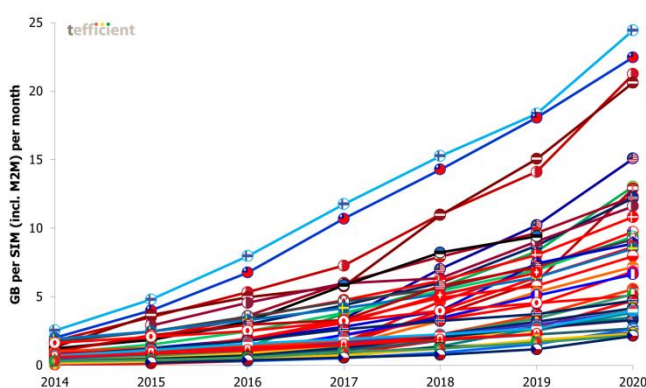


Industry analysis #2 2021

Mobile data – full year 2020

Mobile data usage got a boost when we were immobile

We sat at home, but Wi-Fi offloaded mobile data only in a few countries



Tefficient's 31st public analysis of the development and drivers of mobile data compares 44 countries from all regions of the world.

The pandemic affected us all but although we to a high extent spent the year in our homes, mobile data usage increased in every single country. Mobile data is apparently not just used by people on the move.

Generally speaking, the growth accelerated in 2020; only a few countries experienced a slower growth rate.

Finland, Taiwan, Bahrain and Latvia lead the world in average data usage per subscription. But with 111%, Croatia leads the world in usage growth. Australia, the Netherlands and New Zealand had the slowest growth. In these countries, home Wi-Fi seems to have offloaded mobile data.

Data-only defines the average mobile data usage although the share of base is limited. This is old news, but we believe that the pandemic fuelled the usage of data-only subscriptions as these often are used as a substitute to fixed broadband. The pandemic drove the overall internet traffic and mobile data-only got its fair share of that.

Using mobile data has never been cheaper but the erosion in the revenue per gigabyte varies a lot between markets. Croatia had the fastest erosion, 53%, and India the slowest with just 5%.

And how did ARPU then develop? To answer that, we present an updated Christmas tree graph.

Data usage is still growing in every single country

Figure 1 shows the development of mobile data usage for 44 countries where regulators¹ report mobile data traffic. The usage is shown per SIM per month – and in Figure 1 we are including all² SIMs, also M2M/IoT SIMs.

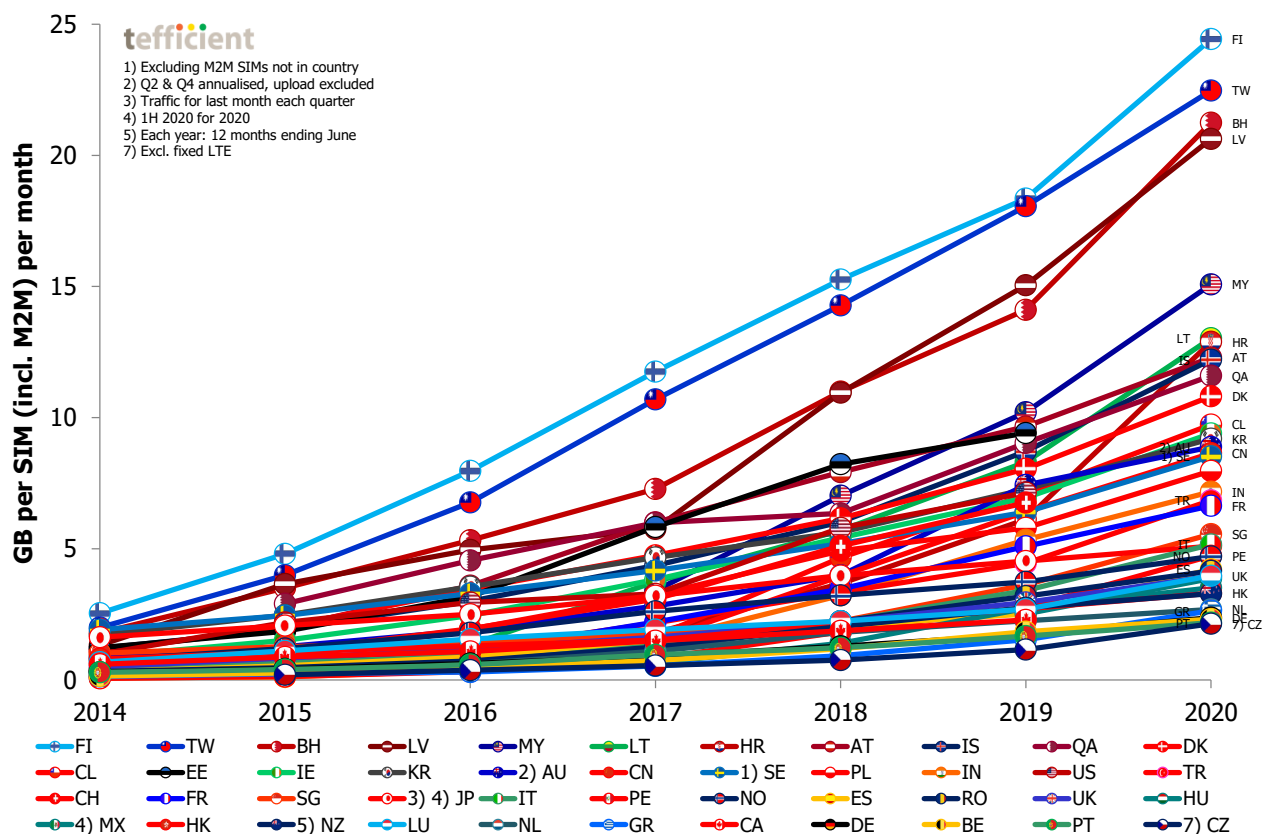


Figure 1. Development of mobile data usage per SIM (incl. M2M) per month – the legend shows the ranking³

Starting from the top of the chart, **Finland** and **Taiwan** are defending the number one and two positions in the world when it comes to mobile data usage. The average Finnish SIM card carried 24.4 GB of data per month in 2020. **68%** of the Finnish SIMs (M2M included) had **unlimited data volume** in December 2020. If excluding M2M, 80%. If excluding also voice-only SIMs, 85%. No other country is as unlimited as Finland.

The average Taiwanese SIM carried 22.5 GB per month. Unlimited is behind **Taiwan's** usage development as well. The Taiwanese operators – there are five MNOs – have tried to cool off the market by attempting to

¹ Exception: USA, where the data is from the industry body CTIA

² All SIMs in a market included; even the SIMs that used no or little data. We think it provides a better comparison than usage per 'mobile broadband subscription' even if it lowers the average mobile data usage numbers somewhat.

³ USA, Estonia, Switzerland and Canada have not yet reported. Japan and Mexico have to date just reported figures for 1H 2020. Italy and Czech Republic still need to report their revenues although subscriptions and traffic have been reported.

move the unlimited price points upwards while discontinuing unlimited for customers that have run out of binding, but the discipline isn't there – ARPU is still in decline.

Bahrain (21.2 GB) surpassed **Latvia** (20.6 GB) during 2020 and both have come closer to the leader duo. **Malaysia's** (15.1 GB) data usage growth continues too and its number 5 position was strengthened in 2020.

The M2M reporting dilemma

Regulators' reporting of M2M/IoT SIMs continues to create a challenge for the comparability between countries. A growing problem is international M2M SIMs that are registered in one country but used somewhere else. Sweden is a good example. The country regulator, PTS, reports 16.9 million M2M SIMs in Sweden – a figure that more than doubles the total SIM base if added to the regular SIM base of 14.3 million. We are therefore happy that PTS now reports the number M2M SIMs that are active in Sweden; 3.9 million, i.e. just 23% of the total M2M base. This has allowed us to recalculate a more representative mobile data usage figure for Sweden when including M2M.

The same issue emerges in Austria where Deutsche Telekom group registers many of its international M2M SIMs. The number of 'Austrian' M2M SIMs as reported by RTR grew 25% in 2020 – to 6.2 million. Similar to how it was for Sweden previously, Austria's average mobile data usage per SIM thus looks lower when including M2M SIMs than what it realistically is. Luckily Austria's regulator is one of those breaking out M2M SIMs in its reporting allowing a like-for-like comparison of mobile data usage per *non-M2M* SIM, see Figure 2 and Figure 4.

Figure 2 is a variant of Figure 1 but with M2M SIMs *excluded*. As the M2M SIMs typically carry significantly less traffic than the regular SIMs, this makes the usage figures look higher.

