

# **International Roaming BEREC Benchmark Data Report October 2019 – March 2020**

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# 1. Structure of the Report

The International Roaming BEREC Benchmark Report (the “Report”) on Roaming contains five parts and two annexes. Chapter 2 is an **Introduction** to the Body of European Regulators for Electronic Communications (BEREC) Report and describes BEREC’s work on roaming based on the Roaming Regulation (EU) No. 531/2012, as amended by Regulation (EU) No. 2120/2015 and by Regulation (EU) No. 2017/920. The third Chapter “**Regulatory evolution**” outlines regulatory measures taken to reduce price levels for roaming services within the EU. The key findings of this Report are included in the fourth Chapter, “**Main findings**”. The fifth Chapter “**Charts**” presents the latest available data on the domestic mobile market and international roaming mobile market. “**Annex I: Methodology for the data collection**” provides a detailed description of the methodology for the current data collection. “**Annex II: List of respondents**” includes the list of operators that provided data for this Report. The Report is accompanied by a spreadsheet file enabling an easy and open access to the data included in the Report (published together with the Report) and additional roaming data for the user.

## 2. Introduction

The Report presents the results of the 25<sup>th</sup> round of data collection on European international roaming services undertaken by BEREC. The Report covers the period 1 October 2019 – 31 March 2020, i.e. the 4<sup>th</sup> quarter of 2019 and 1<sup>st</sup> quarter of 2020. The Report also includes data from previous rounds of data collection. Structure of this report was reviewed and changed already in the 24<sup>th</sup> report by removing or consolidating various figures, thus making the document better readable. However, more roaming data is still included in the .xls file, published as well on the BEREC website. The earliest data in this report is from the 1<sup>st</sup> quarter 2013<sup>1</sup>.

The applicable regulatory framework for this data collection is Roaming Regulation (EU) No. 531/2012, as amended by Regulation (EU) No. 2120/2015<sup>2</sup> and by Regulation (EU) No. 2017/920<sup>3</sup>, applied in the European Union (EU)<sup>4</sup>, which includes new requirements for the retail and wholesale regulated tariffs for voice, SMS and data roaming.

The assessment of the international roaming market should be based on the requirements set out in Article 19 (4) of the Roaming Regulation. In order to assess the competitive developments in the Union-wide roaming markets, BEREC is tasked with regularly collecting data from national regulatory authorities on the development of retail and wholesale charges for regulated voice, SMS and data roaming services, including wholesale charges applied for balanced and unbalanced roaming traffic respectively. It shall also collect data on the wholesale roaming agreements not subject to the maximum wholesale roaming charges provided for in Articles 7, 9 or 12 and on the implementation of contractual measures at

<sup>1</sup> Roaming Data has been collected since the 2<sup>nd</sup> quarter 2007. Data prior to the 1<sup>st</sup> quarter 2013 are available in previous BEREC reports.

<sup>2</sup> Regulation (EU) No. 2120/2015, hereinafter ‘TSM Regulation’, available at: <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32015R2120>

<sup>3</sup> Regulation (EU) 2017/920 of the European Parliament and of the Council of 17 May 2017 amending Regulation (EU) No 531/2012 as regards rules for wholesale roaming markets, available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017R0920>.

<sup>4</sup> The amendments are incorporated in the EEA agreement and are therefore applicable in the three EEA/EFTA states Iceland, Liechtenstein and Norway.

wholesale level aiming to prevent permanent roaming or anomalous or abusive use of wholesale roaming access for purposes other than the provision of regulated roaming services to roaming providers' customers while the latter are periodically travelling within the Union. On the basis of the collected data, BEREC also has to report regularly on the evolution of pricing and consumption patterns in the Member States for both domestic and roaming services, on the evolution of actual wholesale roaming rates for unbalanced traffic between roaming providers and on the relationship between retail prices, wholesale charges and wholesale costs for roaming services. BEREC shall assess how closely those elements relate to each other.

BEREC coordinates this process of data collection by pursuing the following objectives:

- simplifying the process not only for national regulatory authorities (NRAs), as BEREC acts as a central point for the data collection, but also for the European Commission (EC), as the data are received from a single source and a following uniform data processing;
- coordinating the procedures of individual NRAs, as a single and commonly agreed upon data collection model is used for the process of data collection, and the process is synchronised and based on the same collection periods. BEREC consults the market players and the European Commission before finalising the data collection templates;
- providing, as far as possible, a common response to the different questions posed during the collection process by operators and NRAs, as BEREC serves as the forum where these questions are commonly debated and addressed.

### **3. Regulatory evolution**

The ERG initially worked on the long-standing issue of high prices for international roaming services. Following its creation in January 2010, BEREC took over responsibility for this work from the ERG.

#### ***The 2007 Regulation***

In 2005, the ERG undertook a study on international roaming that concluded that the EC Regulatory Framework did not provide the necessary tool-kit for NRAs to tackle the problems identified. The ERG wrote to the European Commission in December 2005 highlighting its concerns.

After significant debate, the first Regulation on international roaming services was published on 29 June 2007. The primary provisions capped wholesale and retail charges for voice calls under Eurotariff and set a number of transparency provisions to help ensure that consumers were well informed. The provisions of the Regulation entered into force at different times, with retail and transparency provisions taking full effect by the end of September 2007 and wholesale provisions calculated annually from the end of August 2007<sup>5</sup>.

#### ***The 2009 amended Regulation***

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<sup>5</sup> In Norway and Iceland the 2007 Regulation was in force from the end of 2007 to the 2<sup>nd</sup> quarter 2010.

On 22 April 2009, the European Parliament (EP) adopted Regulation (EC) No. 544/2009 at first reading, with a view to amending Regulation (EC) No. 717/2007. Subsequently, on 8 June 2009, the Council of EU Telecoms Ministers formally adopted the new EU roaming rules approved by the European Parliament. The definitive text of Regulation (EC) No. 544/2009 was published in the Official Journal of the European Union on 29 June 2009<sup>6,7</sup>.

In particular, the Regulation introduced the following measures related to price control, applicable from 1 July 2009 to 30 June 2012:

- an extension of wholesale and retail price regulation for voice services, with yearly decreases in the levels of the caps;
- price regulation of SMS roaming services at both the wholesale and retail level;
- price regulation of data roaming services at the wholesale level.

And from July 2010 to June 2012:

- retail transparency measures to protect consumers from “bill shock” when using data roaming services.

### ***The 2012 Regulation***

On 30 May 2012 the Council of the European Union approved the International Roaming Regulation III<sup>8</sup>, which entered into force on 1 July 2012<sup>9</sup>.

The Regulation introduced the following measures, applicable from 1 July 2012:

- an extension of wholesale and retail price regulation for voice and SMS with yearly decreases in the levels of the caps until 30 June 2014, with those caps to remain in force until 30 June 2022 for wholesale services, and until 30 June 2017 for the Eurotariffs, subject to a further review by 30 June 2016;
- an extension of wholesale price regulation for data with yearly decreases in the levels of the caps until 30 June 2014, with those caps to remain in force until 30 June 2022;
- price regulation of data roaming services at the retail level with a yearly decrease in the level of the cap until 30 June 2014, with the cap to remain in force until 30 June 2017, being subject to a further review by 30 June 2016;
- the obligation for mobile network operators (MNOs) to meet all reasonable requests for wholesale roaming access, which comprises direct wholesale roaming access and wholesale roaming resale access under the rules set out in the Roaming Regulation.

<sup>6</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:167:0012:0023:EN:PDF>.

<sup>7</sup> From the 3<sup>rd</sup> quarter 2009 to the 1<sup>st</sup> quarter 2010, Regulation 544/2009 applied in the EU while the first Roaming Regulation (EC) No. 717/2007 remained in force in Norway, Iceland and Liechtenstein, with slightly higher voice caps, no SMS caps and no wholesale data cap.

<sup>8</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:172:0010:0035:EN:PDF>.

<sup>9</sup> With regard to the EEA EFTA countries, it must be noted that the Roaming Regulation applies in these countries as from 7 December (Norway and Liechtenstein) and 21 December (Iceland) 2012.

