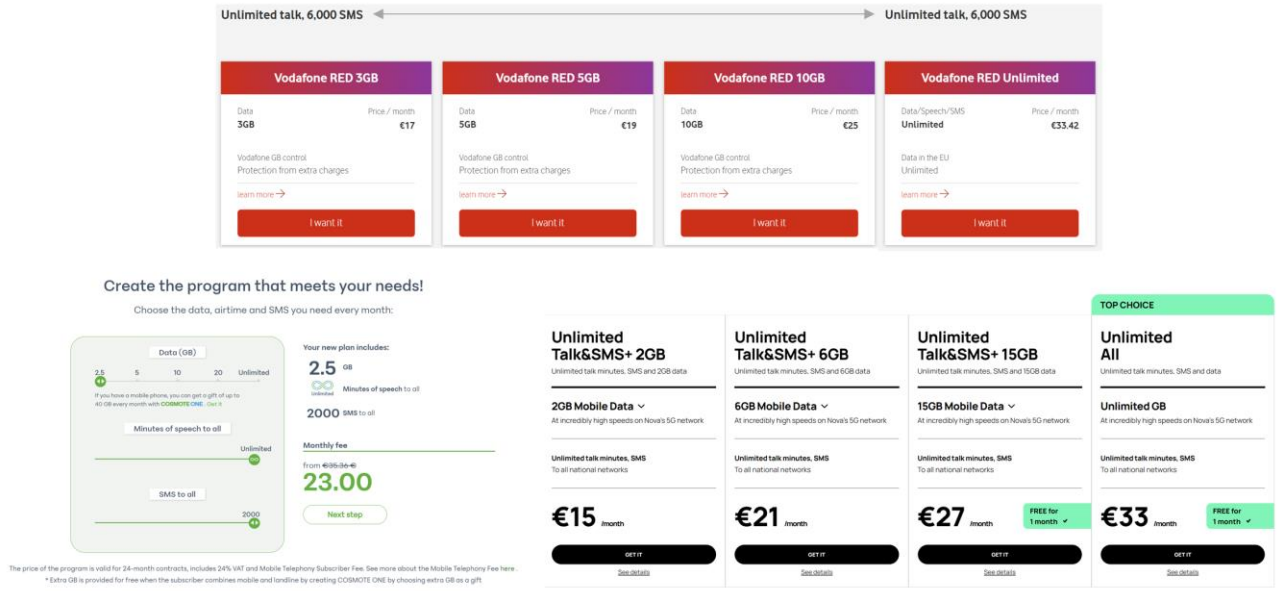

Figure 30. Mobile plans offered by Vodafone (top), Cosmote (bottom left) and Nova (bottom right) 4 January 2024, machine translated from Greek [source: webpages of the respective MNO, compiled by Tefficient].

Prepaid is less straight-forward as top-ups traditionally were done with a certain EUR amount added to a prepaid balance. Consumption of data, voice and SMSs would then be deducted from the balance. But it's today frequent to also offer service packages to prepaid customers. In the case of the latter, mobile data remains the primary price defining parameter, see two such examples from Nova and Cosmote below. According to EETT's statistics for the first half of 2023, prepaid represent 29% of the total mobile retail revenue, postpaid the remaining 71%.

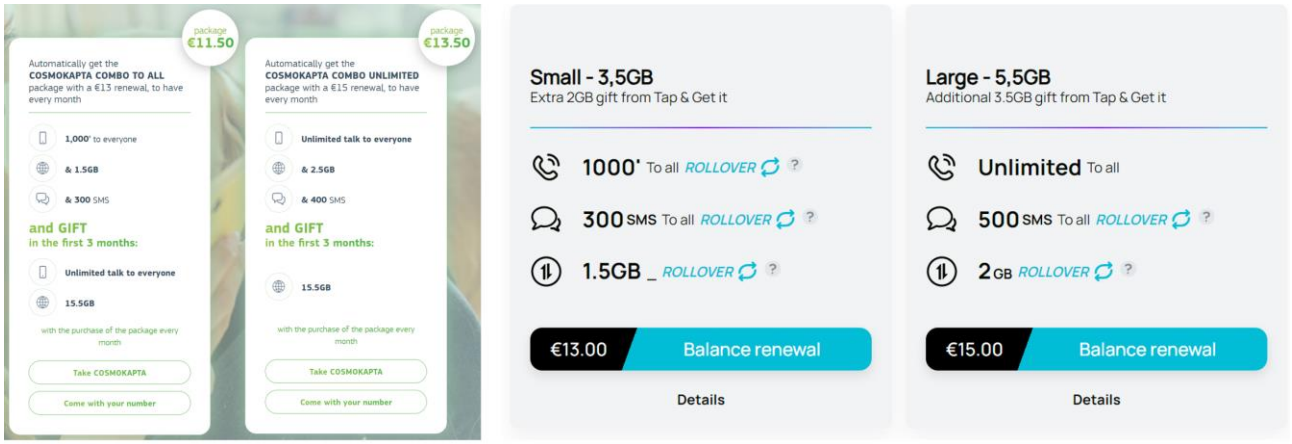

Figure 31. Examples of mobile top-up packages offered by Cosmote (left) and Nova/FREE2GO (right) 6 February 2024, machine translated from Greek [source: webpages of the respective MNO, compiled by Tefficient].

So, although we in the next section (11) – for the sake of completeness – will correlate mobile ARPU also to the voice usage, we think that it's this section that best compares value for money.

Figure 32 is the first of several graphs that correlates the mobile ARPU to the mobile data usage. This one is for 2022, thereby including also the annually-reporting countries Germany and Belgium[31].

[31] Since the NRA does not report the M2M subscription base, Slovenia will only appear in the graphs including M2M.