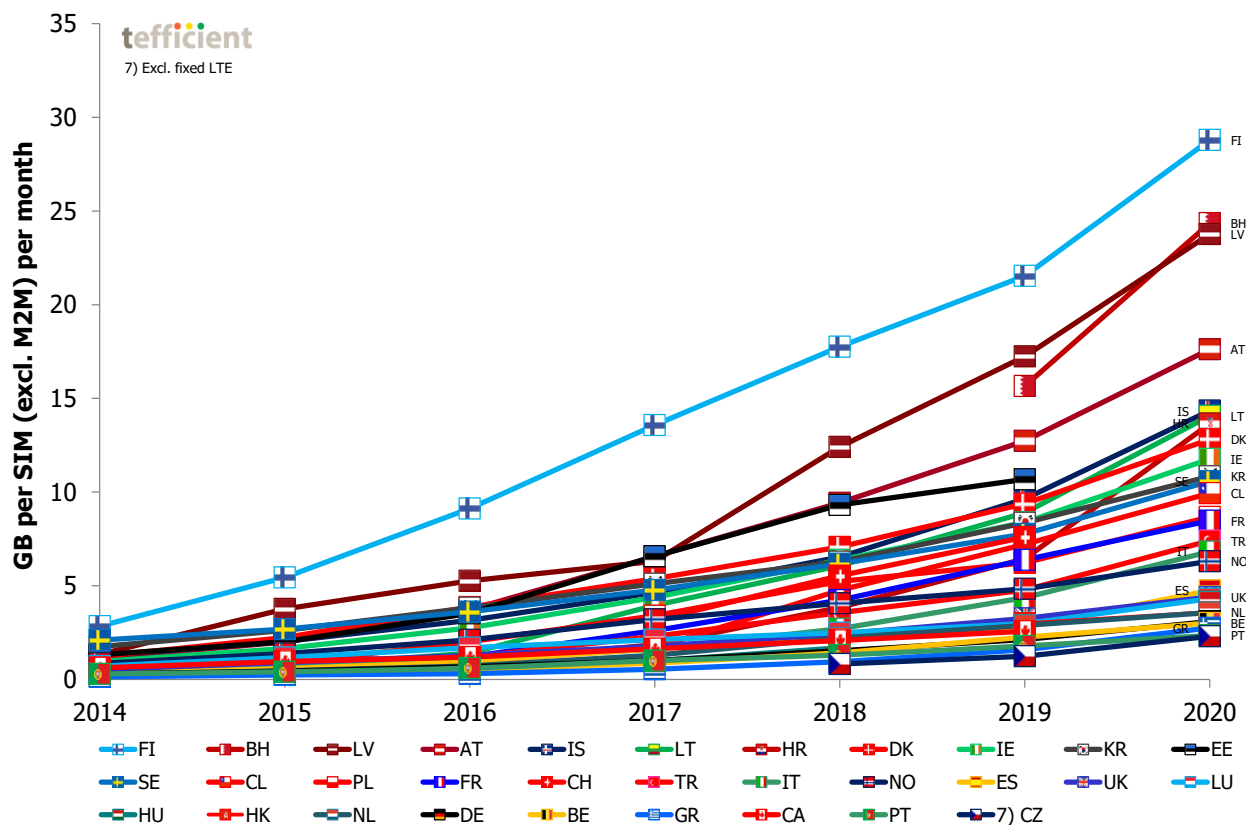


Figure 2. Development of mobile data usage per SIM (excl. M2M) per month – the legend shows the ranking⁴

Since only a fraction of the countries separate out the data traffic associated with M2M SIMs in their reporting (kudos to Norway, Sweden, Czech, Bahrain and Greece), the assumption for most of the countries in Figure 2 is that the M2M data usage is zero. This is of course not correct and as we could expect M2M/IoT SIMs to carry more traffic in future, we think that Figure 1 provides the most accurate comparison.

With **28.8 GB** per non-M2M SIM per month, **Finland** tops also Figure 2. **Bahrain** follows with 24.3 GB and **Latvia** with 23.8 GB. Taiwan and Malaysia have disappeared from the top five here as the M2M SIM number isn't broken out in these countries.

The legends of Figure 1 and Figure 2 show the ranking of the 44 studied countries. But since it's difficult to spot them all, Figure 3 and 4 offer an easier visualisation. First including M2M:

⁴ Countries for which the regulator doesn't break out the M2M SIMs have been excluded

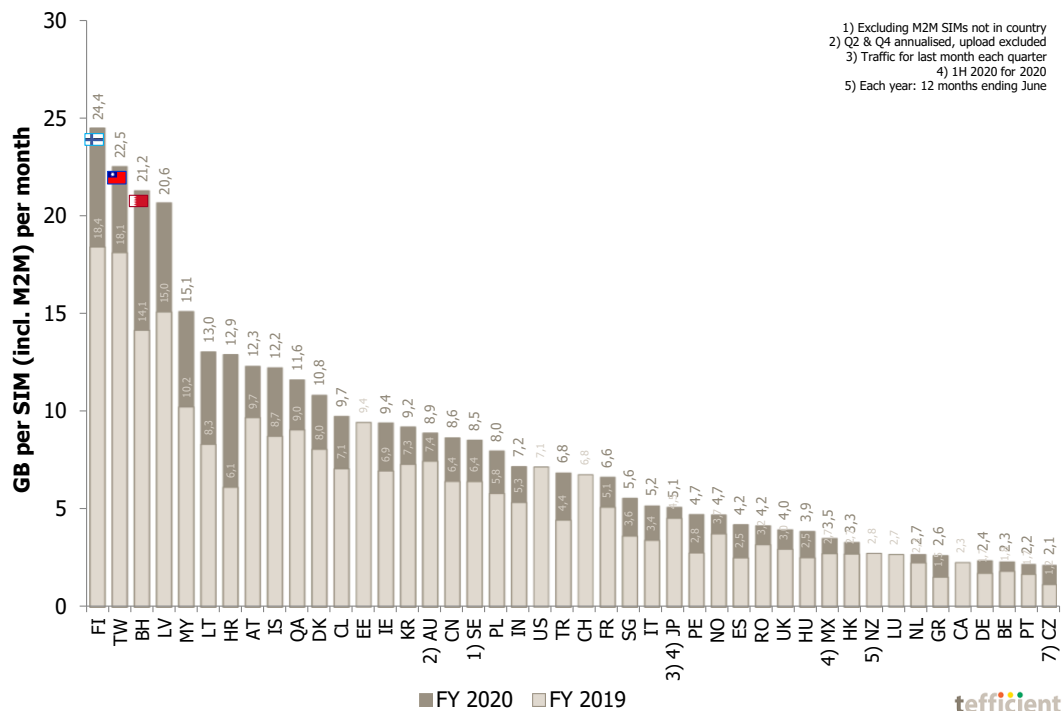


Figure 3. Mobile data usage per SIM (incl. M2M) per month, 2020 and 2019

And in Figure 4 excluding M2M:

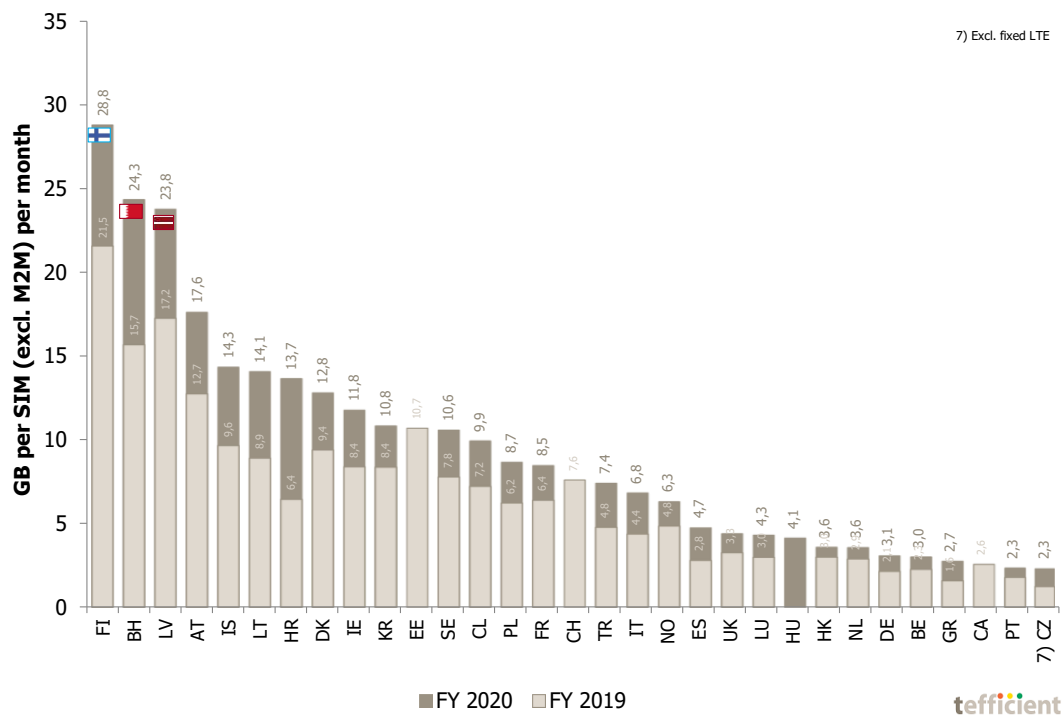


Figure 4. Mobile data usage per SIM (excl. M2M) per month, 2020 and 2019

The countries with the lowest data usage in both Figure 3 and Figure 4 are **Czech Republic**⁵, **Portugal**, **Belgium**, **Germany**, **Canada**⁶, and **Greece**.

Figure 5 is a zoom-in on the lower end of Figure 1.