The Regulation also included provisions on the separate sale of roaming services which entered into force on 1 July 2014;

- extension of safeguard mechanisms. The Regulation requires providers to make available to their customers one or more maximum financial or volume limits on data roaming use during an agreed specified period, subject to the customer's consent to continue ("cut-off mechanism"). The safeguard mechanisms also apply to data roaming services used by roaming customers travelling outside the EU except when the visited network operator in the visited country outside the EU does not allow the roaming provider to monitor its customer usage on a real-time basis. The cut-off limit should, in principle, be made available for all tariffs by default. However, when a customer opts for an offer without a cut-off limit, customers are given the right to be provided with a cut-off limit within one working day at their demand.

### ***The 2012 Regulation as amended by Regulation (EU) No. 2120/2015***

On 3 April 2014, the European Parliament took up the position, within the framework of the procedure for the adoption of a Regulation for a European Single Market for Electronic Communications (TSM Regulation), to abolish retail roaming surcharges in order to allow customers to "Roam Like at Home" (RLAH) with a fair use limit.

Regulation (EU) No. 2015/2120<sup>10</sup>, adopted by the European Parliament on 27 October 2015 and published in the Official Journal of 26 November 2015, includes amendments to Roaming Regulation No. 531/2012<sup>11</sup>, the main one being the principle of Roam Like At Home, i.e. requiring roaming providers not to levy any surcharge in addition to the domestic retail price on roaming customers as of 15 June 2017 (RLAH tariffs). However, there are several cases where the roaming provider is allowed to apply surcharges (e.g. when a Fair Use Policy (FUP) under the conditions of the Roaming Regulation is breached or a data volume limit is exceeded). Moreover, according to Article 6c of the Roaming Regulation, in specific and exceptional circumstances, with a view to ensuring the sustainability of its domestic charging model, a roaming provider may apply for authorisation to apply a surcharge. The Roaming Regulation lays down detailed rules on the methodology for assessing the sustainability of the abolition of retail roaming surcharges and on the application to be submitted by a roaming provider for the purposes of that assessment. For more information on surcharges in excess of or non-compliance with the FUP and the derogation mechanism please see BEREC Guidelines on Regulation (EU) No 531/2012, as amended by Regulation (EU) 2015/2120 and Commission Implementing Regulation (EU) 2016/2286 (Retail Roaming Guidelines)<sup>12</sup>. Furthermore, similar to the provisions set out in the third Roaming Regulation, roaming providers can also offer alternative roaming tariffs as an alternative to RLAH and customers may deliberately choose those alternative tariffs.

<sup>10</sup> Available at: <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32015R2120>.

<sup>11</sup> Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012R0531>.

<sup>12</sup> The BEREC Guidelines on Regulation (EU) No 531/2012, as amended by Regulation (EU) 2015/2120 and Commission Implementing Regulation (EU) 2016/2286 (Retail Roaming Guidelines) are available at: [http://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/regulatory\\_best\\_practices/guidelines/7005-berec-guidelines-on-regulation-eu-no-5312012-as-amended-by-regulation-eu-no-21202015-excluding-articles-3-4-and-5-on-wholesale-access-and-separate-sale-of-services](http://berec.europa.eu/eng/document_register/subject_matter/berec/regulatory_best_practices/guidelines/7005-berec-guidelines-on-regulation-eu-no-5312012-as-amended-by-regulation-eu-no-21202015-excluding-articles-3-4-and-5-on-wholesale-access-and-separate-sale-of-services).



It should further be mentioned that the Roaming Regulation also established a transitional period, from the 30 April 2016 to 14 June 2017, where operators could apply a surcharge in addition to the domestic price for the provision of retail roaming regulated services.

The amendments to the Roaming Regulation resulted in an update of the BEREC Benchmark Report and the current Report includes indicators on volumes and revenues for RLAH, RLAH+ (non-compliance with/exceeding the FUP), RLAH+ (derogation) and alternative tariffs offered by operators. BEREC would like to note that some indicators presented in the following figures and its evolution must be carefully evaluated as before the implementation of the Regulation (EU) No. 2120/2015, it was possible to clearly separate domestic revenues from intra-EEA roaming revenues, since the latter had a separate charging mechanism. However, with the implementation of RLAH, roaming is charged at domestic prices, except for alternative tariffs, and they are therefore included under domestic revenues. Only intra-EEA roaming revenues related to the application of surcharges and revenues from alternative tariffs are now reported under roaming revenues.

### ***The 2012 Regulation as amended by Regulation (EU) No. 2017/920***

Regulation (EU) No. 2017/920<sup>13</sup> adopted by the European Parliament on 17 May 2017 and published in the Official Journal of 9 June 2017 includes amendments to Roaming Regulation No. 531/2012<sup>14</sup>, the main one regarding new wholesale prices for voice, SMS and data services that entered into force on 15 June 2017. Also, its amendments included new provisions for wholesale agreements to prevent permanent roaming and the requirement to collect data about the evolution of actual wholesale roaming rates for unbalanced traffic between providers of roaming services, and on the relationship between retail prices, wholesale charges and wholesale costs for roaming services.

The amendments to the Roaming Regulation resulted in an update of the BEREC Benchmark Report, and the current Report includes the lowest charged as proxy wholesale costs for roaming services and those new clauses to prevent permanent roaming introduced in the roaming wholesale agreements.

## **4. Main findings**

Over 145 providers of international roaming services provided information for this Report. This number includes virtually all of the mobile network operators in the EEA countries, as well as a significant number of mobile virtual network operators (MVNOs) that provide EEA roaming services. BEREC estimates that this report covers around 95 % of mobile customers in the EEA.

### **Retail domestic prices (ARRPU) for mobile services**

BEREC tried to analyse the retail domestic prices and found that it is hard to disaggregate the different mobile communications services (voice, SMS and data) since they are often provided as part of a bundle of several services, including intra-EEA roaming communications and, in several cases, also non-mobile services. Operators find it difficult to organize their revenue data by individual service categories (ISCs), such as fixed telephony, mobile telephony, fixed

<sup>13</sup> Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017R0920>.

<sup>14</sup> Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012R0531>.

broadband, intra-EEA roaming communications and others and no common methodology is defined for this purpose. Bundles challenge this practice, as ISCs require allocating bundle revenues to their components. Therefore, BEREC examined the alternative of presenting data on the evolution of the average retail revenue per user (ARRPU). However, in the context of the BoR (16) 33 BEREC Report on the wholesale roaming market it was emphasized that the ARRPU depends on many different parameters (volumes, handset subsidies, sensitivity to the number of active SIM cards, etc.). In general, the ARRPU is quite a weak index for comparing domestic price levels. In spite of the limitations and lack of common methodology mentioned above, BEREC has calculated the ARRPU but notes that the results of it should be interpreted with caution. For this calculation BEREC used the data relative to mobile domestic services submitted by operators<sup>15</sup>. The domestic monthly ARRPU for Q4 2019 varies considerably between the countries, ranging from 3.83 Euros per month to 31.65 Euros per month, with a weighted EEA average of 10.10 Euros (Figure 1). The Report shows similar outcome for Q1 2020: the ARRPU ranged from 3.84 Euros to 29.70 Euros per month, with a weighted EEA average of 10.31 Euros (Figure 1). BEREC would like to note the caveat that the disproportion between individual ARRPU could also be caused by different methodologies used by operators to allocate the revenues between mobile communication services and non-mobile communication services.

### **Roam Like At Home (RLAH) traffic – EEA roaming consumption patterns**

BEREC data show clear evidence of seasonal movements, with Q3 2019 having more traffic than any other quarters of the year. This is visible for the data roaming traffic (Figure 32) and for the roaming calls made (Figure 15).

In order to deal with the impact of seasonality, BEREC compares data of the same quarter of the different years<sup>16</sup>. In this sense, the average EEA roaming subscriber spent 21.57 minutes per month in calls made in Q1 2020 in comparison to 17.33 minutes in Q1 2019 (Figure 14). The number of received call minutes abroad amounted to 18.77 minutes per EEA average roaming subscriber per month in Q1 2020, whereas this was around 14.81 minutes in Q1 2019 (Figure 17). The average data consumption per EEA roaming subscriber was 0.52GB per month in Q1 2020, whereas 0.40GB per month in Q1 2019 (Figure 31). Data roaming consumption ranged from 0.14GB (Cyprus) to 1.94 GB (Estonia) per roaming subscriber per month in Q1 2020 (Figure 30), in comparison to the range from 0.19GB to 1.55 GB in Q1 2019.