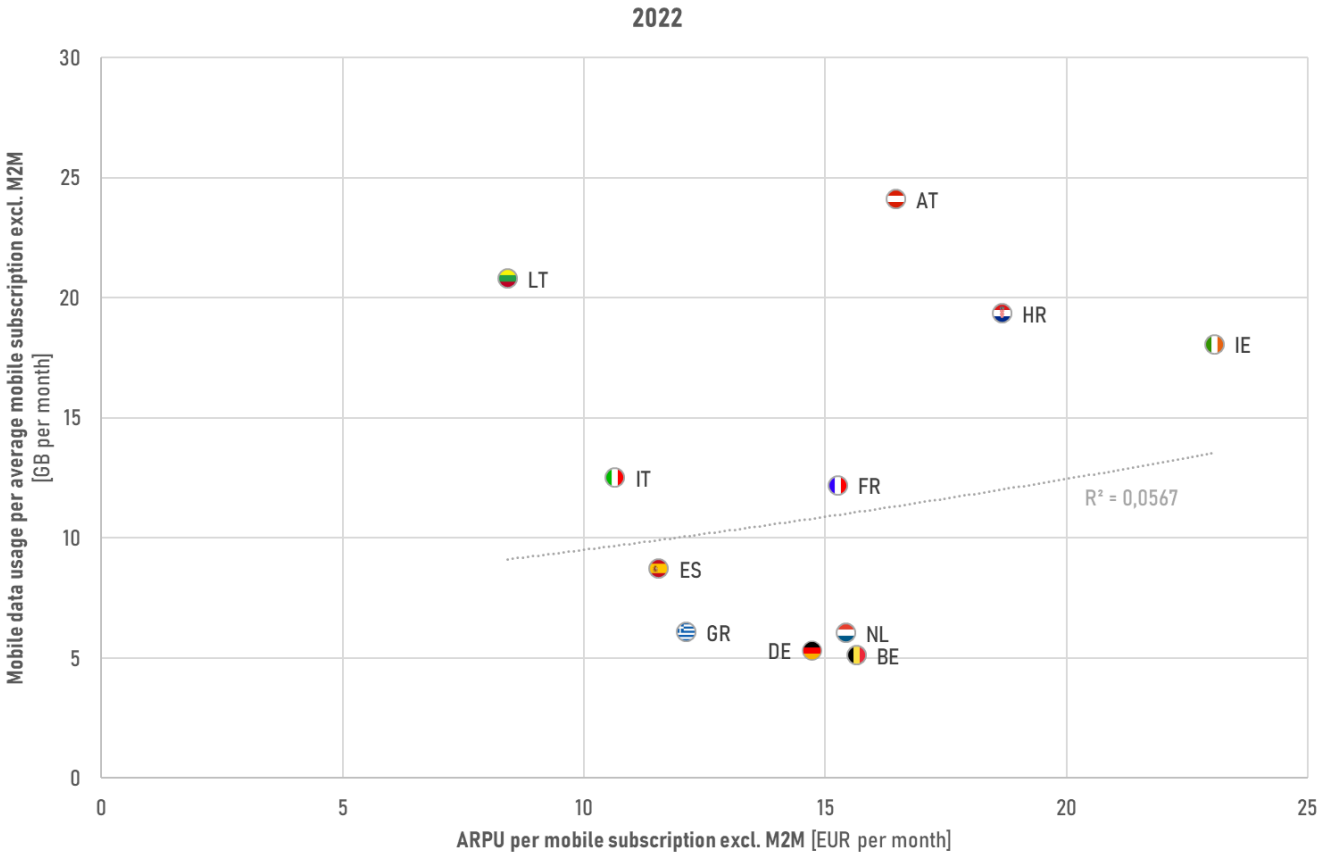

Figure 32. Mobile ARPU vs. mobile data usage, excl. M2M, 2022 [source data: respective NRA, compiled by Tefficient].

The adherence to the regression line is very weak, demonstrated by an R^2 value much below 1. This means that, compared this way, there's not really any correlation between what the average mobile user pays per month (the ARPU) and how much mobile data she or he consumes.

The average mobile subscriber of **Lithuania** gets a lot of mobile data although the ARPU is the lowest. The average mobile subscriber of Belgium consumes the least of mobile data but still generates a relatively high ARPU. Defined this way, value for money is best in Lithuania and worst in Belgium.

The position of **Greece** is, with consumer eyes, better than in Belgium, Germany, and the Netherlands where mobile subscribers pay more for less data, but worse than in e.g. Spain, Italy, and Lithuania where mobile subscribers pay less but still use more data.

The next correlation graph shows the positions of the countries in 1H 2023 which means that Belgium and Germany no longer can take part since NRAs report annually there.

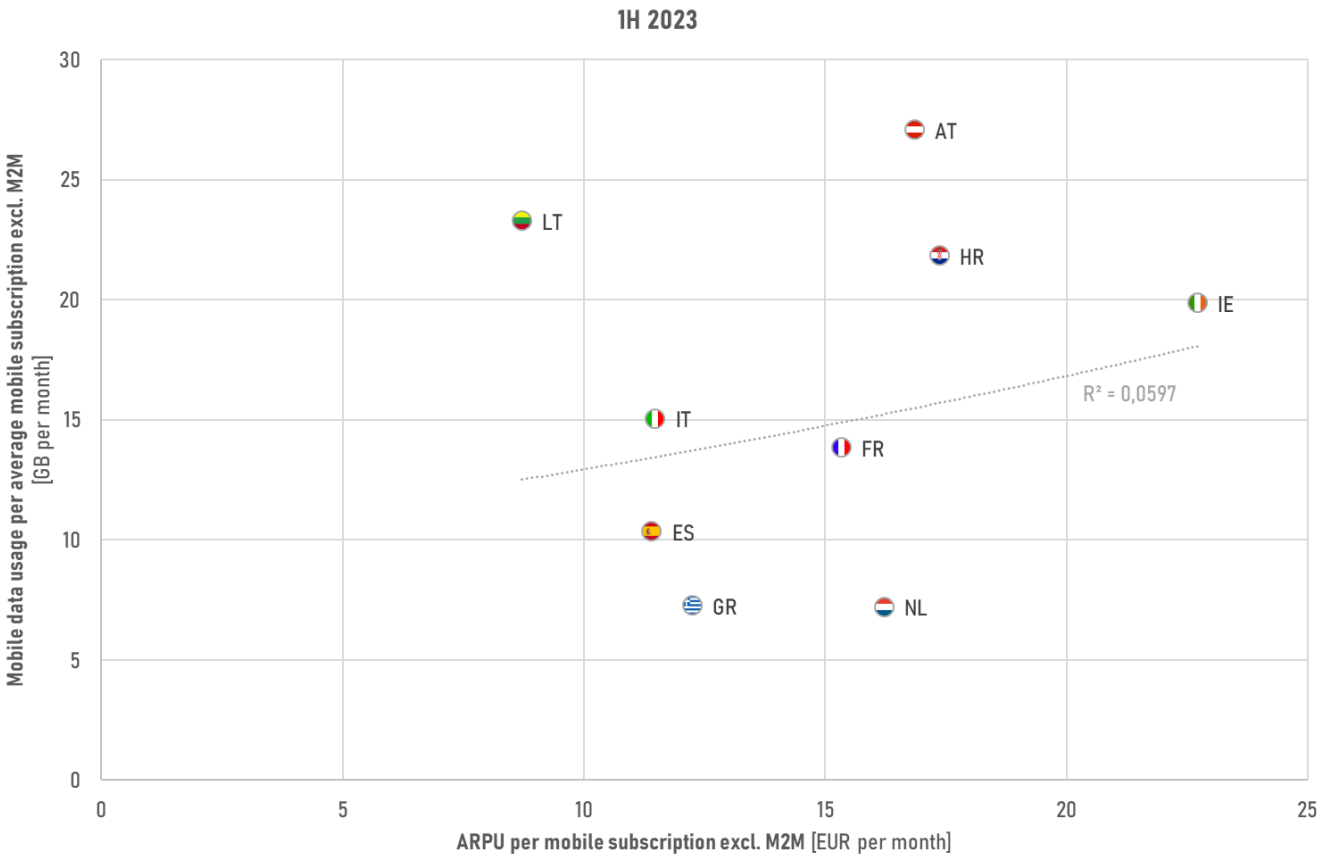

Figure 33. Mobile ARPU[32] vs. mobile data usage, excl. M2M, 1H 2023 [source data: respective NRA, compiled by Tefficient].

Compared to the 2022 graph, positions have moved upwards since the mobile data usage increased. The ARPU has typically not changed much.

The adherence to the regression line is still very weak.

The position of **Greece** is, with consumer eyes, better than in the Netherlands where mobile subscribers pay more for less data, but worse than in e.g. Spain, Italy, and Lithuania where mobile subscribers pay less but still use more data.

Before compensation for the comparative price level, the average mobile subscription in Greece (excluding M2M) consumes relatively little data given its ARPU.

When excluding M2M, Greece's value for money position is though better than in Belgium, Germany and the Netherlands.

[32] The 1H 2023 revenue of Italy is likely overstated in comparison to how it previously has been stated for the full years.

10.1.2 Including M2M

Now to the graphs that include M2M. The peer group is now complete as Slovenia can appear in the inclusive-M2M graph for 2022.