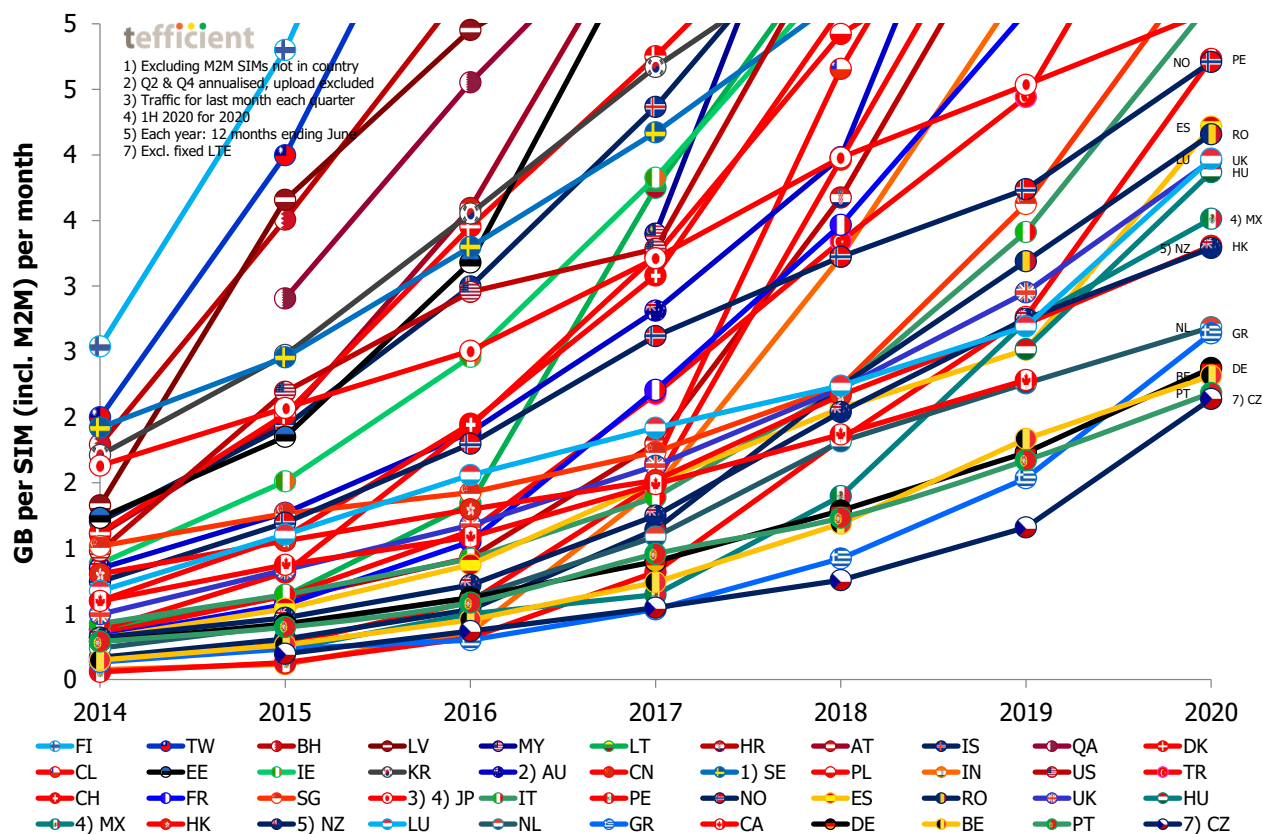


Figure 5. Development of mobile data usage per SIM (incl. M2M) per month [zoom-in on low end]

In the lower usage range, **Peru**, **Spain**, **Greece** and **Czech Republic** demonstrated good usage growth in 2020.

⁵ Note that the fixed LTE traffic is excluded in the reported mobile data traffic of the regulator CTU. To make it comparable with other markets, we could have added it, if only CTU reported it.

⁶ Based on the latest available (2019) data

Data usage growth fastest in Croatia – more than doubled y-o-y

Figure 6 shows the growth in average usage per SIM (incl. M2M) between 2019 and 2020.

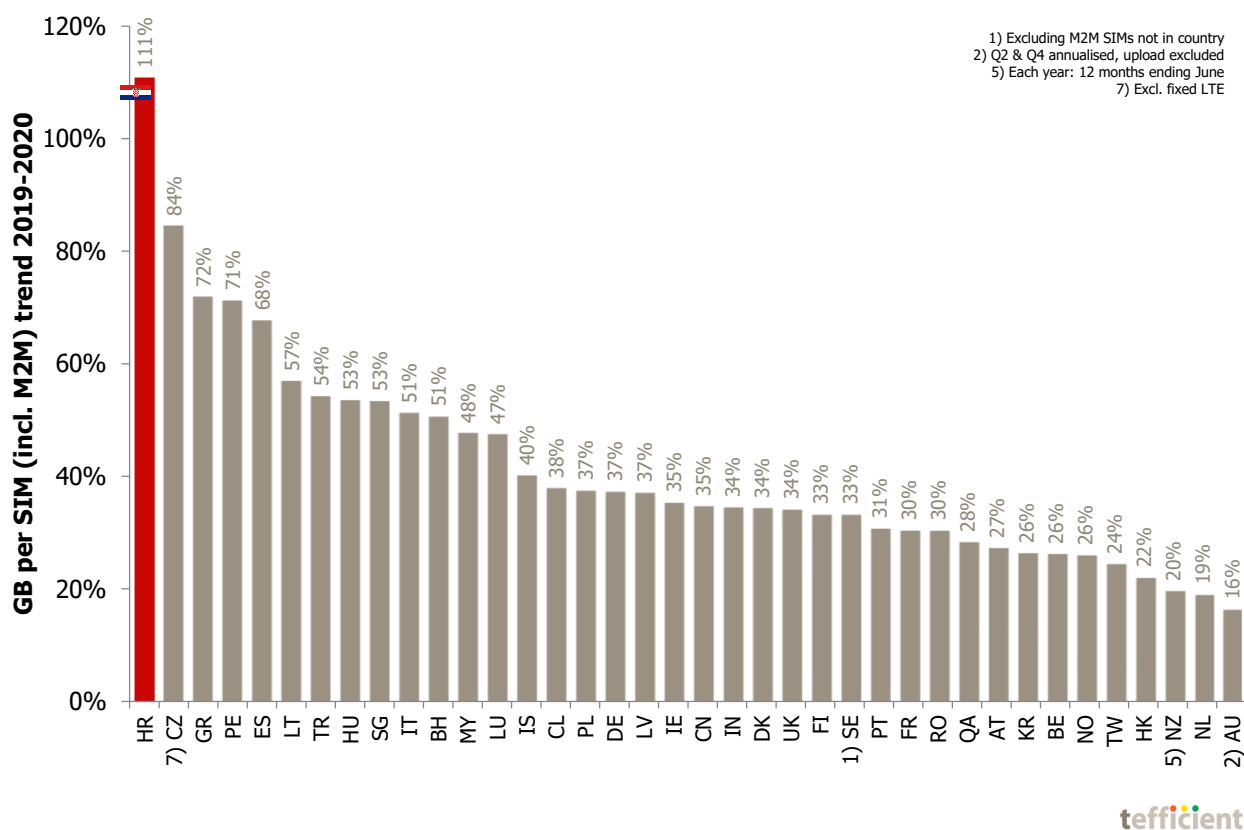


Figure 6. Development of mobile data usage per SIM 2019-2020

Croatia outpaced every other market in mobile data usage growth. The average Croatian SIM used 111% more mobile data in 2020 than what it did in 2019. The usage of **Czech Republic** grew 84%, **Greece's** 72%, **Peru's** 71% and **Spain's** 68%. The previous growth powerhouses India and China had more modest growth rates this time; 34-35%.

The growth laggards in Figure 6 are **Australia** (16%), the **Netherlands** (19%) and **New Zealand** (20%). Although COVID-19 measures might have influenced, we need to mention that the two MNOs that drove unlimited into the Dutch market – T-Mobile and Tele2 – merged in January 2019. Also Australia had a merger – between Vodafone and TPG in July 2020 after long preparations – and although TPG wasn't a MNO, it had been quite successful as MVNO so the merger concentrated the mobile market. The Australian Competition & Consumer Commission (ACCC) opposed the merger and [last month criticised](#) the three MNOs for raising prices.

Australia, the Netherlands, and New Zealand had the slowest usage growth

Data-only rarely more than 20% of base, but defines usage

Although **fixed wireless access** (FWA) seems to experience a renaissance with 5G, using mobile networks to substitute fixed broadband is hardly something new. In some markets, like Finland and Austria, this has been around for long. The take-up can be significant if the FWA/data-only offers are reasonably charged and without usage caps. It also helps if the fixed broadband offering is weak with much DSL is the mix.

Since Q4 2017, the regulator RTR publishes the fixed data traffic of **Austria**. If we compare it to the mobile data traffic, it's obvious how important the mobile networks are for the overall internet of the country: In the fourth quarter of 2020, the mobile data traffic was **57%** of the fixed data traffic. But maybe there's a trend shift coming; in Q2 2020 it was even higher; 60%.

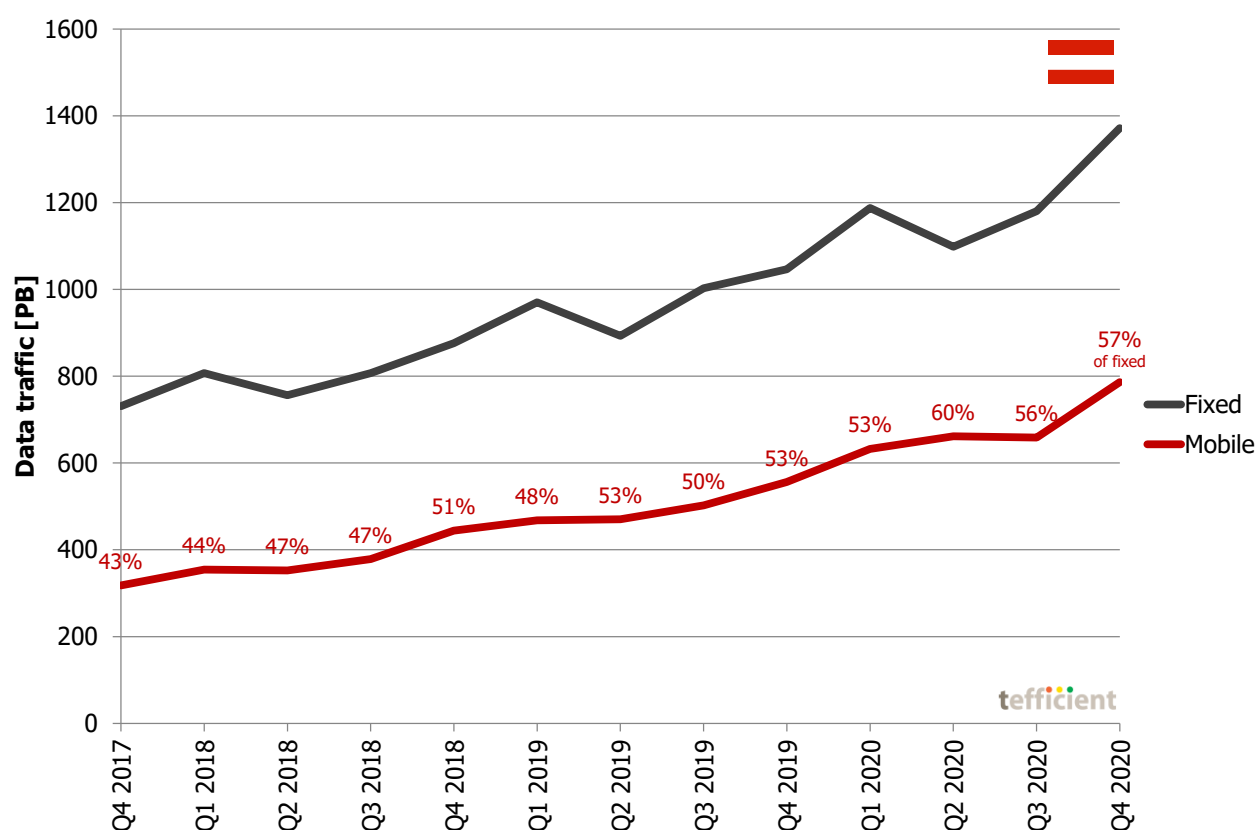


Figure 7. Development of fixed and mobile data traffic in Austria

This takes us to Figure 8. It plots the average data usage per SIM vs. the data-only share of a country's SIM base.