Although international roaming services demonstrate high seasonal variations, the results clearly show that the introduction of Roaming Like at Home on 15 June 2017 has significantly contributed to stimulate the demand for roaming services and the development of the international roaming market.

The introduction of RLAH services, coupled with the growing demand for data services, has changed the international roaming market. A relevant point could be made that the RLAH services enabled a substantial increase in international roaming traffic. The consumption for

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<sup>15</sup> The monthly ARRPU was calculated per country by dividing retail revenues (i.e. total revenues related to mobile voice, SMS and data traffic, excluding any other type of revenue, such as those originating from mobile devices, subscription fees to services etc.) in the respective quarters by the total number of domestic and roaming subscribers per country within the same period and dividing the result by 3 to arrive at a monthly value.

<sup>16</sup> United Kingdom operators did not participate in the 25th data collection round. Therefore data from United Kingdom operators were not included to this Report for Q4 2019 and Q1 2020.

most roaming services has continued to increase in 2020, respectively in Q1 2020, around 86.95 % of data traffic was based on the RLAH data tariff while roaming (Figure 28).

### Rest of the World (RoW) roaming retail prices

With regard to the 'Rest of World' retail voice roaming calls (Figure 33), the EEA average RoW tariff for calls made was 54.74 Euro cents in Q4 2019 and 50.46 Euro cents in Q1 2020. Receiving calls when roaming outside the EEA area cost 27.07 Euro cents in Q4 2019 and 25.65 Euro cents in Q1 2020. At the same time, data from the operators reveals that the average price for data consumption outside EEA amounted to 35.18 Euro per GB in Q4 2019 and 28.08 Euro per GB in Q1 2020.

### Wholesale roaming rates

At the wholesale level, the voice, SMS and data roaming charges set between operators have declined below the regulated average caps.

The applicable price caps and the related EEA average prices during the data collection period were:

Service at wholesale level (no VAT)	Q4 2019		Q1 2020	
	Price Cap	EEA Average	Price Cap	EEA Average
Wholesale voice (€/minute)	3.2	2.07	3.2	2.04
Wholesale SMS (€/SMS)	1	0.33	1	0.35
Wholesale data (€/GB <sup>17</sup> )	4.5	1.67	3.5	1.53

### Wholesale roaming rates for outgoing calls

At the wholesale level (Figure 12), the EEA average price was 2.07 Euro cents in Q4 2019 and decreased to 2.04 Euro cents in Q1 2020 compared to a cap of 3.2 Euro cents. A reduction in the average EEA wholesale prices for intra-EEA roaming voice calls since 2016 (Figure 12) is observed. The EEA average wholesale price for balanced traffic was 2.25 Euro cents in Q4 2019 and declined to 2.15 Euro cents in Q1 2020. Meanwhile, payments for unbalanced traffic in the EEA averaged at 1.70 Euro cents in Q4 2019 and decreased to 1.66 Euro cents in Q1 2020.

### Wholesale roaming rates for SMS

At the wholesale level, a reduction in the average EEA SMS price (Figure 19) to 0.33 Euro cents in Q4 2019 and 0.35 in Q1 2020 is observed compared to a cap of 1 Euro cents respectively. The average price for balanced traffic was 0.36 Euro cents in Q4 2019 and 0.45 Euro cents in Q1 2020 and the average price for unbalanced traffic was 0.25 Euro cents in Q4 2019 and 0.21 Euro cents in Q1 2020.

### Wholesale roaming rates for data

<sup>17</sup> Conversion of gigabytes to megabytes was done in line with Recital 17 of Regulation (EU) 2017/920 of the European Parliament and of the Council of 17 May 2017 amending Regulation (EU) No 531/2012, which results in 1 gigabyte being equal to 1000 megabytes.

At the wholesale level, the data cap applying in the EEA was 4.5 Euro per GB in Q4 2019 and 3.5 Euro per GB in Q1 2020. The EEA average price for wholesale data services fell to 1.67 Euro per GB Q4 2019, compared to 2.33 Euro in Q4 2018 (Figure 24). The prices continued to decline in Q1 2020. The EEA average price for wholesale data services fell to 1.53 Euro per GB in Q1 2020, compared to 1.78 Euro in Q1 2019 (Figure 25). In the context of the wholesale inbound roaming prices, the EEA average price for balanced traffic was 1.79 Euro per GB in Q4 2019 and 1.69 Euro per GB in Q1 2020, whereas the EEA average price for unbalanced traffic was 1.43 Euro per GB in Q4 2019 and 1.26 Euro per GB in Q1 2020 (Figure 22 and Figure 23).

### **Wholesale roaming agreements (Article 3)**

Only some operators submitted data on wholesale agreements based on Article 3 of the Roaming Regulation. BEREC's Opinion on the functioning of the Roaming Regulation<sup>18</sup> showed that depending on the type of MVNO (full or light MVNO), MNVOs use different ways for accessing wholesale roaming services. The preferred option is to use wholesale resale access from the domestic host MNO, 30% of the full MVNOs make use of resale access from another MNOs, only a few MVNOs use access via a hub or have bilateral agreements with the foreign MNOs. The wholesale prices that MVNOs pay for voice and SMS services stay close to the cap prices of the Roaming Regulation (Figure 34 and Figure 35).

### **How wholesale costs and prices relate to each other**

In the table below, BEREC presents the cost estimates for wholesale roaming services per country. The estimation of the unit cost per service is based on the Axon Consultants cost model.<sup>19</sup> However, apart from the Axon's model output per country<sup>20</sup>/per service, the unit costs included in the tables below include also an estimation for transit costs (for voice and data services) and an estimation of voice termination costs (for voice service). The Axon study does not provide one single result for each type of service, country and year, but provides 72 scenarios (e. g. for Austria the model calculates 72 different unit costs for roaming voice service for 2020 depending on the combination of parameters/methodological approaches under which the model is run). Therefore, in the tables below, the range of the cost estimates are presented<sup>21</sup>.

<sup>18</sup> [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/opinions/8595-berec-opinion-on-the-functioning-of-the-roaming-market-as-input-to-ec-evaluation](https://berec.europa.eu/eng/document_register/subject_matter/berec/opinions/8595-berec-opinion-on-the-functioning-of-the-roaming-market-as-input-to-ec-evaluation)

<sup>19</sup> <https://ec.europa.eu/digital-single-market/en/news/finalisation-mobile-cost-model-roaming-and-delegated-act-single-eu-wide-mobile-voice-call>.

<sup>20</sup> Please note that the model developed for EC by Axon Consultants does not calculate unit costs for Luxembourg, Iceland and Liechtenstein because the NRAs/operators of these three countries did not provide the required data

<sup>21</sup> Except for SMS services for which there is insignificant differentiation between the various scenarios for which only the max cost estimate is presented.

**Wholesale roaming services cost estimates (in €cents/unit) in each of the 28 countries for 2019<sup>22</sup>**

	<b>voice min</b>	<b>voice max</b>	<b>SMS max</b>	<b>data min</b>	<b>data max</b>
AT	1.5	1.63	0.13	0.61	0.79
BE	1.82	2.15	0.15	1.53	2.37
BG	1.5	1.62	0.04	0.85	1.23
CY	1.79	1.86	0.16	1.3	1.53
CZ	1.77	2.1	0.1	0.9	1.34
DE	1.96	2.12	0.06	1.85	2.09
DK	1.5	1.55	0.08	0.62	0.85
EE	1.57	1.62	0.3	0.8	0.97
EL	1.65	1.78	0.08	1.74	2.13
ES	1.59	1.71	0.05	1.55	2.34
FI	1.44	1.46	0.13	0.63	1.11
FR	1.57	1.74	0.07	1.3	1.96
HR	1.53	1.62	0.07	0.85	1.4
HU	1.86	2.02	0.11	1.66	2.4
IE	1.55	1.69	0.04	1.22	1.8
IT	1.62	1.72	0.05	1.03	1.31
LT	1.55	1.68	0.05	0.78	1.23
LV	1.52	1.71	0.27	0.61	0.84
MT	2.34	2.52	0.31	2.04	2.72
NL	1.59	1.74	0.07	1.17	1.98
PL	1.43	1.45	0.09	0.57	0.71
PT	1.59	1.67	0.06	0.98	1.4
RO	1.46	1.57	0.07	0.73	1.13
SE	1.65	1.84	0.06	0.86	1.19
SI	1.75	1.81	0.2	1	1.39
SK	1.64	1.86	0.06	1.01	1.4
UK	1.75	1.82	0.1	1.3	1.61
NO	1.85	2.03	0.13	1.2	1.72
<b>Average</b>	<b>1.66</b>	<b>1.79</b>	<b>0.11</b>	<b>1.1</b>	<b>1.53</b>