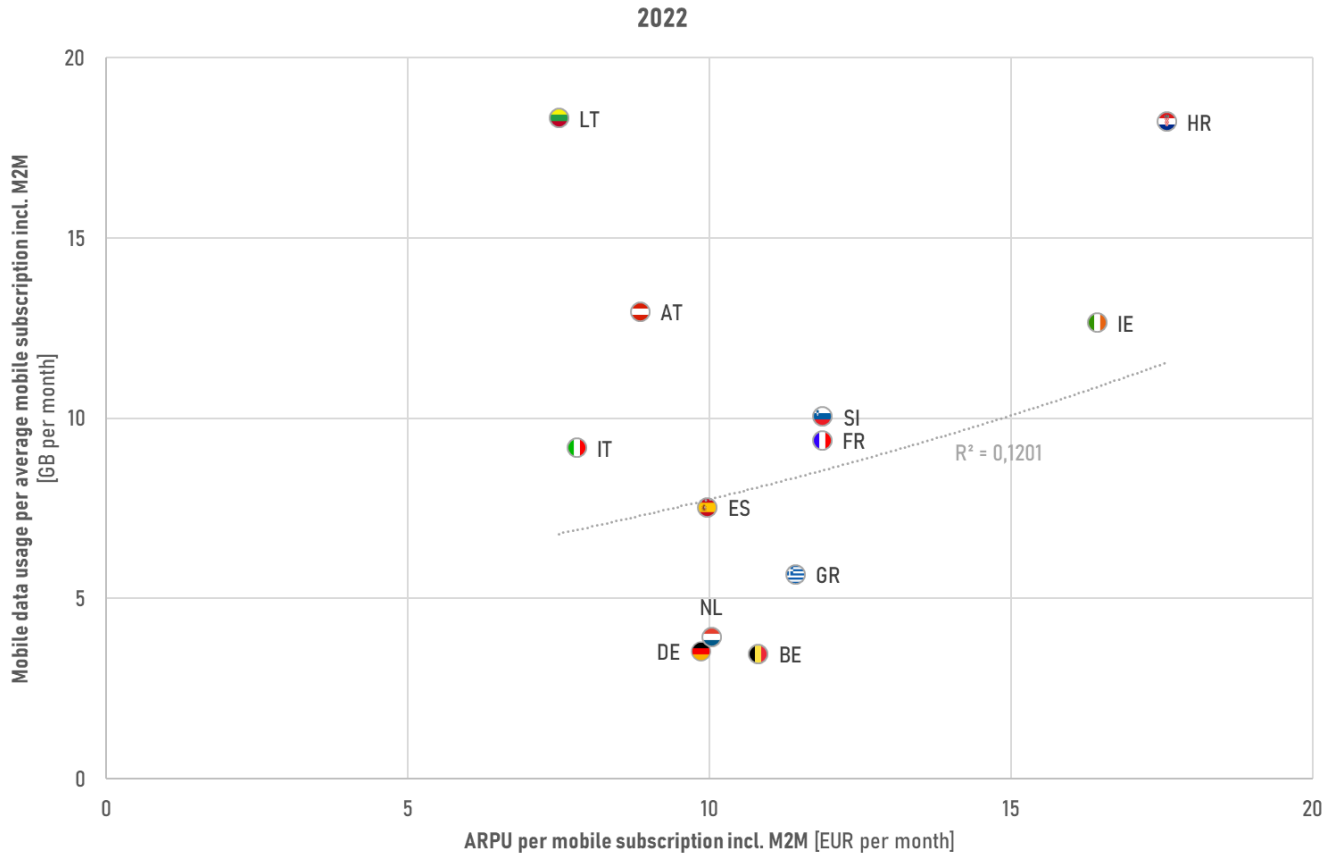

Figure 34. Mobile ARPU vs. mobile data usage, incl. M2M, 2022 [source data: respective NRA, compiled by Tefficient].

The adherence to the regression line is still weak.

The average mobile subscriber of **Lithuania** gets a lot of mobile data although ARPU is the lowest. The average mobile subscriber of Belgium consumes the least of mobile data but still generates a relatively high ARPU. Defined this way, value for money is best in Lithuania and worst in Belgium.

The value position of **Greece** with more data for more money is, with consumer eyes, now similar to Belgium, Germany, and the Netherlands, and worse than in e.g. Spain, Italy, Austria[33], and Lithuania where mobile subscribers pay less but still use more data.

The next correlation graph shows the positions of the countries in 1H 2023.

[33] Including international M2M SIMs. Excluding these can only be done from 1H 2023.

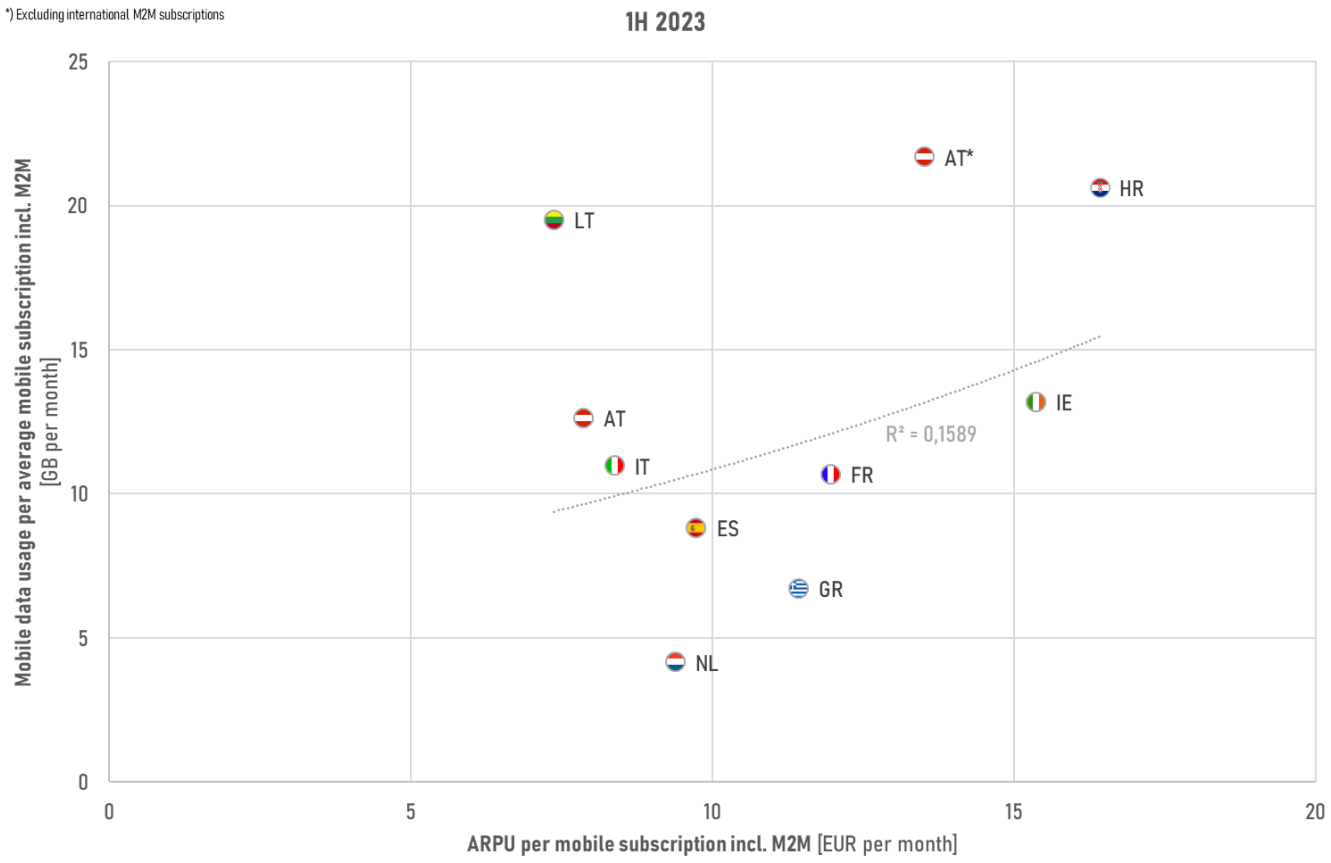

Figure 35. Mobile ARPU[34] vs. mobile data usage, incl. M2M, 1H 2023 [source data: respective NRA, compiled by Tefficient].

Compared to the 2022 graph, positions have moved upwards since the mobile data usage increased. The ARPU has typically not changed much. We now have the data available to put Austria without international M2M subscriptions (AT*) on the chart. Let's also again point out that the 1H 2023 revenue of Italy likely is overstated in comparison to how it previously has been stated for the full years.

The adherence to the regression line is still weak.

The position of **Greece** is, with consumer eyes, similar to the Netherlands, and worse than in e.g. Spain, Italy, Austria[35] and Lithuania where mobile subscribers pay less but still use more data.

Before compensation for the comparative price level, the average mobile subscription in Greece (including M2M) consumes little data given its ARPU.

When including M2M, Greece's value for money position is about as weak as in Belgium, Germany and the Netherlands.

[34] The 1H 2023 revenue of Italy likely is overstated in comparison to how it previously has been stated for the full years.
[35] Including international M2M SIMs.

10.2 Adjusted to the comparative price level of Greece

10.2.1 Excluding M2M

There are four more correlation graphs lined up in this section – where the ARPU has been adjusted to the comparative price level of Greece.