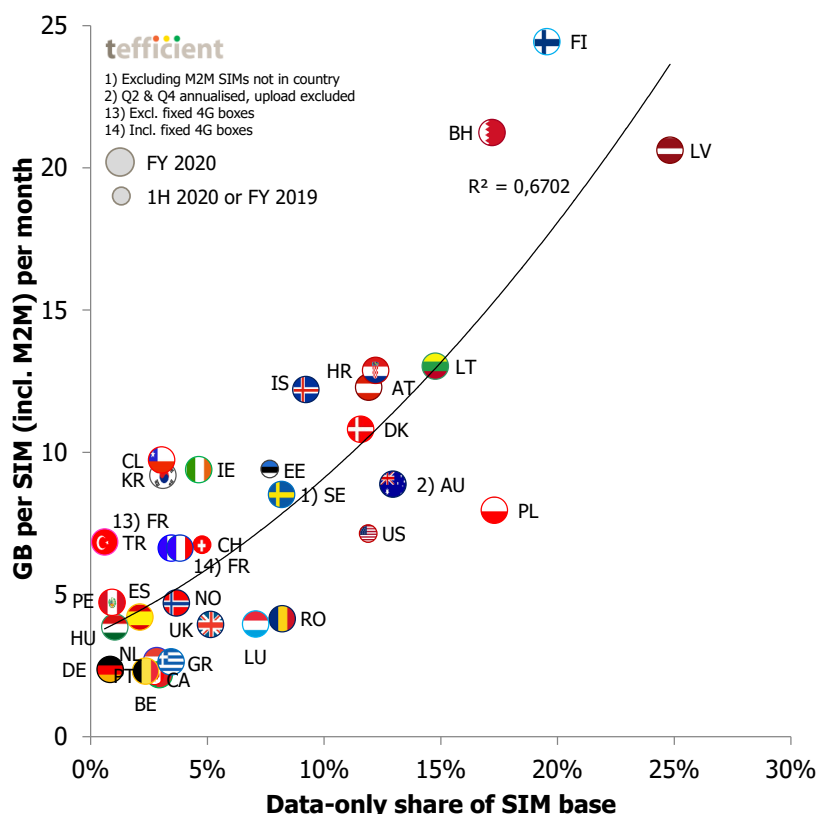
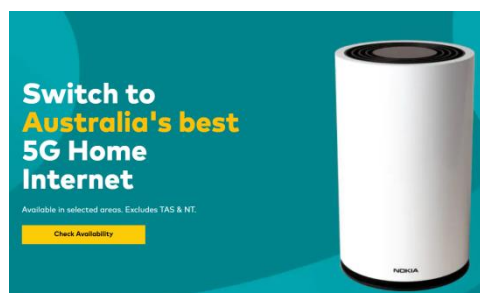


Figure 8. Mobile data usage vs. data-only share

In December 2020, **25%** of the SIM base in Latvia was data-only. That makes **Latvia** the leader in data-only share of base – and the average mobile data usage was also high. In **Finland** data-only represented 20% of the base but usage was even higher than in Latvia. Also **Bahrain** had a high data-only share – 17%. There are ten countries forming a central cluster between 8% and 16%: Estonia, Sweden, Iceland, Denmark, USA, Austria, Croatia, Australia, Lithuania and Poland.

The adherence to the regression line is relatively strong. As in all previous reports we therefore conclude that **data-only penetration is a significant driver of the average mobile data usage**.



The easiest way for low-usage countries to grow data usage and expand the mobile market would be to **start addressing and monetising the data-only segment**. This seems to be effective particularly in markets where fast fixed broadband networks (FTTH, FTTB or HFC) aren't already available to a substantial share of the households. The US wireless market leader **Verizon** launched its first **5G** branded service in December 2018 to support a fixed wireless access (FWA) use case. Operators such as Optus in Australia (left), 3 in the UK, Sunrise in

Switzerland, 3 in Austria and DNA & Elisa in Finland have all followed Verizon into **5G-based FWA**. Figure 8 shows that even a relatively low share of such data-only subscriptions could lift the average data consumption significantly.

Some of the countries in Figure 8 are also reporting the data-only traffic. For these countries, we can compare the data-only penetration of the SIM base to its share of the total mobile data traffic, see Figure 9.

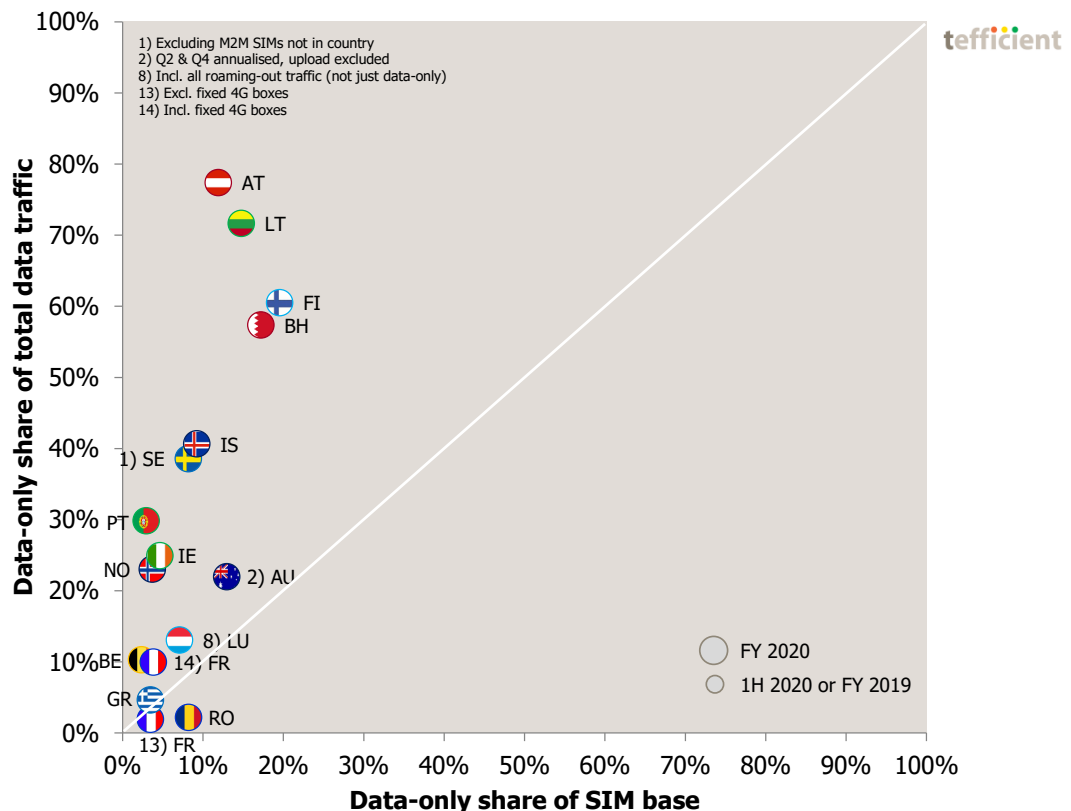


Figure 9. Data-only share of total traffic vs. data-only share of SIM base

With the exception of Romania, data-only SIMs carry a disproportionately high share of the data traffic:

- Portugal **10.2x** higher traffic per data-only SIM vs. any SIM
- Austria **6.5x**
- Norway **6.3x**
- Ireland **5.4x**
- Lithuania **4.9x**
- Sweden **4.7x**
- Iceland **4.4x**
- Belgium **4.4x**
- Bahrain **3.3x**
- Finland **3.1x**

- France (incl. fixed 4G boxes) **2.6x**
- Luxembourg **1.9x**
- Australia **1.7x**
- Greece **1.4x**
- Romania **0.3x**

In addition to the countries in Figure 9, there is one which doesn't report data-only SIM base, but data-only's share of traffic: In **China**, 5% of mobile data traffic wasn't carried over regular mobile phones.

For the countries that are reporting both data-only traffic and the number of data-only subscriptions, we can compare the average usage per *data-only* subscription, see Figure 10.