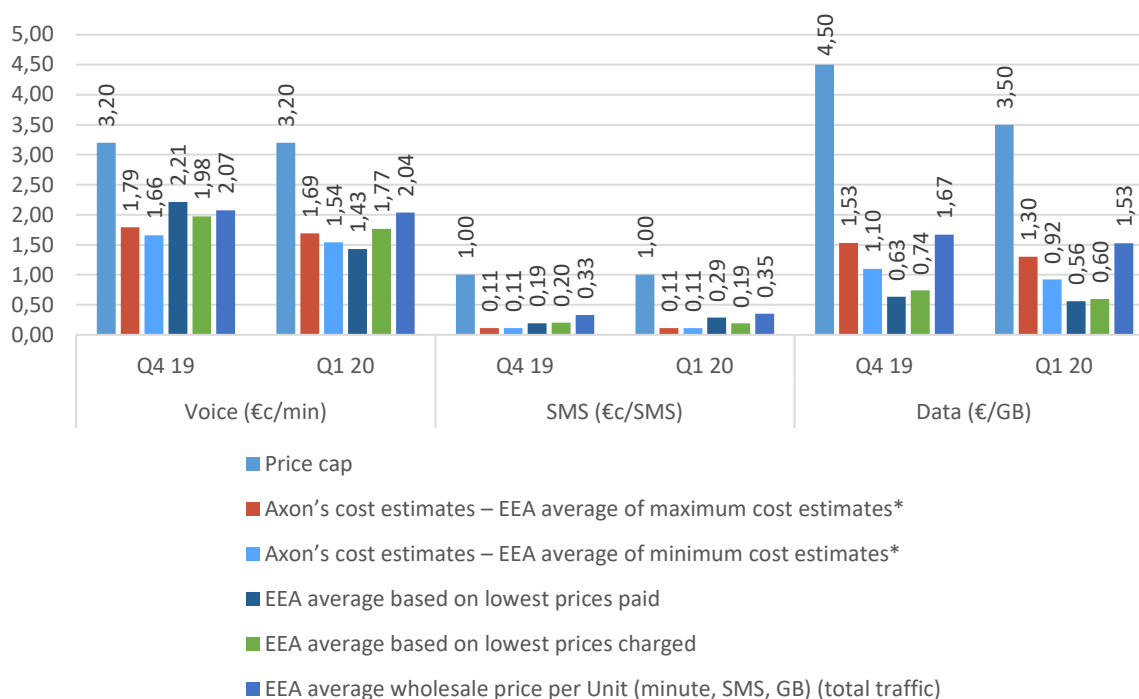
<sup>22</sup> These cost estimates include: 1) the total wholesale roaming costs in MS estimated by Axon (including network costs, roaming-specific costs and the impact of seasonality on roaming costs); 2) an estimation for the termination rate that the visited network operator needs to pay the terminating network operator for terminating a call on its network (only for voice) and 3) an estimation for the transit costs that the visited network operator needs to pay for routing a call to the terminating network operator or to send data traffic back to the home network (only for voice and data services). More information on the approach that BEREC follows to estimate the unit costs can be found in BEREC's document BoR (19) 168.

**Wholesale roaming services cost estimates (in €cents/unit) in each of the 28 countries for 2020<sup>23</sup>**

	<b>voice min</b>	<b>voice max</b>	<b>SMS max</b>	<b>data min</b>	<b>data max</b>
AT	1.42	1.60	0.13	0.55	0.72
BE	1.67	1.89	0.15	1.27	2.06
BG	1.40	1.51	0.04	0.62	0.92
CY	1.67	1.71	0.16	1.16	1.39
CZ	1.58	1.97	0.10	0.83	1.10
DE	1.79	2.00	0.06	1.44	1.80
DK	1.41	1.50	0.08	0.59	0.75
EE	1.49	1.52	0.30	0.67	0.81
EL	1.51	1.70	0.08	1.27	1.67
ES	1.53	1.63	0.05	1.13	1.83
FI	1.37	1.39	0.13	0.55	0.67
FR	1.47	1.66	0.07	1.06	1.68
HR	1.44	1.52	0.06	0.74	1.13
HU	1.65	1.90	0.11	1.44	2.18
IE	1.42	1.55	0.04	0.89	1.55
IT	1.51	1.60	0.05	0.89	1.17
LT	1.47	1.56	0.05	0.67	0.93
LV	1.44	1.65	0.27	0.56	0.84
MT	2.19	2.46	0.30	1.65	2.16
NL	1.51	1.67	0.07	1.03	1.69
PL	1.37	1.40	0.09	0.54	0.69
PT	1.47	1.59	0.06	0.80	1.19
RO	1.38	1.49	0.07	0.60	0.83
SE	1.52	1.74	0.06	0.81	1.15
SI	1.65	1.71	0.19	0.89	1.26
SK	1.53	1.72	0.06	0.85	1.14
UK	1.65	1.75	0.10	1.14	1.38
NO	1.69	1.88	0.13	1.07	1.66
<b>Average</b>	<b>1.54</b>	<b>1.69</b>	<b>0.11</b>	<b>0.92</b>	<b>1.30</b>

<sup>23</sup> These cost estimates include: 1) the total wholesale roaming costs in MS estimated by Axon (including network costs, roaming-specific costs and the impact of seasonality on roaming costs); 2) an estimation for the termination rate that the visited network operator needs to pay the terminating network operator for terminating a call on its network (only for voice) and 3) an estimation for the transit costs that the visited network operator needs to pay for routing a call to the terminating network operator or to send data traffic back to the home network (only for voice and data services). More information on the approach that BEREC follows to estimate the unit costs can be found in BEREC's document BoR (19) 168.

BEREC compared the lowest wholesale prices for the unbalanced traffic in Q4 2019 and Q1 2020 against the estimated unit costs for 2019 and 2020<sup>24</sup>.



The evidence from the estimates of the EEA wholesale rates for the outgoing calls and data services shows that the EEA average of the maximum unit cost estimates for 2019 and 2020 are lower than but close to the EEA average wholesale prices. The EEA average wholesale rate for SMS services is more than twice the EEA average of Axon's unit cost estimates.

Further information on unit cost estimates can be found in the BEREC supplementary analysis on wholesale roaming costs<sup>25</sup>.

### MNOs and MVNOs<sup>26</sup>

For both quarters (Q4 19 and Q1 20), roaming consumption is lower for MVNOs' subscribers than for those of MNOs (Figure 38). It is also worth noting that payments made by MVNOs to the host operators for wholesale roaming service for all services are higher than the average wholesale prices (Figure 45).

<sup>24</sup> Prices are calculated from the lowest unbalanced rates submitted by the operators and expressed as simple average.

\* These cost estimates include: 1) the total wholesale roaming costs in MS estimated by Axon (including network costs, roaming-specific costs and the impact of seasonality on roaming costs); 2) an estimation for the termination rate that the visited network operator needs to pay the terminating network operator for terminating a call on its network (only for voice) and 3) an estimation for the transit costs that the visited network operator needs to pay for routing a call to the terminating network operator or to send data traffic back to the home network (only for voice and data services).

<sup>25</sup> BoR (19) 168 BEREC supplementary analysis on wholesale roaming costs is available at: [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/opinions/8756-berec-supplementary-analysis-on-wholesale-roaming-costs](https://berec.europa.eu/eng/document_register/subject_matter/berec/opinions/8756-berec-supplementary-analysis-on-wholesale-roaming-costs)

<sup>26</sup> In some cases the data for MVNOs is incomplete so the figures presented are more of indicative nature.