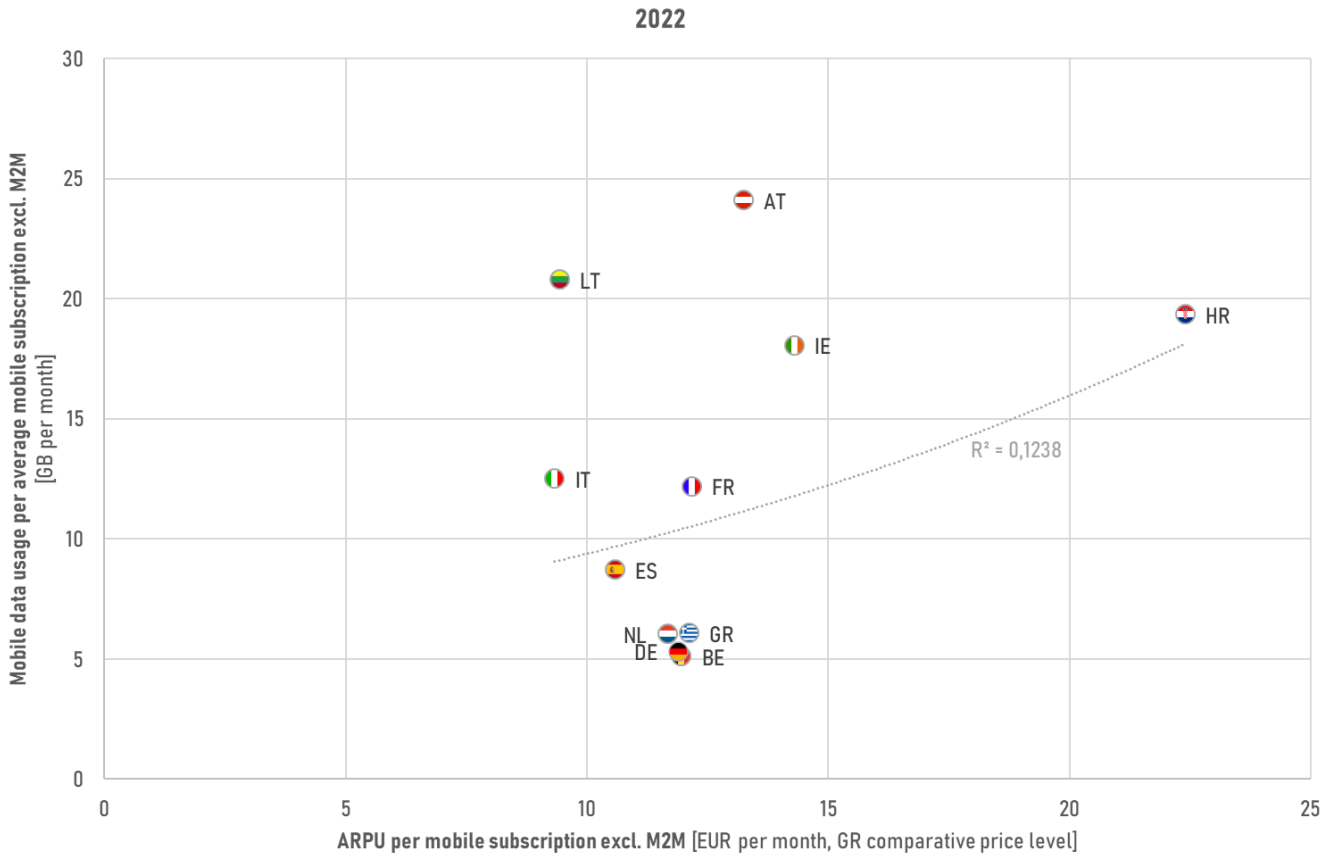

Figure 36. Mobile ARPU adjusted for comparative price level vs. mobile data usage, excl. M2M, 2022 [source data: respective NRA, Eurostat, compiled by Tefficient].

Compared to the unadjusted case, Figure 32, the spread in ARPU is now less. The adherence to the regression line is weak. This means that, compared this way, there's not really any correlation between what the average mobile user pays per month (the ARPU) and how much mobile data he or she consumes.

The average mobile subscriber of **Lithuania** gets a lot of mobile data although the adjusted ARPU is low. The average mobile subscriber of Belgium consumes the least of mobile data but still generates an about-average adjusted ARPU. Defined this way, value for money is best in Lithuania and worst in Belgium.

The difference between Belgium and **Greece**, Germany and the Netherlands is minor, though. These four countries form a cluster where the **value for money is poor**.

The next correlation graph shows the positions of the countries in 1H 2023.

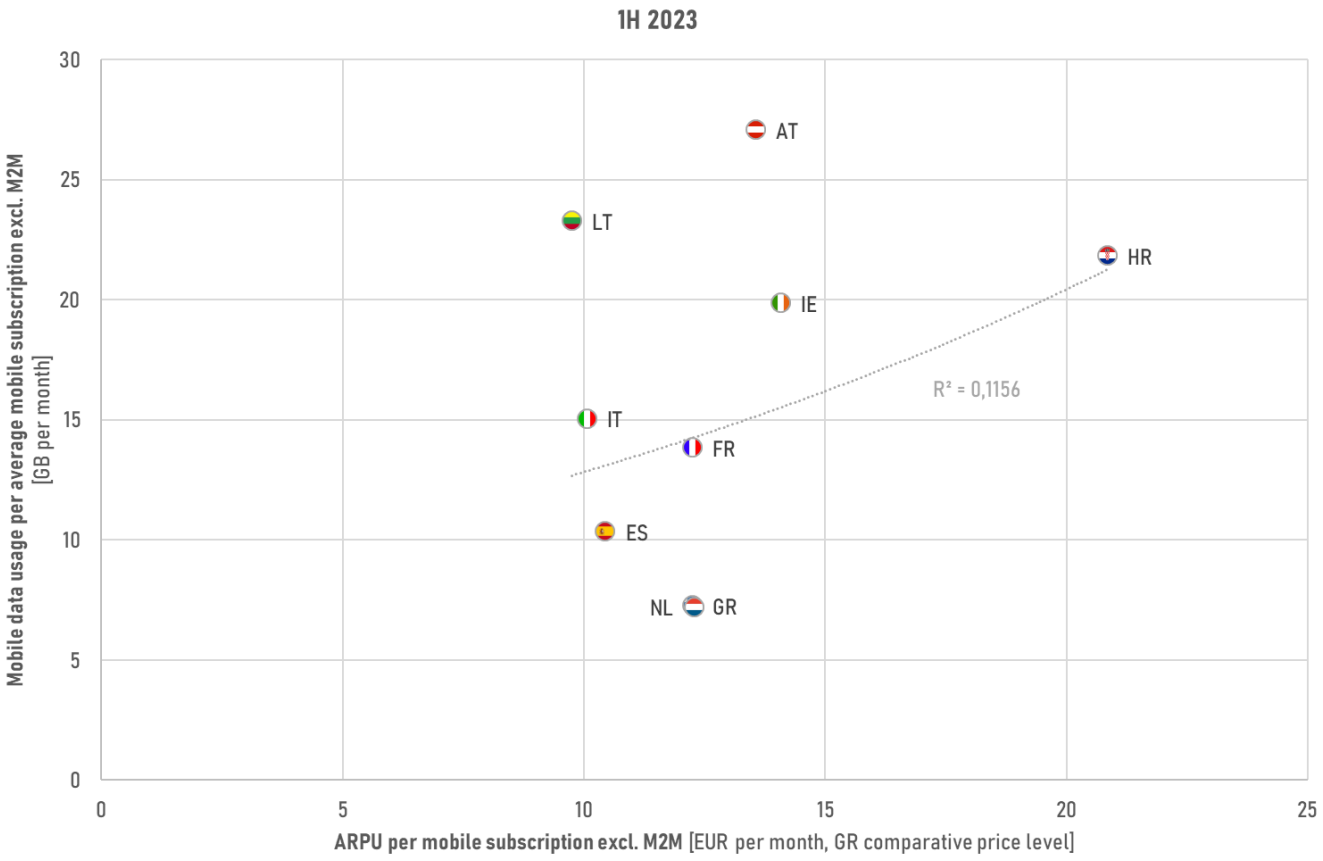

Figure 37. Mobile ARPU[36] adjusted for comparative price level vs. mobile data usage, excl. M2M, 1H 2023 [source data: respective NRA, Eurostat, compiled by Tefficient].

Compared to the 2022 graph, positions have moved upwards since the mobile data usage increased. The ARPU has typically not changed much.

The adherence to the regression line is still weak.