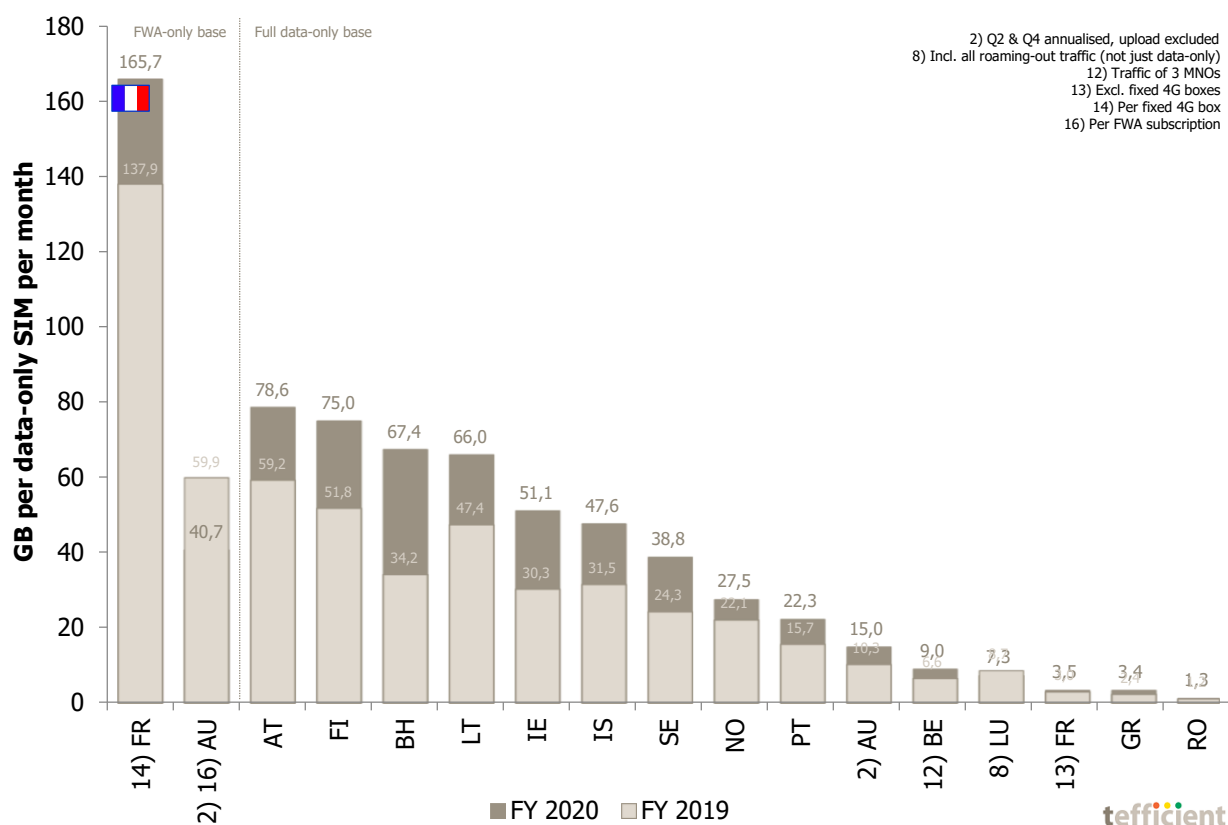


Figure 10. Mobile data usage per data-only SIM per month, 2020 and 2019

Starting from the left, the average '4G box' in **France** carried **165.7 GB** of mobile data per month in 2020. This is significantly higher than for the other FWA-only usage number in Figure 10: In Australia, the usage per FWA subscription was 40.7 GB in 2020 – actually a decline from the 59.9 GB reported for 2019.

If instead looking at the *whole* data-only base (not just the FWA segment), **Austria** leads with the average mobile data consumption per data-only SIM of **78.6 GB**.

The average Austrian data-only subscription consumed 78.6 GB per month in 2020

Finland had 75.0 GB. **Bahrain** follows with 67.4 GB – and very fast growth. **Lithuania** is just behind with 66.0 GB.

If **5G** should become the fibre-over-radio solution that e.g. Verizon, Sunrise and others suggest, the data-only FWA usage figure of France gives a taste of the usage that the solution must at least manage. Fixed broadband usage is yet higher – often around 300 GB per month.

The appetite that operators show for FWA seems to make them let go of their **anxiety for unlimited** within the data-only segment. Figure 11 shows something quite interesting.

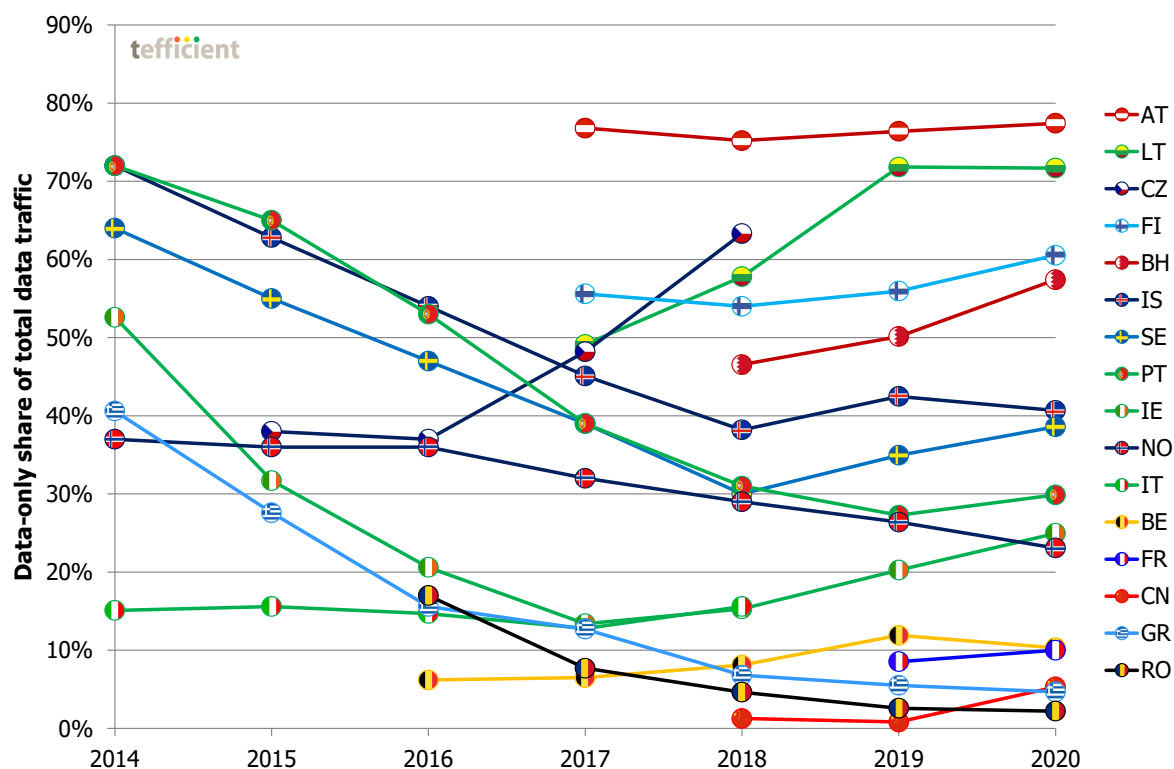


Figure 11. Development in the data-only share of total mobile data traffic – for all reporting countries

Data-only's *share* of traffic decreased until 2018. It's not necessarily that the absolute data-only traffic decreased, but the growth of the smartphone traffic was much quicker. But something happened in 2019 which continued in 2020.

For a number of markets – Austria, Finland, Bahrain, Sweden, Portugal, Ireland, France and China – **data-only traffic gained market share** in 2020. Of our markets, Iceland, Norway, Belgium, Greece and Romania had a decline. Overall, the trend seems to have turned to a higher share of traffic originating from data-only subscriptions. It's must be because of Corona, right? No; that trend shift happened already in 2019. We instead attribute it to FWA and the wider adoption of unlimited within operators' data-only propositions.

Data-only's share of total traffic started to grow again in many markets

4G adoption a weakening driver of data usage – 5G a different story

Ever since Tefficient started to publish these mobile data analyses back in 2013, we have checked mobile data usage against the 4G adoption. With the growing adoption of 4G, that correlation has weakened and weakened. Unlike data-only, 4G adoption is no longer defining data usage.

As 5G has been in commercial operation in more than two years by now, it would be more interesting to now correlate mobile data usage with **5G** adoption. Too few regulators (and operators for that sake) are however reporting 5G traffic – and 5G base – to make a sensible correlation graph for 5G. We strongly encourage regulators to see to that 5G numbers are reported.

Figure 12 below gathers all 5G information reported for our 44 markets.

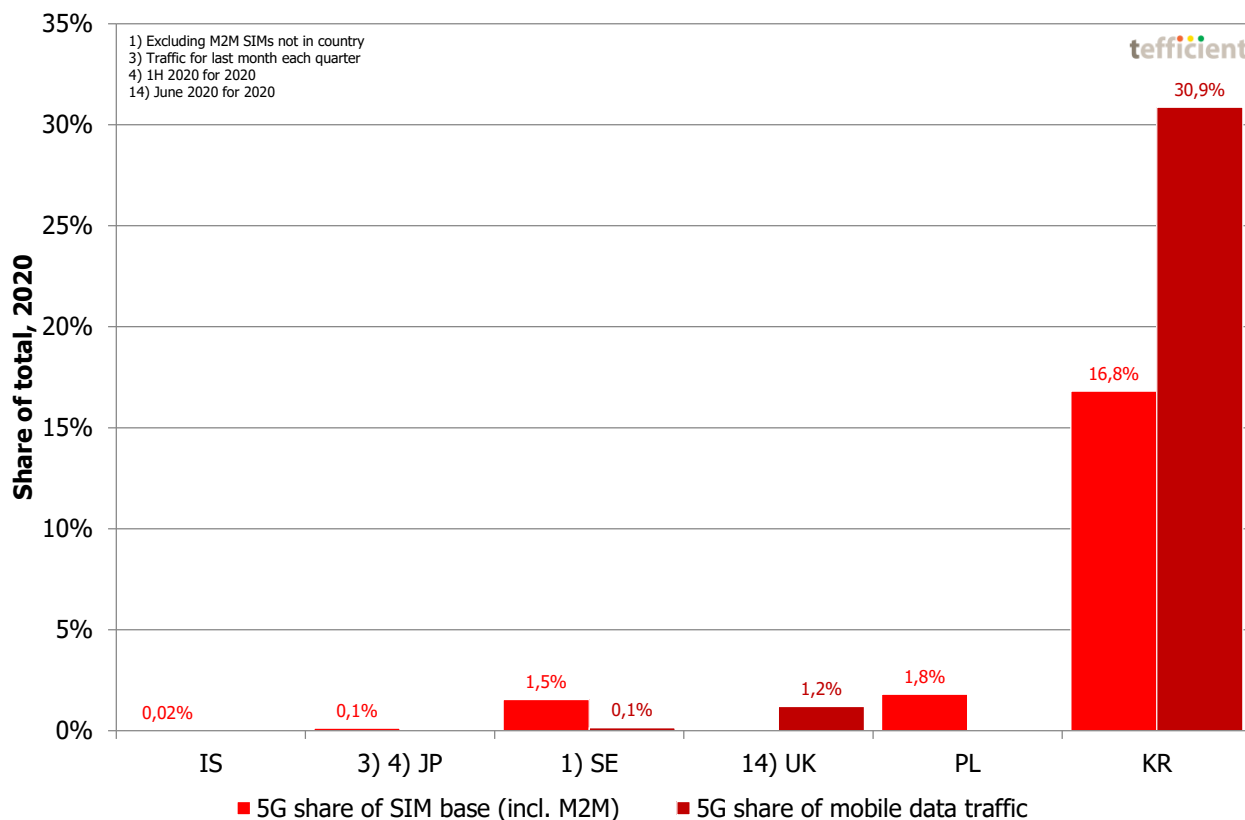


Figure 12. Mobile data usage vs. 4G/5G share

From left in Figure 12: In December 2020, 0.02% of **Iceland**'s mobile subscriptions were 5G. In June 2020⁷, 0.1% of **Japan**'s mobile subscriptions were 5G. For both of these countries, 5G traffic wasn't reported. **Sweden** had 1.5% 5G adoption in December 2020 – but just 0.1% of the mobile data traffic was 5G in 2020. In the month of June 2020, the 5G networks of the **UK** carried 1.2% of the mobile data traffic – but

⁷ The newest Japanese stats reported to date

Ofcom doesn't break out 5G subscriptions in its reporting. In **Poland**, 1.8% of the SIM base was 5G in December 2020.