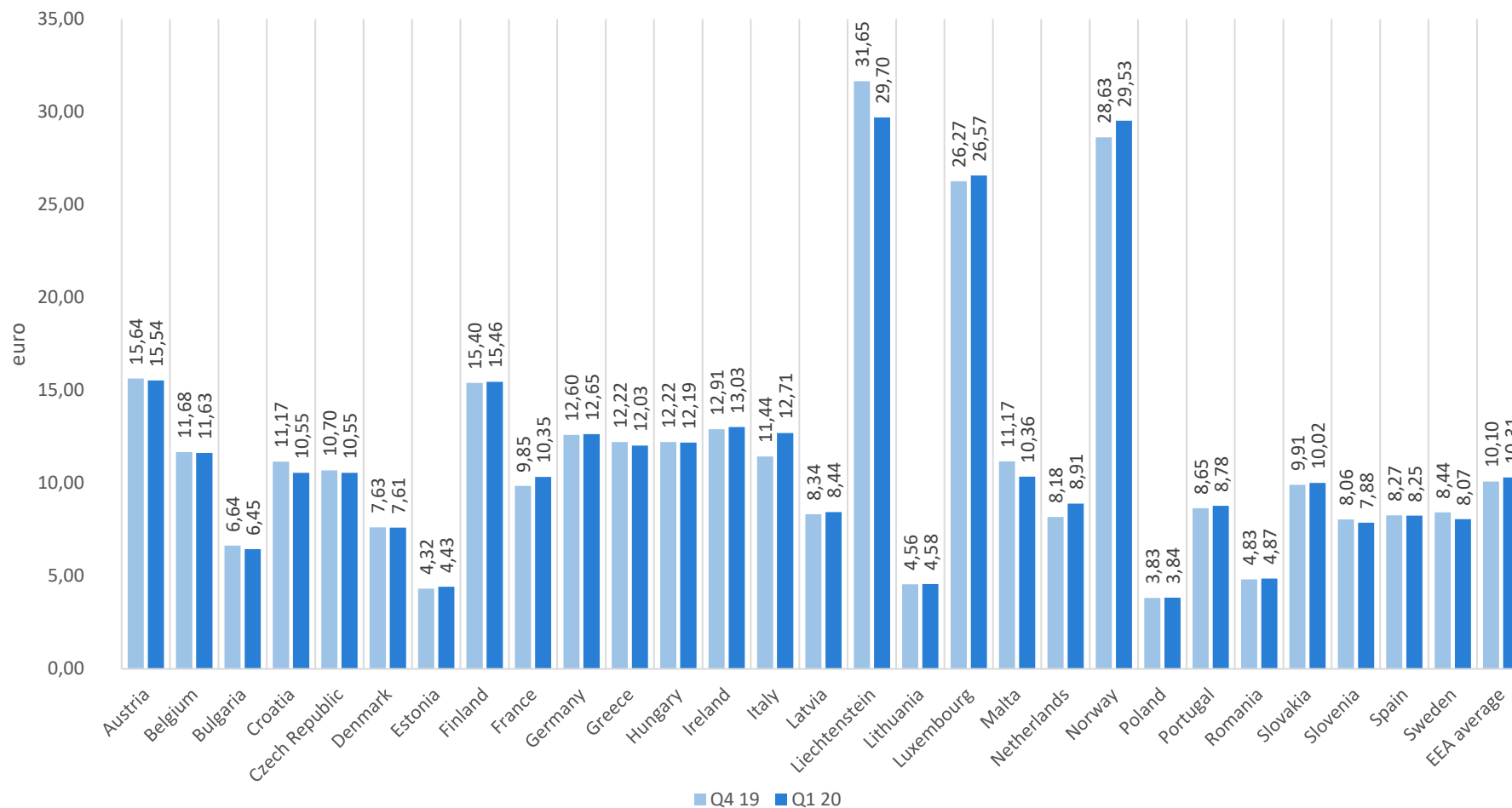
## 5. Charts



## **5.1. Analysis of subscribers and those that use roaming services**

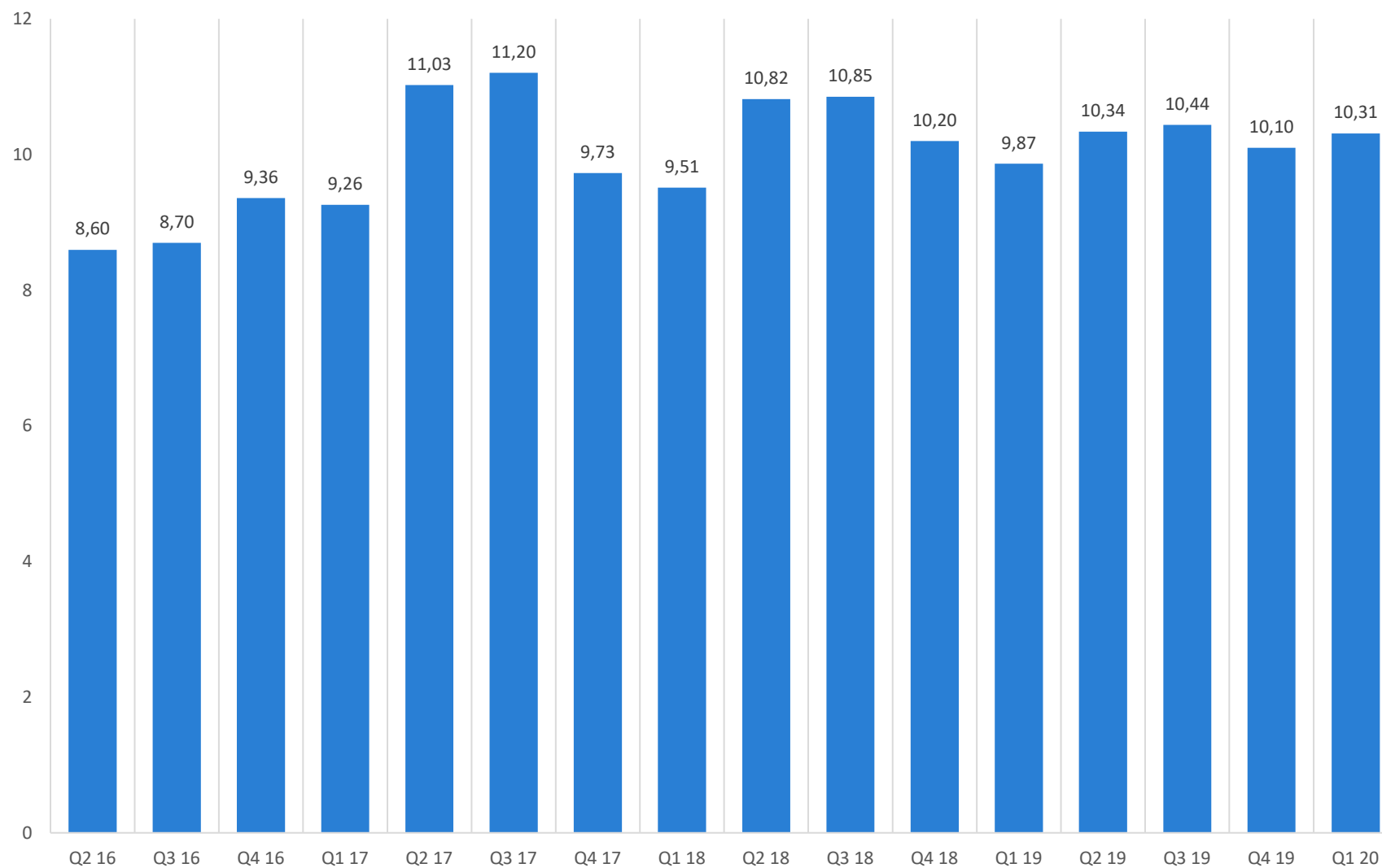
### **5.1.1. Domestic average Retail Mobile Revenue per User (ARRPU)**

Figure 1: Domestic mobile service: monthly retail revenue per total number of subscribers (ARRPU), Q4 19 and Q1 20



EEA average excludes: Cyprus - revenues from several operators were not disclosed due to the fact that they have not been audited.  
In some cases, not all operators provided the data for subscribers.