The position of **Greece** is, with consumer eyes, very similar to the Netherlands [the two markers are on top of each other], and worse than in e.g. Spain, Italy and Lithuania where mobile subscribers pay less but still use more data.

After compensation for the comparative price level, the average mobile subscription in Greece (excluding M2M) consumes little data given its ARPU.

When excluding M2M, Greece's value for money position is about as weak as in Belgium, Germany and the Netherlands.

[36] The 1H 2023 revenue of Italy likely is overstated in comparison to how it previously has been stated for the full years.

10.2.2 Including M2M

Now, finally, the two graphs that include M2M.

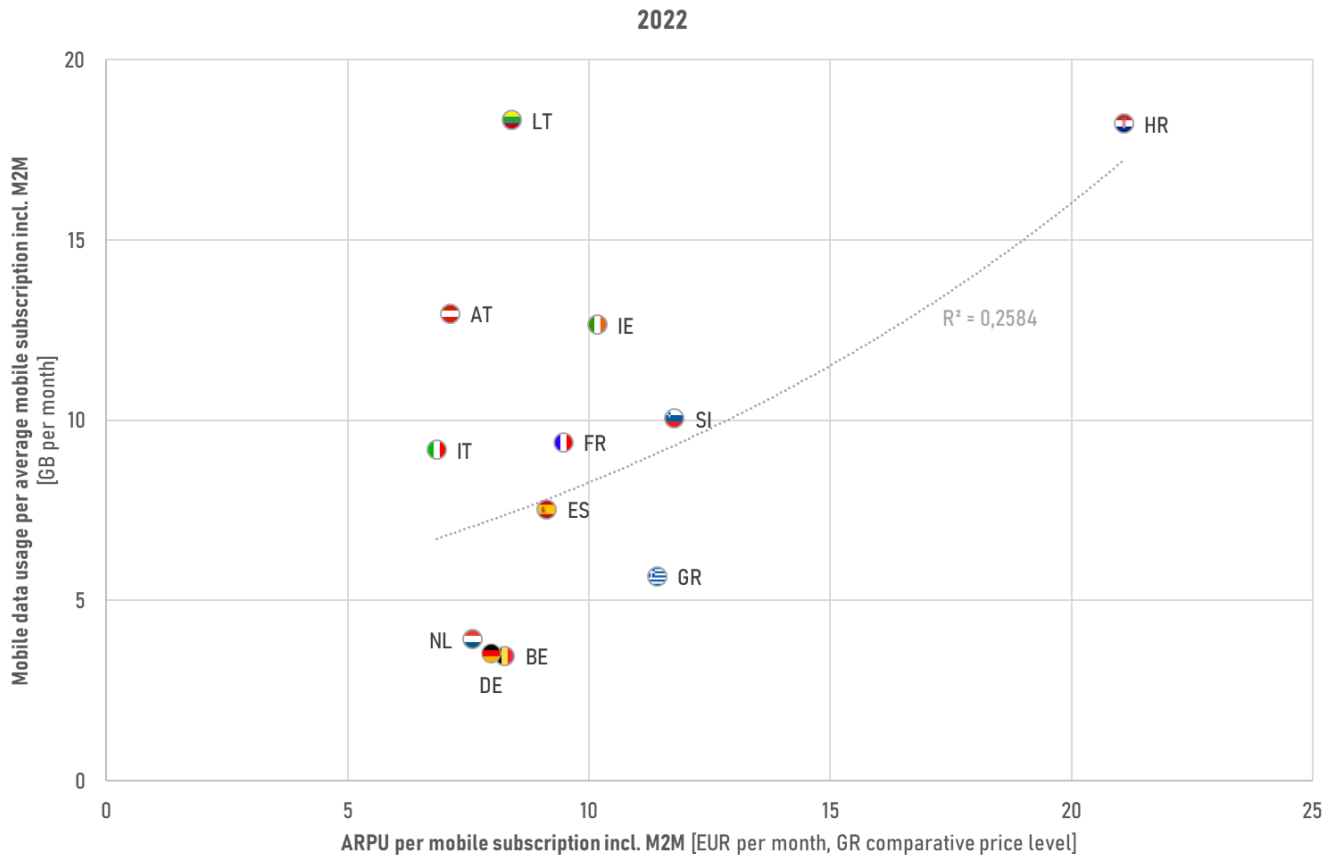

Figure 38. Mobile ARPU adjusted for comparative price level vs. mobile data usage, incl. M2M, 2022 [source data: respective NRA, Eurostat, compiled by Tefficient].

The adherence to the regression line is now stronger than before.

The average mobile subscriber of **Lithuania** gets a lot of mobile data although the adjusted ARPU is low. The average mobile subscriber of Belgium consumes the least of mobile data but still generates an about-average adjusted ARPU. Defined this way, value for money is best in Lithuania and worst in Belgium. Germany and the Netherlands are though close to Belgium.

The value position of **Greece** with more data for more money is, with consumer eyes, quite similar to Belgium, Germany and the Netherlands (who use less but also pay less), and worse than in e.g. Spain, Italy, France, Austria[37], Ireland and Lithuania where mobile subscribers pay less but still use more data.

The next correlation graph shows the positions of the countries in 1H 2023.

[37] Including international M2M SIMs. Excluding these can only be done from 1H 2023.

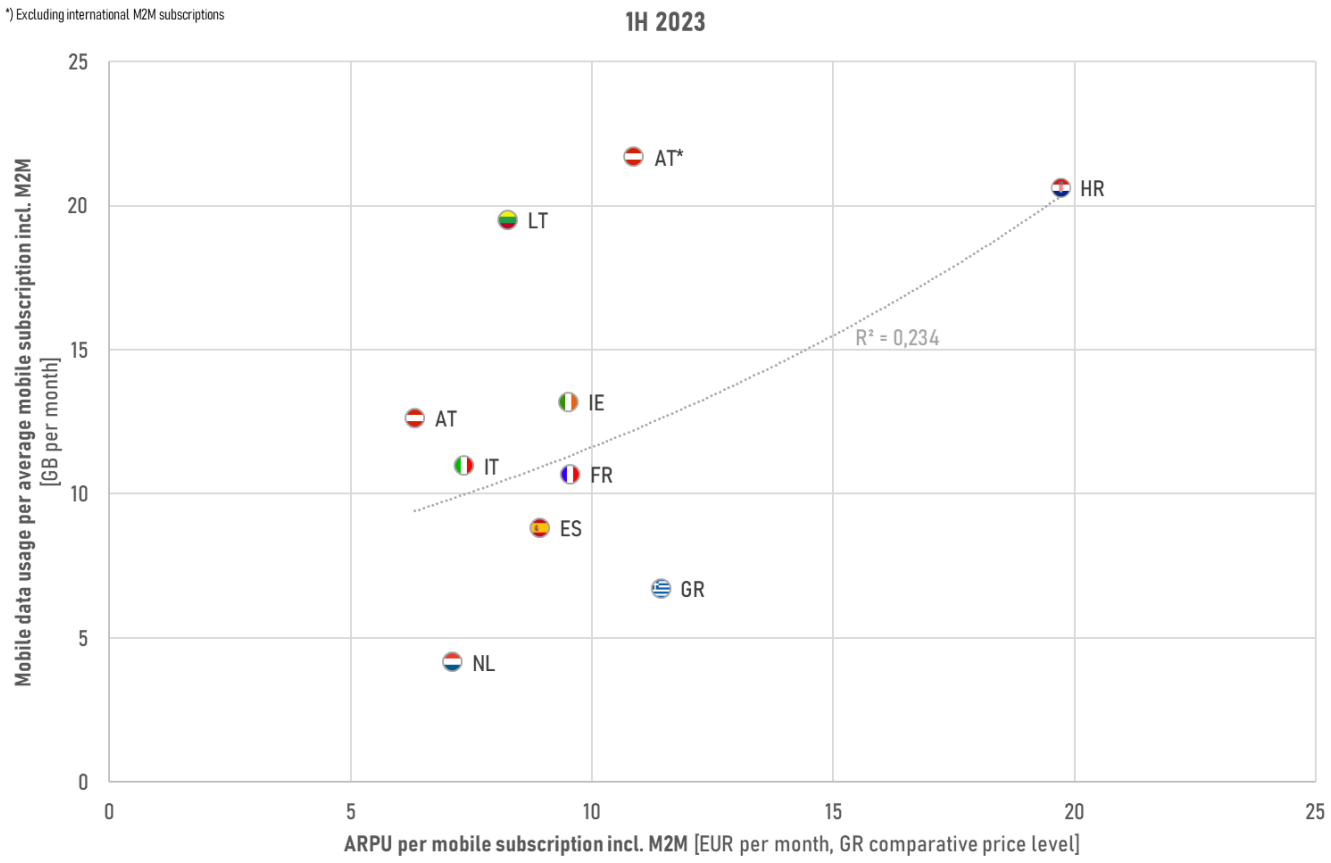

Figure 39. Mobile ARPU[38] adjusted for comparative price level vs. mobile data usage, incl. M2M, 1H 2023 [source data: respective NRA, Eurostat, compiled by Tefficient].