And then there's **South Korea**, the country that was first with commercial, standards-based, 5G in the world: In December 2020, 16.8% of the SIM base in the country was 5G – while 5G carried 30.9% of the traffic.

As the Korean government reports monthly stats on 5G, Figure 13 shows the development up to May 2021 for the subscriber and traffic adoption.

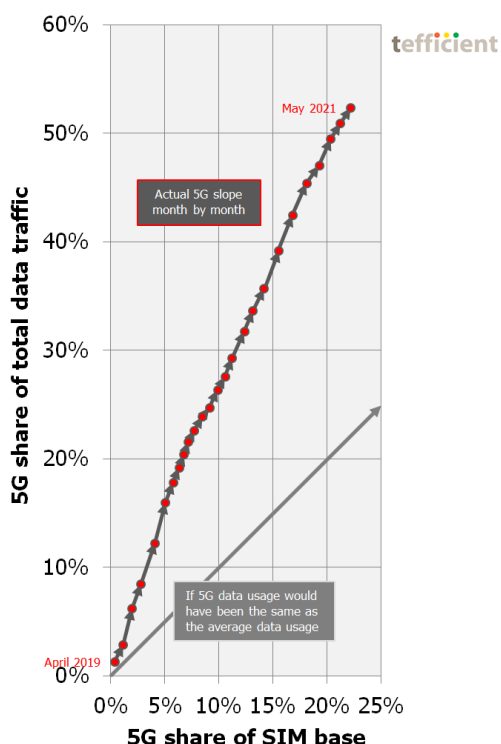


Figure 13. 5G share of total traffic vs. 5G share of SIM base – Korea per month since 5G launch

In May 2021, a majority of the mobile data traffic in South Korea – **52.4%** – was 5G. 5G represented 22.2% of the total SIM base, indicating that the average mobile data usage per 5G subscriber is far higher than for non-5G subscribers in South Korea. The usage figures for May 2021 are:

- 5G: **27.4** GB per month
- 4G: **9.4** GB per month

It's important to point out that it's not 5G as such that alone explains that 2.4x higher mobile data usage in 5G: Korea's operators are offering **unlimited** data plans more widely in 5G compared to what they did in 4G. But even if comparing apples to apples – unlimited to unlimited – 5G still seems to drive usage.

In March 2021⁸, the average unlimited 5G subscription generated **38.8 GB** whereas the average unlimited 4G subscription generated 10 GB less – **28.4 GB**.

The development in Korea is impressive and bodes well for the industry. It will be interesting to see if **China** and **Japan** – two other countries where operators with launched 5G networks have started to report 5G customer numbers – will be able to follow the Korean 'gearing' curve between base and traffic.

⁸ These stats are reported quarterly

A gigabyte has never been cheaper – but it doesn't mean it's cheap everywhere

Most mobile operators in mature markets aren't attempting to monetise voice and SMS based on usage any longer; they have instead made these allowances unlimited and included them in a flat fee. This means that the last price-defining parameter for most mobile users is **data volume**. Even though more and more operators introduce unlimited propositions, these are often the last step in a tiered data plan⁹ – which means that price still, essentially, is about data volume.

Figure 14 plots the *total* mobile service revenue per consumed gigabyte¹⁰ against the average mobile data usage per SIM and month.

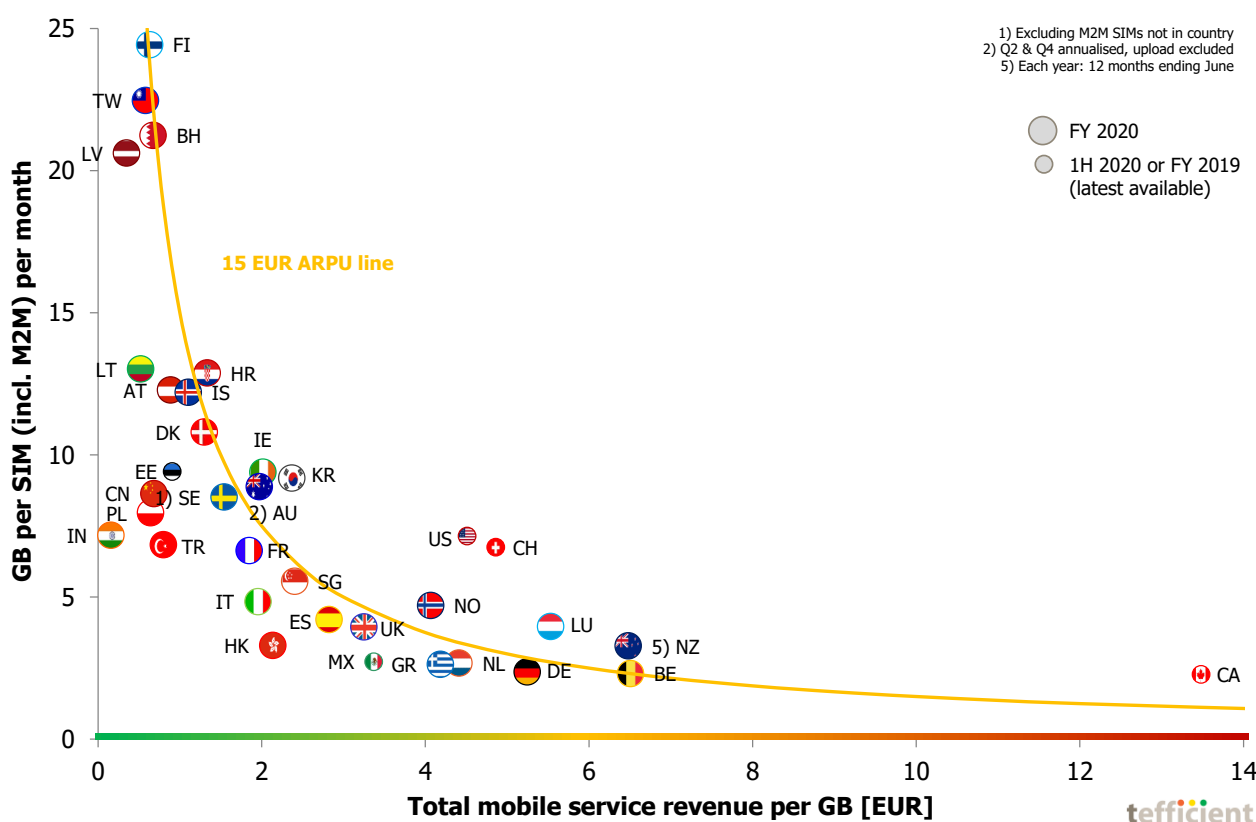


Figure 14. Mobile data usage vs. total mobile service revenue per consumed GB

The amber line shows where **15 EUR of ARPU** is earned. Countries below it had an ARPU lower than 15 EUR; countries above an ARPU higher than 15 EUR.

There are a few countries where operators enjoy very high total revenue per consumed gigabyte: **Canada** foremost¹¹, but also the cluster of **Belgium, New Zealand¹², Luxembourg** and **Germany**.

⁹ There are exceptions to this, e.g. Finnish operators, Swisscom, O2 Germany and Vodafone in Spain, the UK and most other European Vodafone markets except Germany, where the price-defining parameter instead is data throughput. There are also operators mixing several parameters such as volume, throughput, policy, zero-rating, video resolution, service bundling etc.

¹⁰ Attributing zero value to voice and messaging

It's important to point out that our analysis looks at what the mobile operator industry *de facto* makes on end-users, not what the best offer on the market currently is. In reality, most users are on old price plans because they are still locked in by a contract – or because they have not bothered to find the best deal.

In the other end of the scale we find the countries where operators get the lowest revenue per consumed gigabyte: **India, Latvia, Lithuania, Taiwan, Finland, Bahrain, China and Poland.**

Looking at Figure 14 we can conclude – as in all our previous analyses on this topic – that the key explanation to high mobile data usage is low effective revenue per gigabyte: **Bigger data buckets lead to lower revenue per GB – which, on the other hand, increases usage.** At least when customers can use those big buckets also on data-only devices; see Figure 8.

Indian operators have the lowest total revenue per GB – Canada the highest

But we also said that a gigabyte has never been cheaper. More correctly put is that operators never had lower total service revenue per gigabyte than what they currently have. Figure 15 shows the revenue erosion from 2019 to 2020.