Figure 2: EEA average: domestic mobile service: monthly retail revenue per total number of subscribers (ARRPU), Q2 16 – Q1 20



The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

### **5.1.2. Consumption patterns for domestic mobile retail services**

Figure 3: Domestic calls made: average number of minutes per month per total number of subscribers, Q4 19 and Q1 20

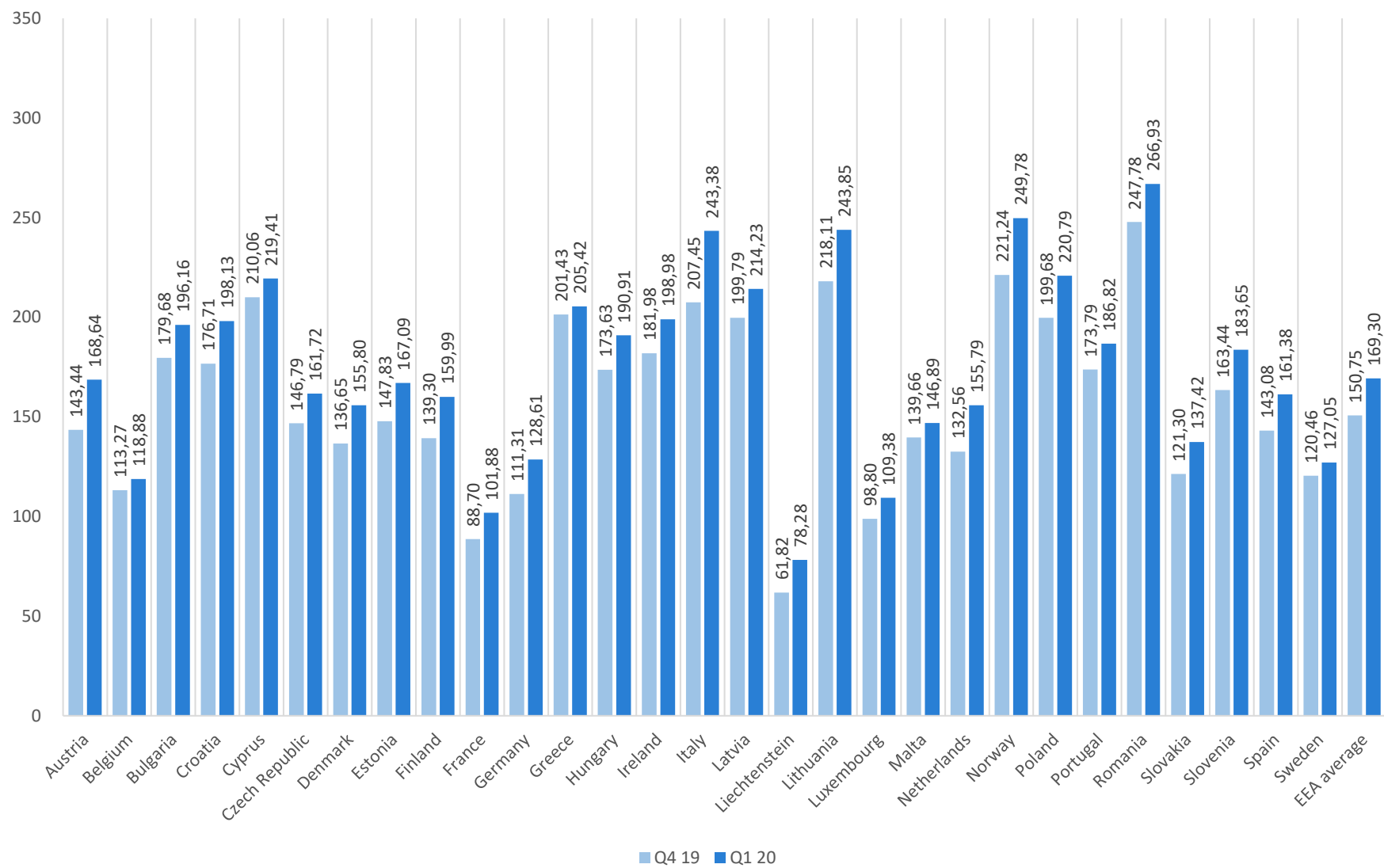
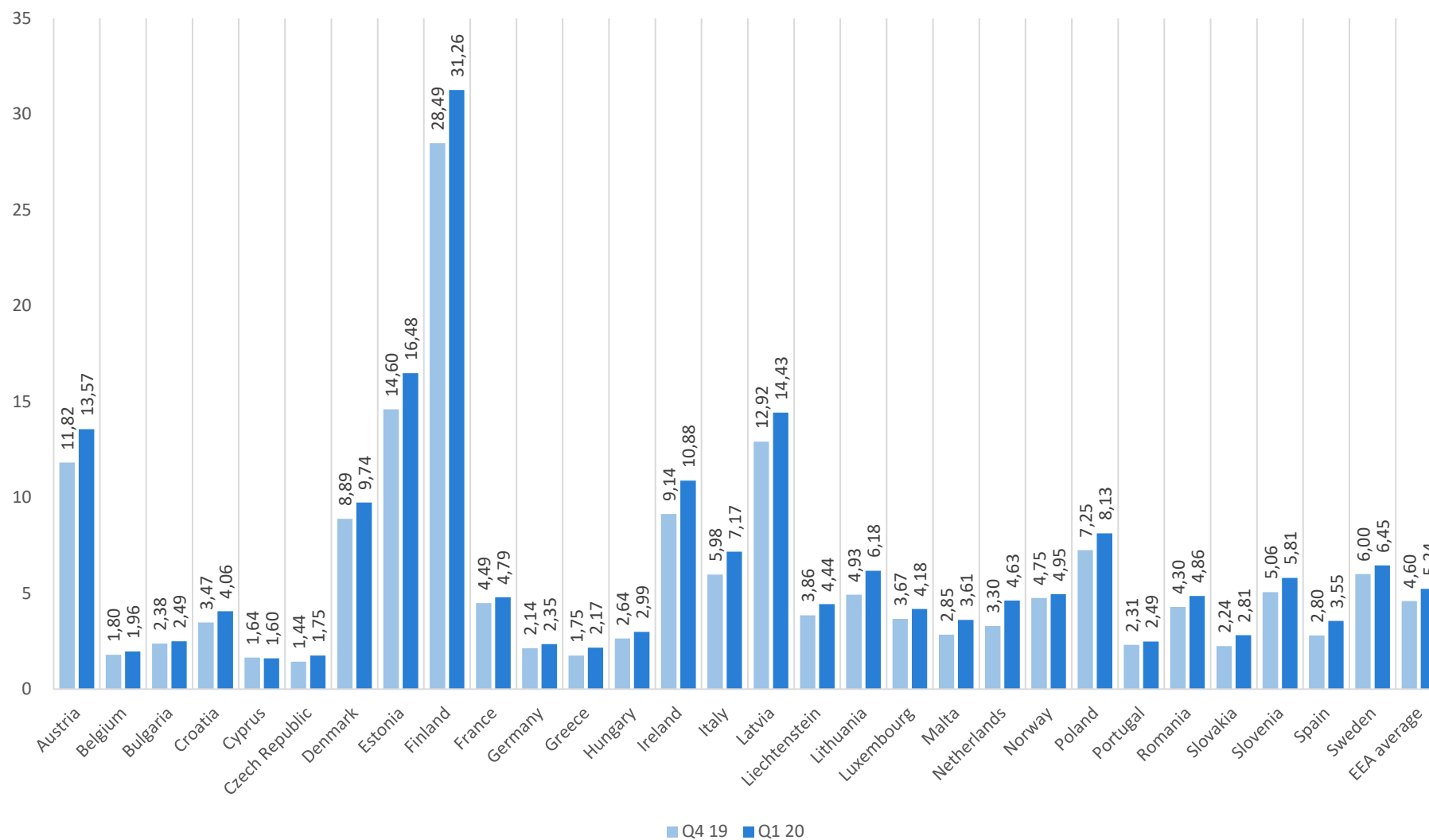
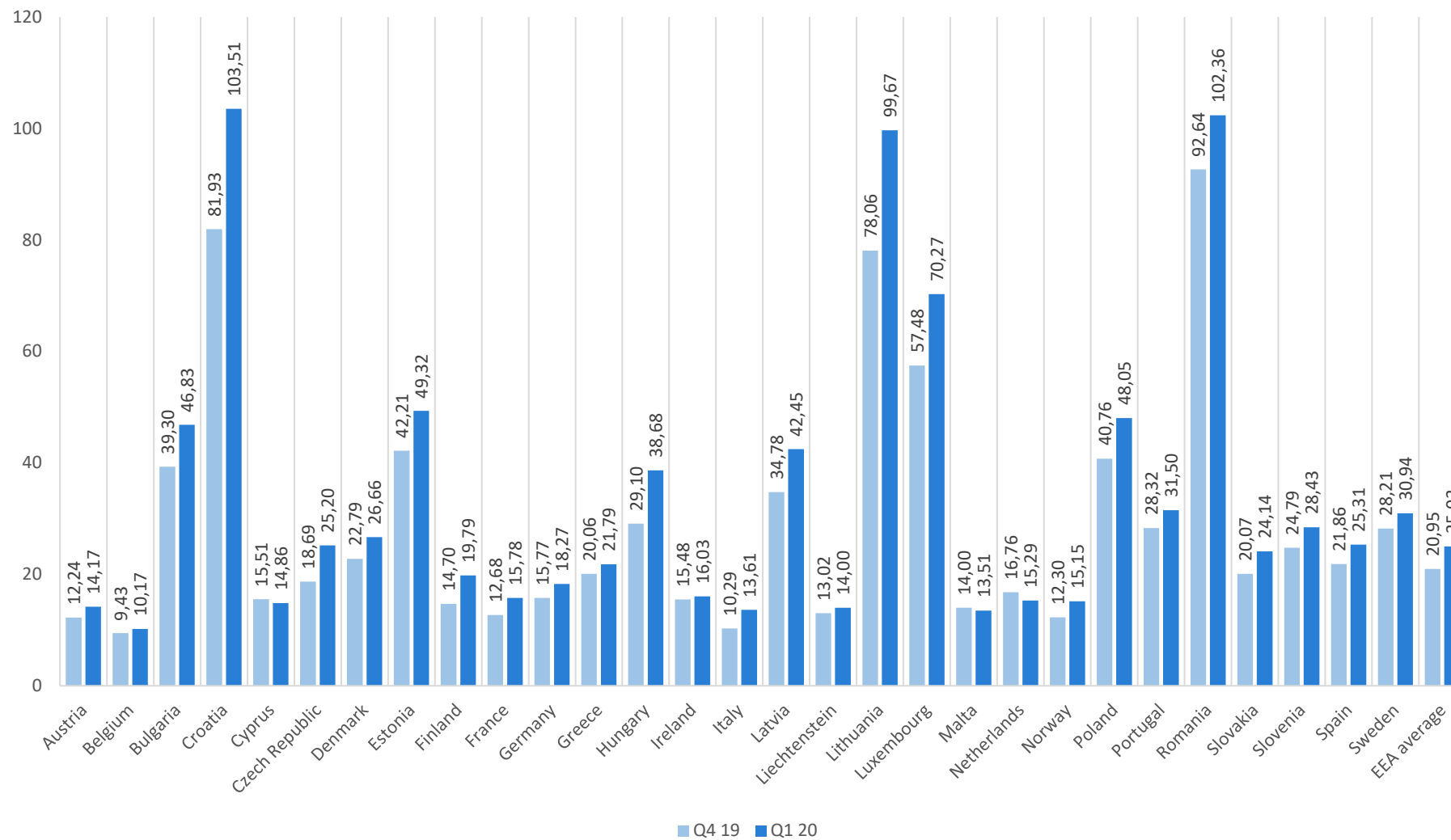