Compared to the 2022 graph, positions have moved upwards since the mobile data usage increased. The ARPU has typically not changed much. We now have the data available to put Austria without international M2M subscriptions (AT*) on the chart.

The adherence to the regression line is weak, demonstrated by a low R^2 value.

The position of **Greece** is, with consumer eyes, similar to the Netherlands (who uses less but pays less), and worse than in e.g. Spain, Italy, Austria[39] and Lithuania where mobile subscribers pay less but still use more data.

After compensation for the comparative price level, the average mobile subscription in Greece (including M2M) consumes little data given its ARPU.

When including M2M, Greece's value for money position is about as weak as in Belgium, Germany and the Netherlands.

[38] The 1H 2023 revenue of Italy likely is overstated in comparison to how it previously has been stated for the full years.
[39] Including international M2M SIMs.

11 Correlation between mobile ARPU and mobile voice usage

11.1 Unadjusted

This section is provided mainly for the sake of completeness since we in the previous section judged that value for money today seldom is linked to the number of mobile voice minutes consumed (but instead to the data consumed).

Figure 40 is the first of four graphs that correlates the mobile ARPU to the mobile voice usage. This one is for 2022, thereby including also the annually-reporting countries Germany and Belgium[40].

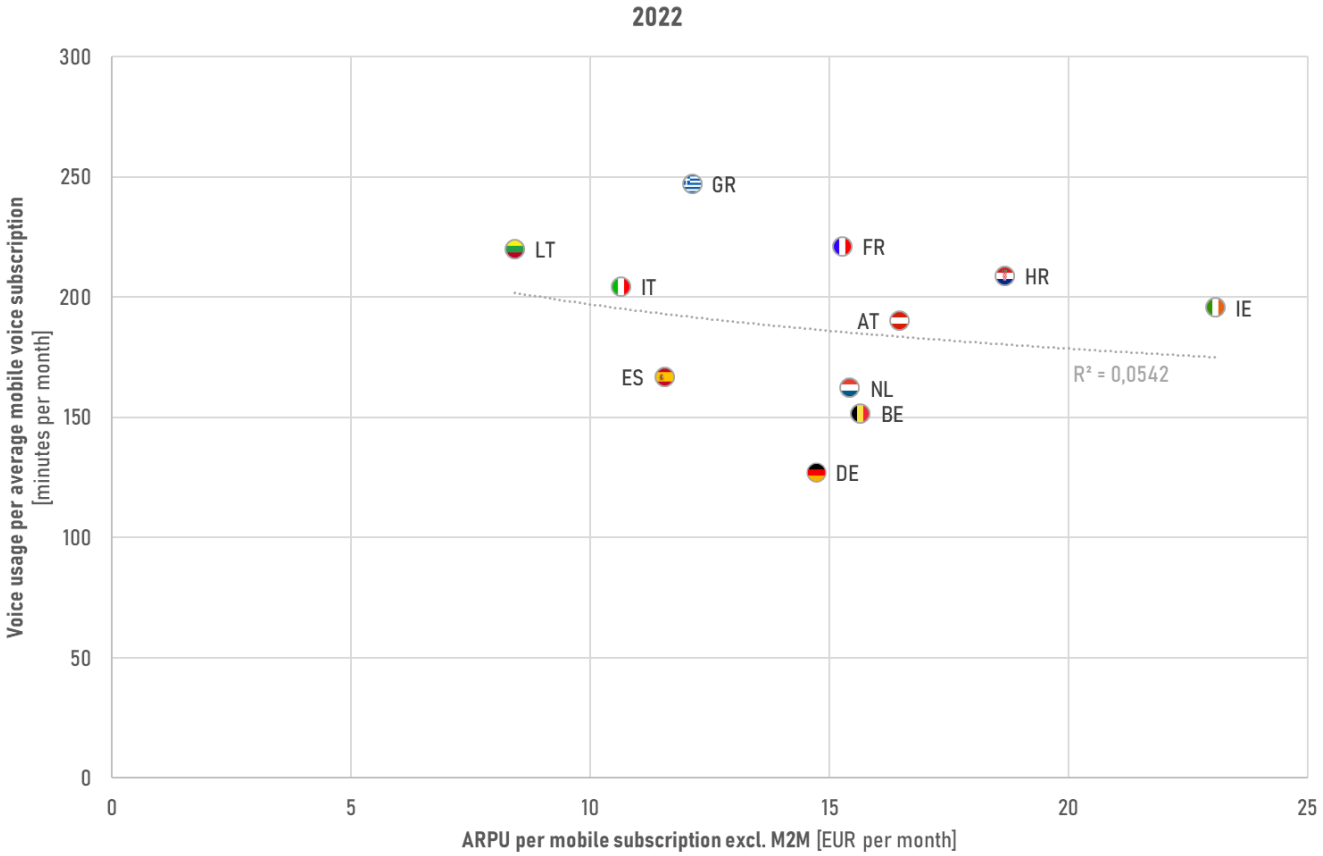

Figure 40. Mobile ARPU vs. mobile voice usage, 2022 [source data: respective NRA, compiled by Tefficient].

The adherence to the regression line is very weak, demonstrated by a low R^2 value. It also points in the logically incorrect direction where an increasing ARPU suggests less, not more, voice usage. In short, there's not any correlation between what the average mobile user pays per month (the ARPU) and how much mobile voice he or she consumes.

[40] Slovenia is missing since the NRA does not report voice traffic.

The average mobile subscriber of **Lithuania** gets a lot of mobile voice although ARPU is the lowest and thus holds the best value for money position. **Germany** seems to be in a weak value position.

Greece has the highest mobile voice usage and with a relatively low ARPU, Greek mobile subscribers get good voice value for money.

The next correlation graph shows the positions of the countries in 1H 2023 which means that Belgium and Germany no longer take part since NRAs report annually there. Neither Italy is in the 1H 2023 chart as voice traffic is just reported annually.