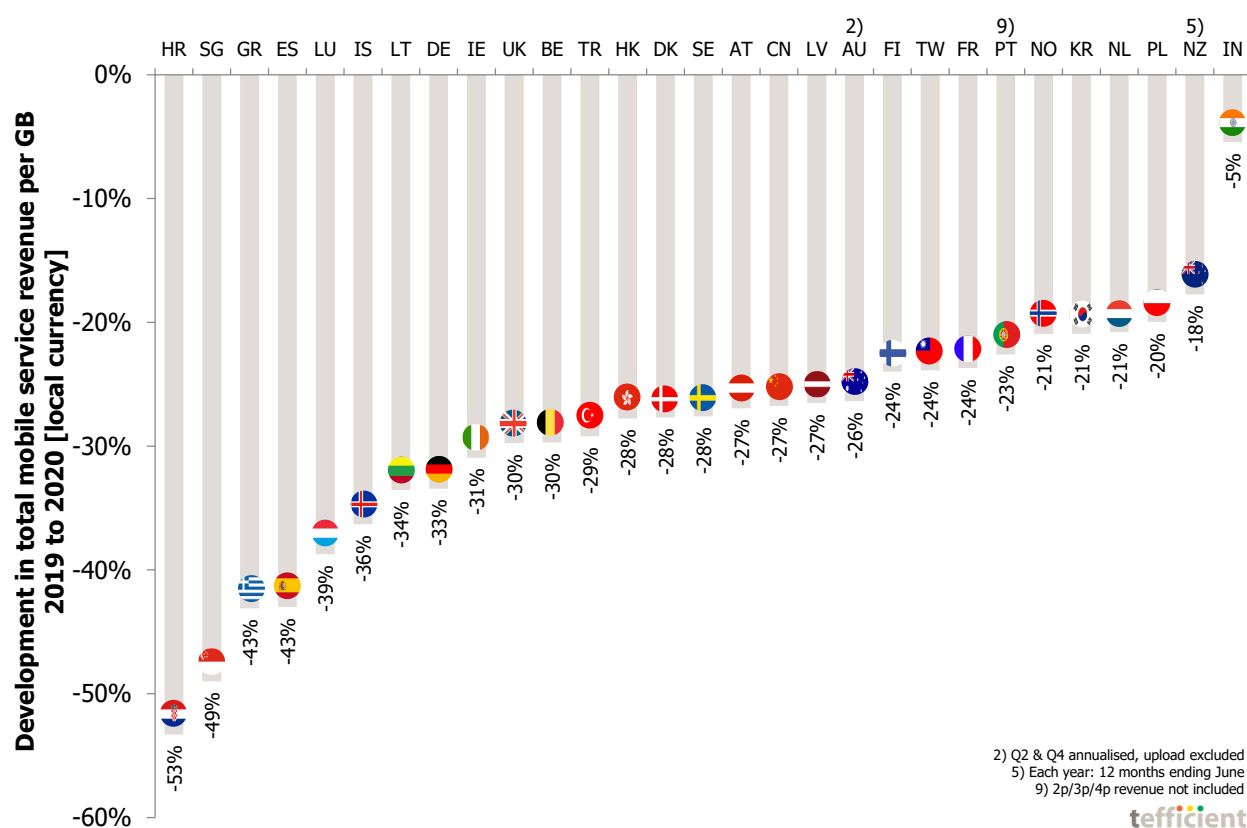


Figure 15. Erosion in total mobile service revenue per consumed GB – 2019 to 2020

¹¹ Based on latest available (2019) data

¹² Based on latest available (12 months to June 2020) data

The prerequisite to be in Figure 15 is of course that the statistics have been reported both for 2019 and 2020. Of these markets, **Croatia** has the fastest revenue erosion, 53%. **Singapore** is just behind with 49% as TPG's entry led to a shift in data consumption. **Greece** – which finally moves away from its very low levels of data usage had 43%. **Spain** had 43% too while **Luxembourg** was at 39%.

India, which historically often had the fastest revenue erosion in our reports, is now having the absolute slowest erosion, just 5%. The merger between Vodafone and Idea into Vi seems to have benefited the two market leaders Jio and Airtel while Vi continues to weaken, leading to higher market concentration.

No correlation between data usage and ARPU

Figure 16 is a variant of the revenue per GB chart – it plots the usage against the average revenue per SIM, i.e. the ARPU.

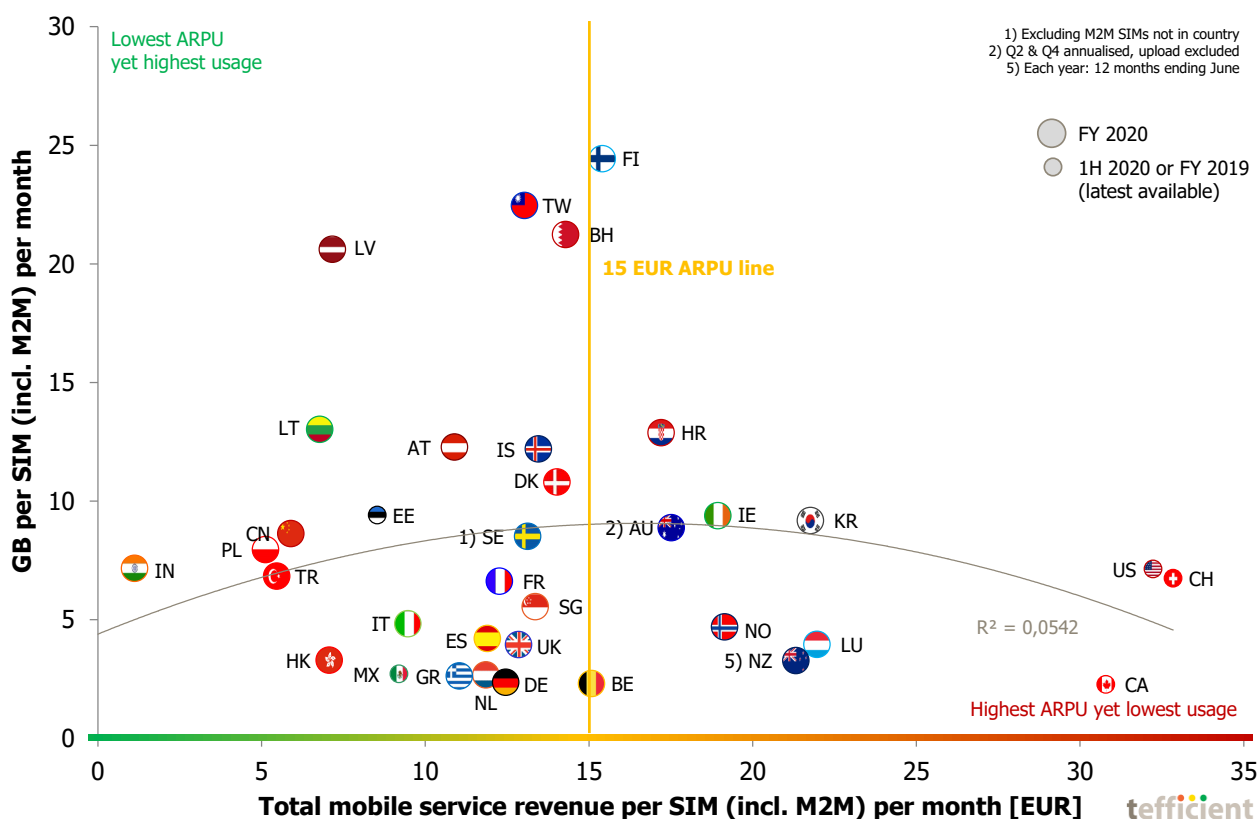


Figure 16. Mobile data usage vs. total mobile service revenue per SIM

Of our markets, there are three where operators derive ARPUs much higher than elsewhere: **Switzerland**, **USA** and **Canada**. In all these markets, regulators/CTIA have not yet reported 2020 data so the dots are for 2019. 2020 data would likely not have changed the outlier position of these markets as we continuously over the years have seen that operators in these markets enjoy high ARPU even though mobile data usage isn't very high.

Operators in the upper left corner – **Finland**, **Taiwan**, **Latvia**, **Lithuania**, **Bahrain** and **India** – are being the most generous with mobile data considering their ARPU. These countries form a nice line suggesting that operators could expect to get rewarded with higher ARPU as usage grows.

But that's regrettably not to overall trend: The adherence to the grey regression line is weak and it's anyhow not pointing in the north-easterly direction one would like to see – with more usage leading to higher ARPU.

Did the pandemic make the Christmas tree unbalanced?

Now to our Christmas tree graph. It's the graph we ideally like to see the branches stretch to the right since that means that the ARPU grew in the past year. That would demonstrate that the operators of a country have been able to monetise the growth in data usage.