Figure 4: Domestic data services: average consumption per month per total number of subscribers (GB), Q4 19 and Q1 20



### **5.1.3. Consumption patterns for RLAH services (voice, SMS and data)**

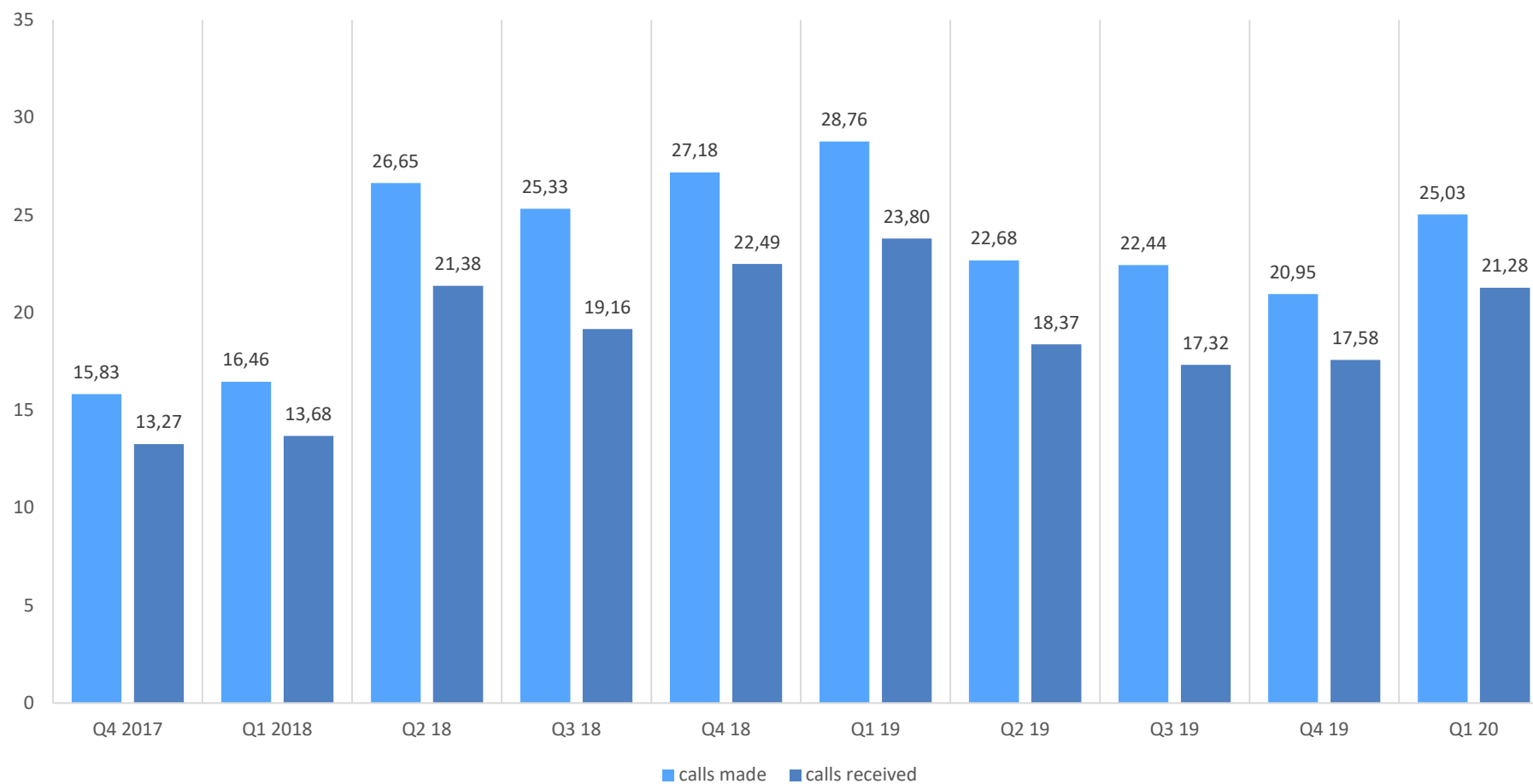
Figure 5: RLAH, calls made: average number of RLAH minutes per month per total number of roaming subscribers with active RLAH services, Q4 19 and Q1 20



In some cases, not all operators provided the data for RLAH subscribers



Figure 6: EEA average number of RLAH minutes per month per total number of roaming subscribers with active RLAH services, Q4 17 – Q1 20