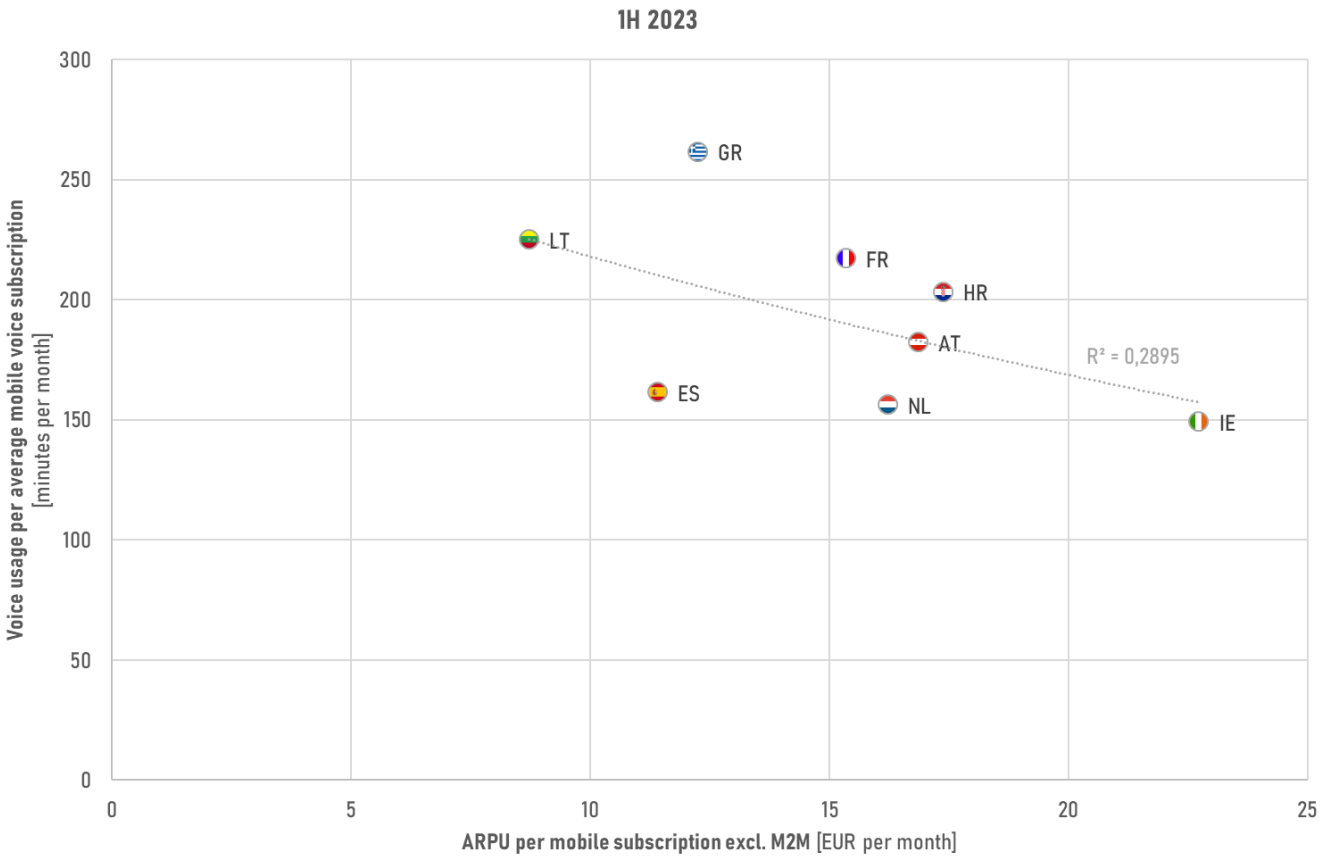

Figure 41. Mobile ARPU vs. mobile voice usage, 1H 2023 [source data: respective NRA, compiled by Tefficient].

The adherence to the regression line is now, with less countries, stronger but still points in the downwards direction.

The average mobile subscriber of **Lithuania** gets a lot of mobile voice although ARPU is the lowest and thus holds the best value for money position. With Germany not in the 1H 2023 chart, **Ireland** seems to be in a weak value position.

Greece has the highest mobile voice usage and with a relatively low ARPU, Greek mobile subscribers get good voice value for money.

Before compensation for the comparative price level, the average mobile voice subscription in Greece consumes the most voice minutes although ARPU is relatively low.

Greece's voice value for money position is hence about as good as Lithuania and Italy.

11.2 Adjusted to the comparative price level of Greece

To conclude this correlation section on voice, here are finally the two last correlation charts in which adjustment has been done to match the comparative price level of Greece.

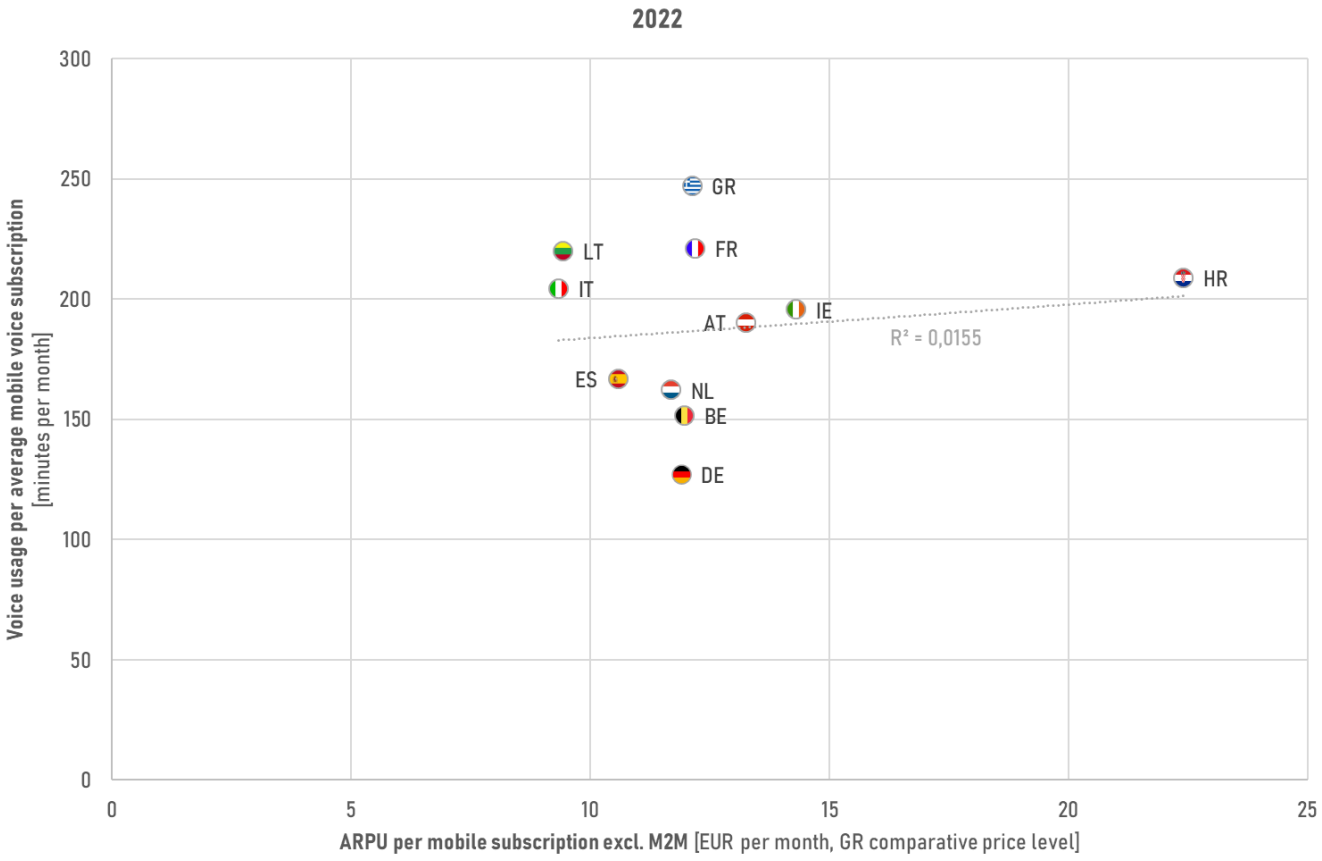

Figure 42. Mobile ARPU adjusted for comparative price level vs. mobile voice usage, 2022 [source data: respective NRA, compiled by Tefficient].

After compensation for the comparative price level, the adherence to the regression line is very weak. There's not any correlation between what the average mobile user pays per month (the ARPU) and how much mobile voice he or she consumes.

The average mobile subscriber of **Lithuania** and **Italy** gets a lot of mobile voice although the adjusted ARPU is low. But **Greece** too, with its highest voice usage and about-average adjusted ARPU, get good voice value for money. **Germany** seems to be in a weak value position.

The last correlation graph shows the positions of the countries in 1H 2023 which means that Belgium and Germany no longer take part since NRAs report annually there. Neither Italy is in the 1H 2023 chart as voice traffic is just reported annually.