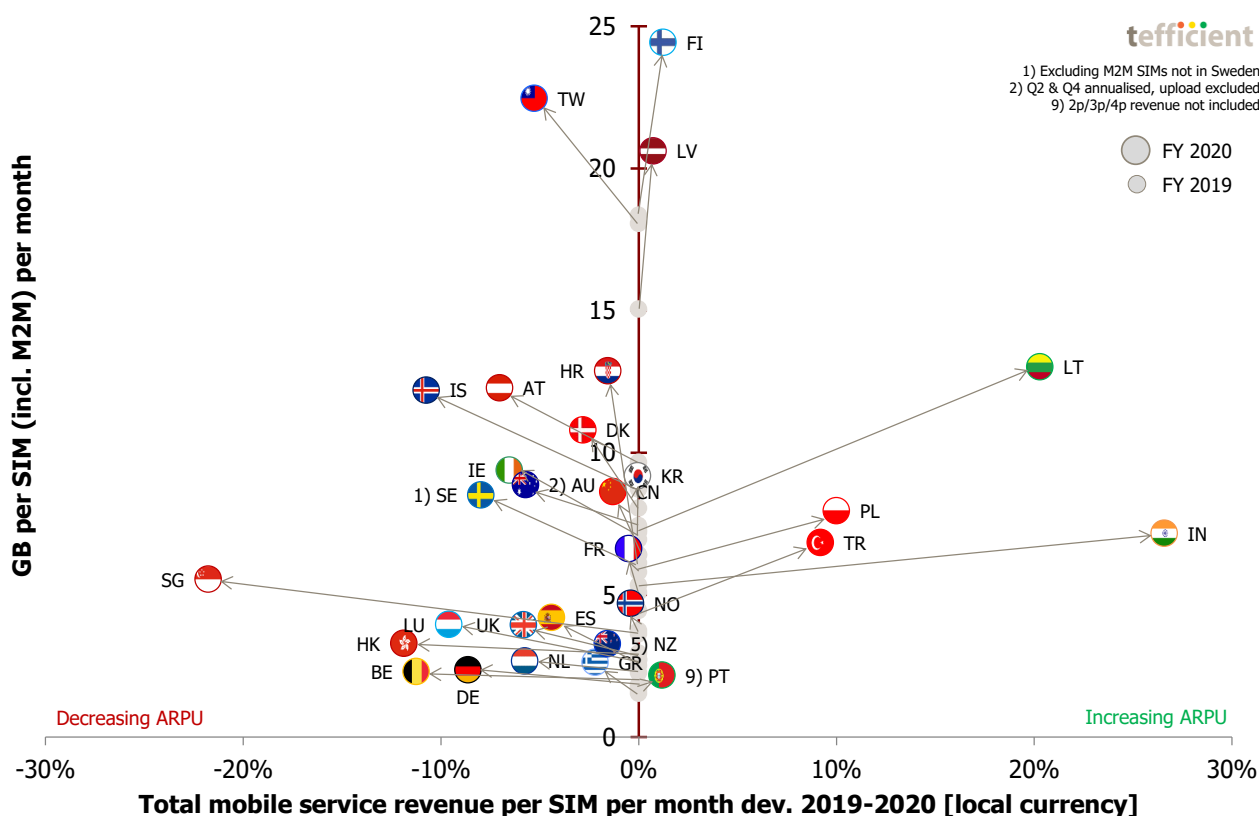
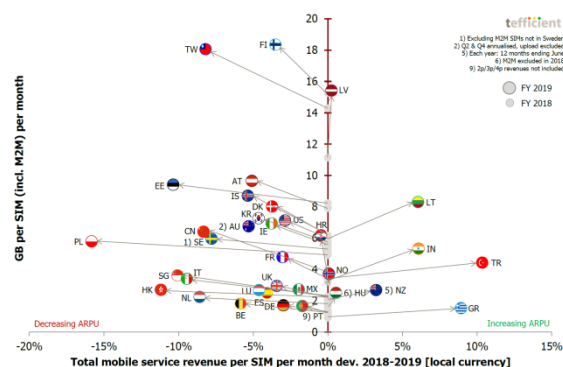


Figure 17. Development in mobile data usage vs. the development in ARPU – 2019 to 2020

In reality the branches stretch right in only **7 of 29 markets**¹³ (24%). These seven are – from the top – **Finland, Latvia, Lithuania, Poland, India, Turkey** and **Portugal**. In 22 markets (76%), the branches stretch left meaning that even though data usage grew, ARPU fell. The ARPU erosion in Singapore is unparalleled; above 20%.

ARPU fell because of Corona, right? Not really. [Last year's Christmas tree](#) didn't look any better – see the miniature to the right. Why aren't we more successful as an industry?



¹³ The 29 markets for which regulators to date have reported the necessary underlying stats

It's important to remember that Figure 17 depicts the development of a market as a whole. Individual operators might not follow the country trend. In our [operator report](#) for the same time period – the situation looks better as 39% of the operators could grow ARPU based on an increase in data usage. The comparable figure for our countries is 24%. It suggests that smaller operators – with less weight in the country totals – do better in Christmas tree graphs than larger operators.

5G could be the key to change the balance – by convincing the branches to grow to the right.

As shown, **5G** has had a major impact on the data usage in Korea. But Korea doesn't have a positive ARPU development in Figure 17 – it's -0.1%. One explanation is that Korea's ARPU was heavily affected by a government decision taken in 2017 to increase the SIM-only discount from 20% to 25%. This started to have an effect on the ARPU by the end of 2017 and as the typical contract binding period on handset plans is two years in Korea, the effect should have lasted until the end of 2019. The upside of the change has been an equally significant improvement in churn, so it's not all bad.

The Korean operators do not break out their 5G ARPU in their reporting, but by looking at the year-over-year development of the overall mobile service revenue, we could try to see if 5G had a positive impact since the launch in Q2 2019.

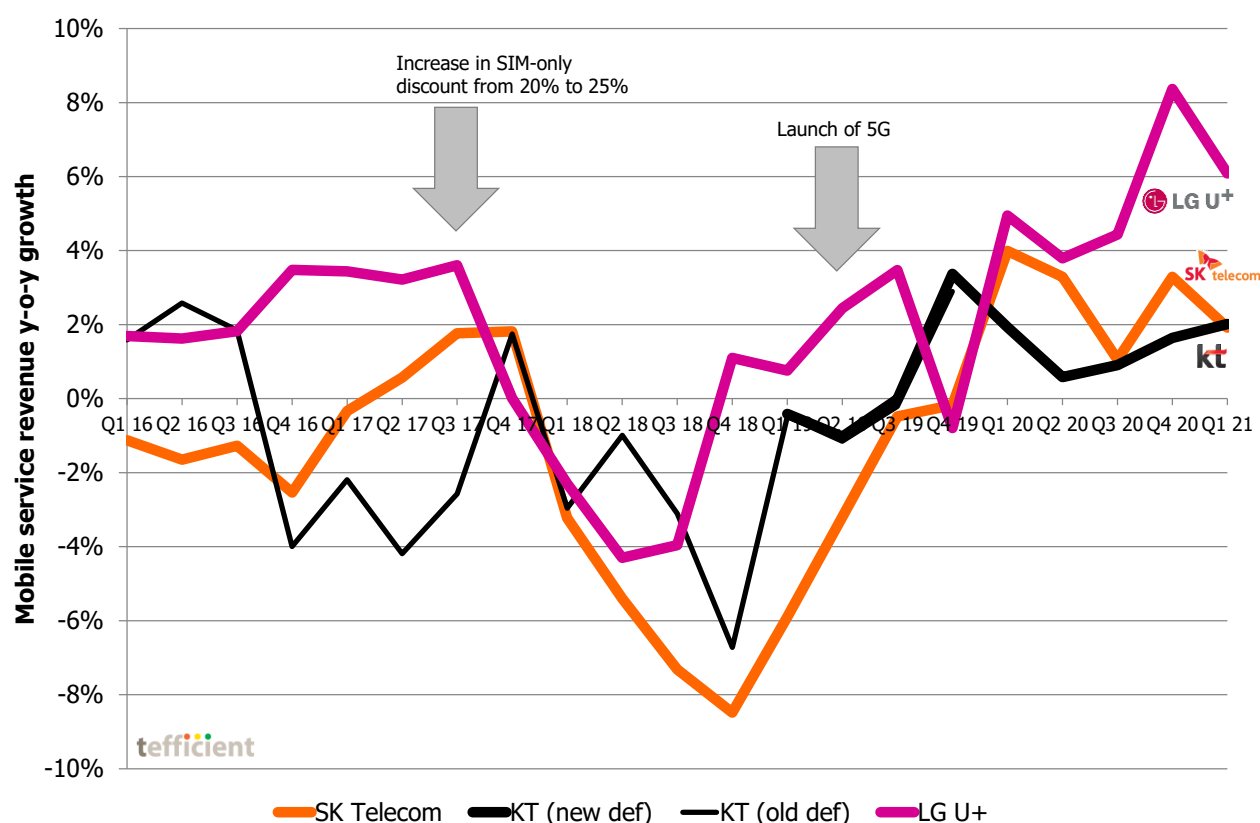


Figure 18. Y-o-Y development in overall mobile service revenue – Korea

From Figure 18 it's clear that the increase in SIM-only discount (see the first arrow) had a quite negative impact on the mobile service revenue when customers rather took the 25% SIM-only discount than committing to binding contracts with subsidised handsets. At around the time of the second arrow (=5G launch), the overall mobile service revenue started to grow again – LG U+ first, then KT and finally SK Telecom.

There's reason to be positive, but we should also realise that the negative effect of the SIM-only discount increase effectively should have ended by the end of 2019. A cautious conclusion is that 5G *helped* the Korean operators to get back on track. They have now **re-established the revenue growth** they had prior to the increase in SIM-only discount.

5G helped the
Korean
operators to re-
establish
growth

Conclusion

Mobile data usage is growing in all of the 44 countries covered by this analysis. The growth rates are very different and so are the usage levels. We believe COVID-19 measures have increased the spread. **Finland** tops the charts – with 24.4 GB per average SIM per month in 2020. If excluding M2M, the usage grows to 28.8 GB per month. But in spite of **80%** of non-M2M SIMs being **unlimited** and three 5G networks covering at least 36% of the population, the data usage growth rate isn't particularly high in Finland – 33%. Usage in **Croatia** grew 111%. To determine usage is no longer as simple as classifying a market as mature or maturing. The lowest usage is found in Czech Republic, Portugal, Belgium and Germany, hardly any maturing markets.

Our analysis shows strong correlation between the **data-only share** of a country's SIM base and the average data usage. **Latvia, Finland and Bahrain** are the data-only powerhouses of the world. In many markets, **data-only's share of total traffic grew** – a trend that started in 2019, before Corona. We attribute this to FWA.

While 4G doesn't really drive data usage as such any longer, **5G** is different. At least in South Korea – still the only country with proper reporting on 5G. In Korea, 5G traffic surpassed the 4G traffic in March 2021 and stands for the **majority of the mobile data traffic** since April 2021. The data consumption per 5G subscription is about **2.4 times** that of the average subscription – 27.4 GB per month. 5G seems to have helped Korean operators to re-establish mobile service revenue growth overall.

Regardless of technology, data usage could be elevated by an increased data-only penetration through fixed-line substitution. But a prerequisite for this – and for high data usage in general – is that the **total revenue per gigabyte** is low.

This is the case in **India, Latvia, Lithuania, Taiwan, Finland, Bahrain, China and Poland**. **Canada, Belgium, New Zealand, Luxembourg and Germany** represent the other end.

Low usage doesn't necessarily mean low ARPU, though. Market ARPU is uncorrelated with usage. **Switzerland, USA and Canada** have much higher ARPU than other countries in our analysis.

What is worrying is that **only 7 of 29 markets could grow ARPU** on the back of data usage growth. It's easy to blame Corona for it, but the percentage is actually similar to what we have had in our previous country analyses. As an industry, we can do better.