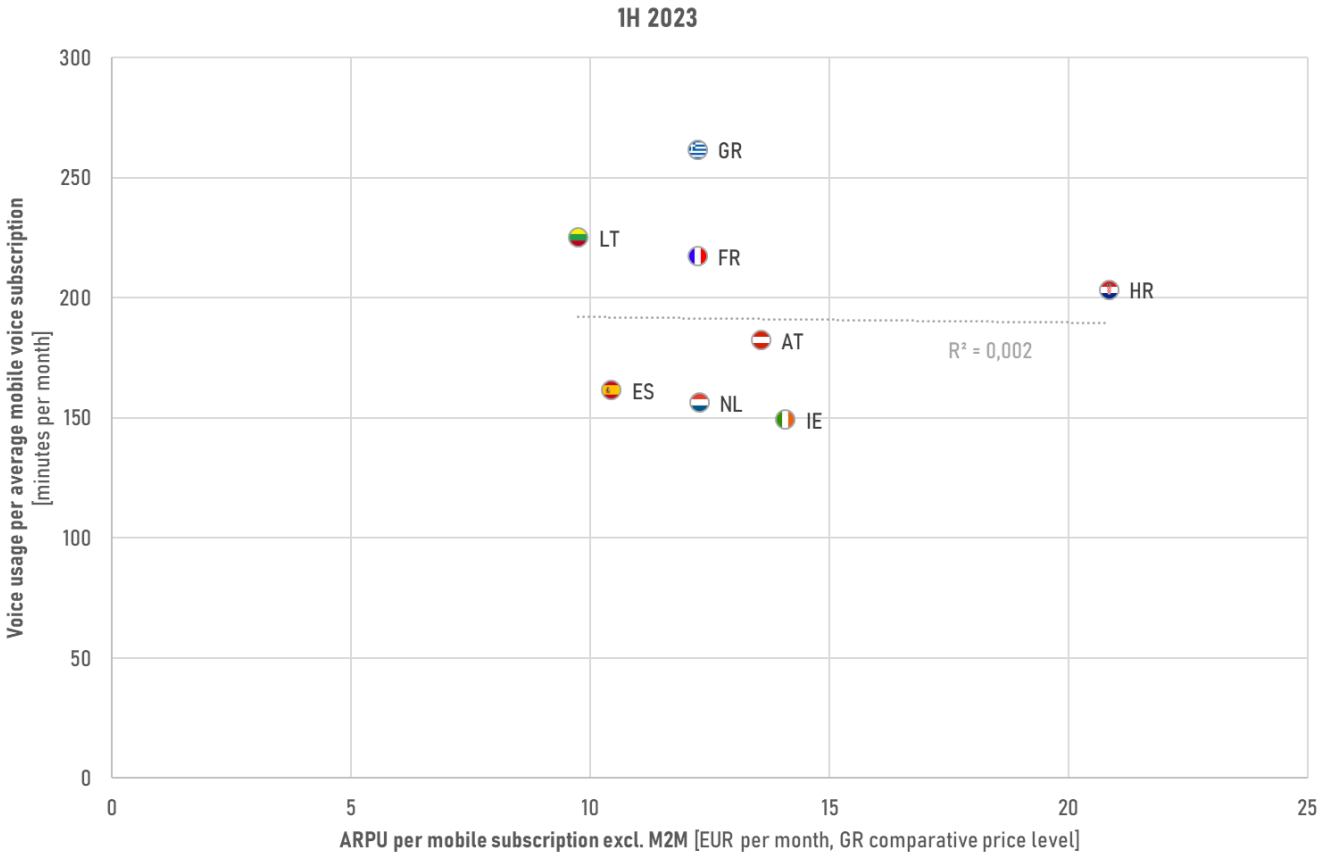

Figure 43. Mobile ARPU adjusted for comparative price level vs. mobile voice usage, 1H 2023 [source data: respective NRA, compiled by Tefficient].

The adherence to the regression line is now non-existent.

The average mobile subscriber of **Lithuania** gets a lot of mobile voice although the adjusted ARPU is the lowest and thus holds the best value for money position alongside **Greece**. With Germany not in the 1H 2023 chart, **Ireland** and **Croatia** seem to be in the weakest value position.

After compensation for the comparative price level, the average mobile voice subscription in Greece consumes the most voice minutes although adjusted ARPU is about-average.

Greece's voice value for money position is hence about as good as Lithuania and Italy.

12 Summary and conclusion

This analysis is commissioned by the Hellenic Telecommunications & Post Commission, EETT, and is the first of its kind with focus on Greece. It assesses the present and historical mobile data and voice usage and the mobile revenues of Greece in a wider EU context and draws conclusions on value for money based on it.

The analysis derives its insights from actual usage patterns and revenues rather than focussing on the market's best offerings or theoretical service baskets. Careful consideration was given to selecting peer group countries to ensure robust data comparisons, minimising potential distortions such as currency fluctuations.

Revenue comparisons are meticulously conducted, both with and without adjustments for comparative price levels. Furthermore, to account for the potential influence of M2M communications on the findings, comparisons are presented with and without M2M data where relevant.

When summarising the findings on **Greece** below, we will use a matrix to cover all four cases.

Mobile ARPU – approximately on par but with a notable increase

The mobile ARPU of Greece is on par with the median peer group market – or slightly higher. Greece has had a more positive development (CAGR) in its ARPU than most other peer group markets.

Mobile ARPU	Before compensation for the comparative price level	After compensation for the comparative price level
Excl. M2M	↓ ARPU below median ↑ CAGR above median	○ ARPU close to median ↑ CAGR above median
Incl. M2M	↑ ARPU slightly above median ↑ CAGR above median	↑ ARPU above median ↑ CAGR above median

Mobile data usage – low but exhibits the most significant growth

Greece's mobile data usage is below the median of the peer group. Greece has had a more positive development (CAGR) in its data usage than all other peer group markets.

Mobile data usage	
Excl. M2M	↓ Usage below median ↑ CAGR fastest
Incl. M2M	↓ Usage below median ↑ CAGR fastest

Mobile voice usage – the highest among the peer group but continues to see robust growth

Greece's mobile voice usage is the highest among the peer group. Greece has had a more positive development (CAGR) in its voice usage than most other peer group markets.

Mobile voice usage	
Excl. M2M	↑ Usage highest ↑ CAGR above median

Total mobile revenue per GB of mobile data – high but demonstrates a marked decrease

The total mobile revenue per GB of mobile data of Greece is higher than the median of the peer group. Greece has had a more negative development (CAGR) in its revenue per GB than most other peer group markets.

Revenue per GB	Before compensation for the comparative price level	After compensation for the comparative price level
Excl. M2M	↑ Revenue above median ↓ CAGR below median	↑ Revenue above median ↓ CAGR below median
Incl. M2M	↑ Revenue above median ↓ CAGR below median	↑ Revenue above median ↓ CAGR below median

Voice revenue per voice minute – aligns with the median with median erosion

The voice revenue per voice minute of Greece is close to the median of a limited peer group. Greece has had a close to median erosion (CAGR) in its revenue per minute.

Revenue per minute	Before compensation for the comparative price level	After compensation for the comparative price level
Excl. M2M	○ Close to median ○ CAGR close to median	○ Close to median ○ CAGR close to median

Data value for money – weaker than most of its peers

The mobile ARPU of Greece is on par with the median peer group market – or slightly higher. The data usage is though below the median, resulting in a weaker value for money position than for most of the peer group markets – except for Belgium, Germany and the Netherlands.

Mobile data for ARPU	Before compensation for the comparative price level	After compensation for the comparative price level
Excl. M2M	↓ Usage below median ↓ ARPU below median Better value for money than in BE, DE and NL	↓ Usage below median ○ ARPU close to median About as weak value for money as in BE, DE and NL
Incl. M2M	↓ Usage below median ↑ ARPU slightly above median About as weak value for money as in BE, DE and NL	↓ Usage below median ↑ ARPU above median About as weak value for money as in BE, DE and NL

Voice value for money – stronger than most of its peers

The mobile ARPU of Greece is on par with the median peer group market – or slightly lower. The voice usage is the highest in the peer group which results in a stronger value for money position than for most of the peer group markets – only Lithuania and Italy are as good.

Mobile voice for ARPU	Before compensation for the comparative price level	After compensation for the comparative price level
Excl. M2M	↑ Usage highest ↓ ARPU below median As strong value for money as in LT and IT	↑ Usage highest ○ ARPU close to median As strong value for money as in LT and IT

Conclusion

In conclusion, Greek mobile subscribers appear to pay a standard monthly amount to their providers, although consuming relatively less data and more voice. Given that voice minutes are typically not billed per minute in today's market, the emphasis on value for money should shift towards mobile data, which remains primarily monetised per gigabyte.

Greece's value for money positioning within the peer group is among the weakest, comparable to countries like Belgium, Germany, and the Netherlands. However, Greece's trajectory shows promise, fuelled by the peer group's most rapid growth in data usage.

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