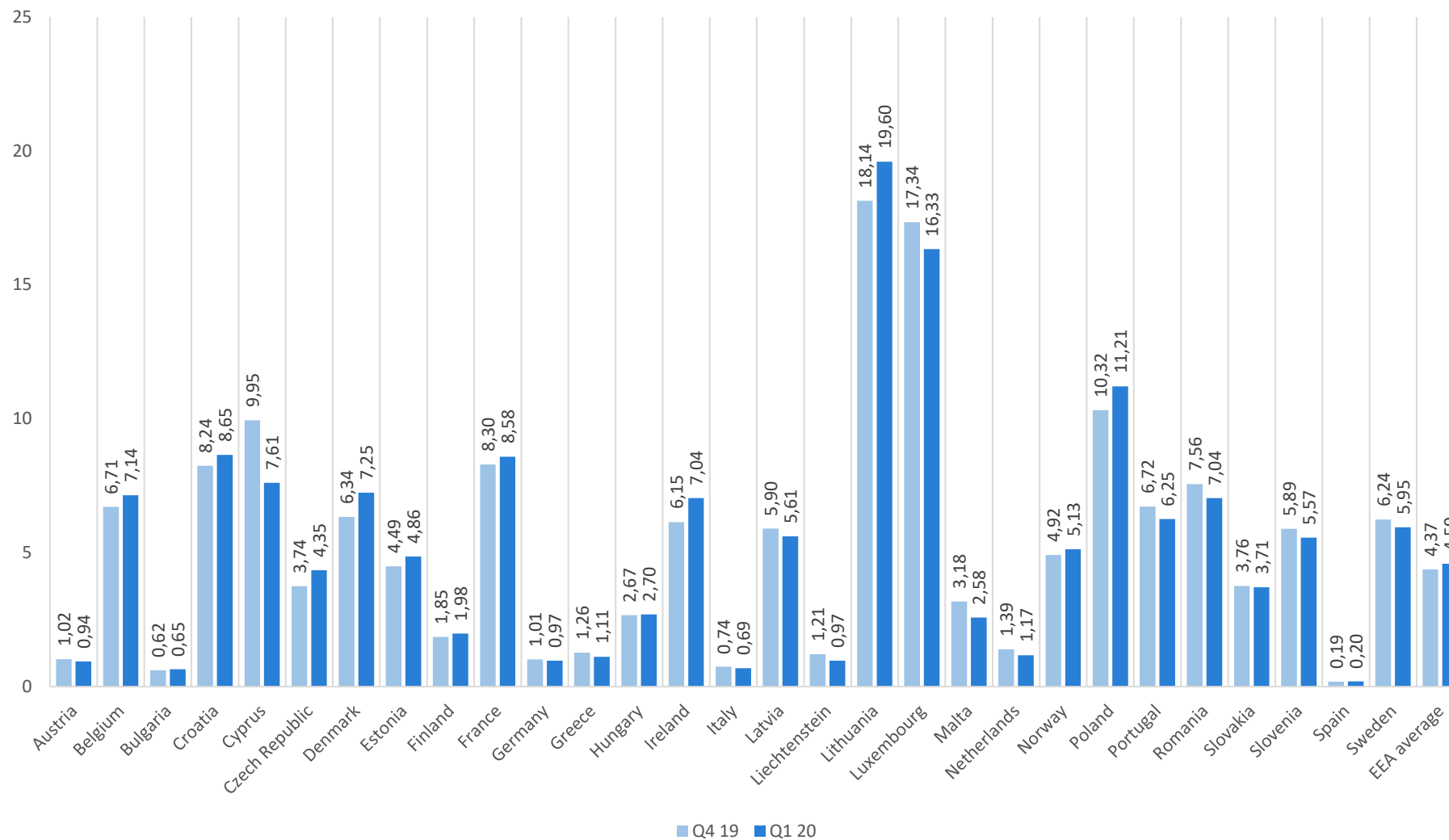


BEREC changed the way it presents consumption patterns for RLAH services in order to make it easier to interpret. Since Q2 18, the indicator has been calculated by dividing RLAH volumes by number of active subscribers with RLAH services that were roaming at least once in the concerned period in the EEA. This is to ensure that period-to-period changes in the indicator are not influenced by subscribers with different tariff plans. For a correct interpretation of the trend, the reader should take into account that Q4 17 and Q1 18 is calculated by dividing RLAH volumes by number of all active subscribers that were roaming at least once in the concerned quarter in the EEA.

In some cases, not all operators provided the data for RLAH subscribers.

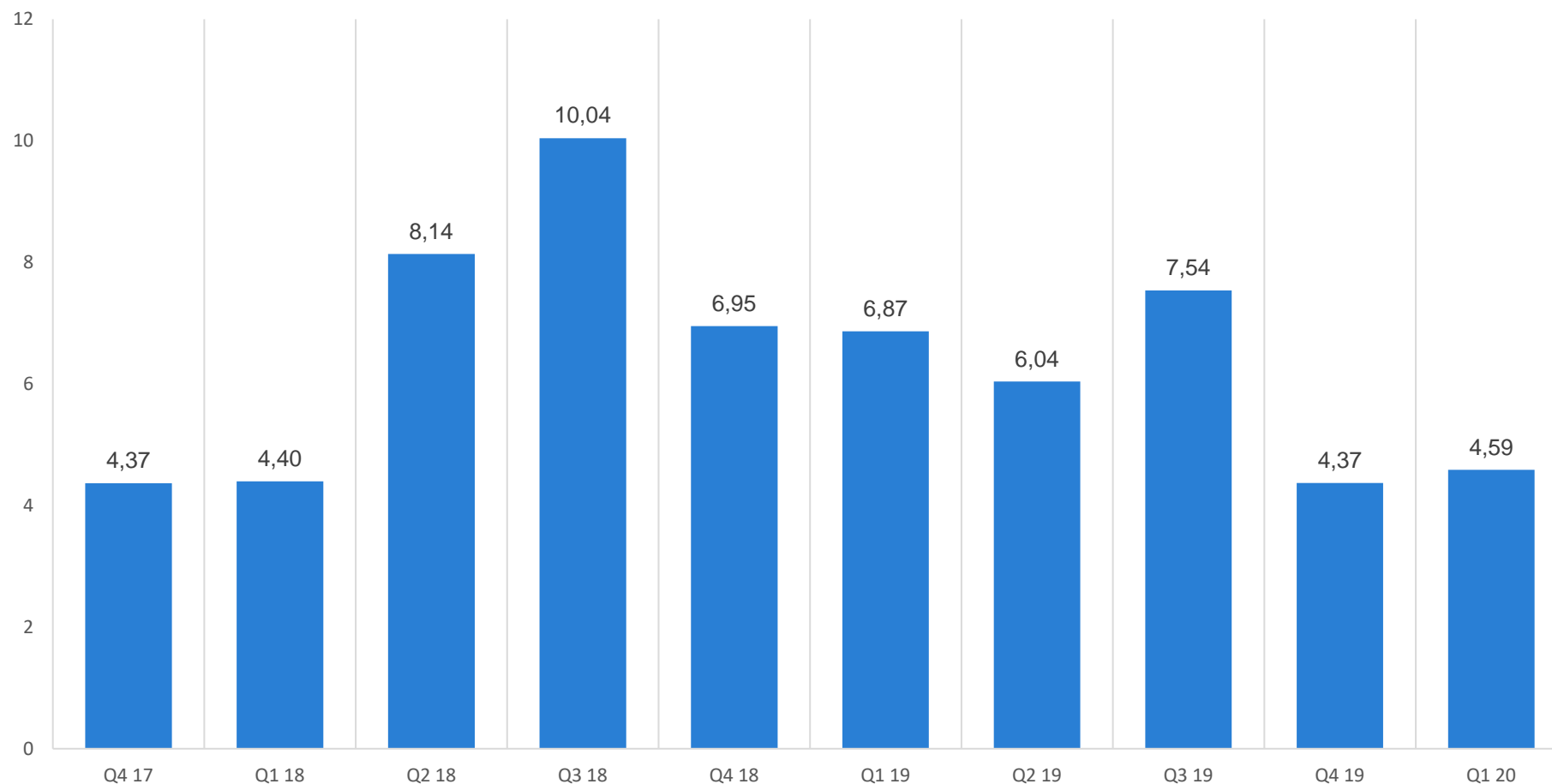
The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 7: RLAH, SMS services: average number of SMS per month per total number of roaming subscribers with active RLAH services, Q4 19 and Q1 20



In some cases, not all operators provided the data for RLAH subscribers

Figure 8: EEA average number of SMS per month per total number of roaming subscribers with active RLAH services, Q4 17 – Q1 20

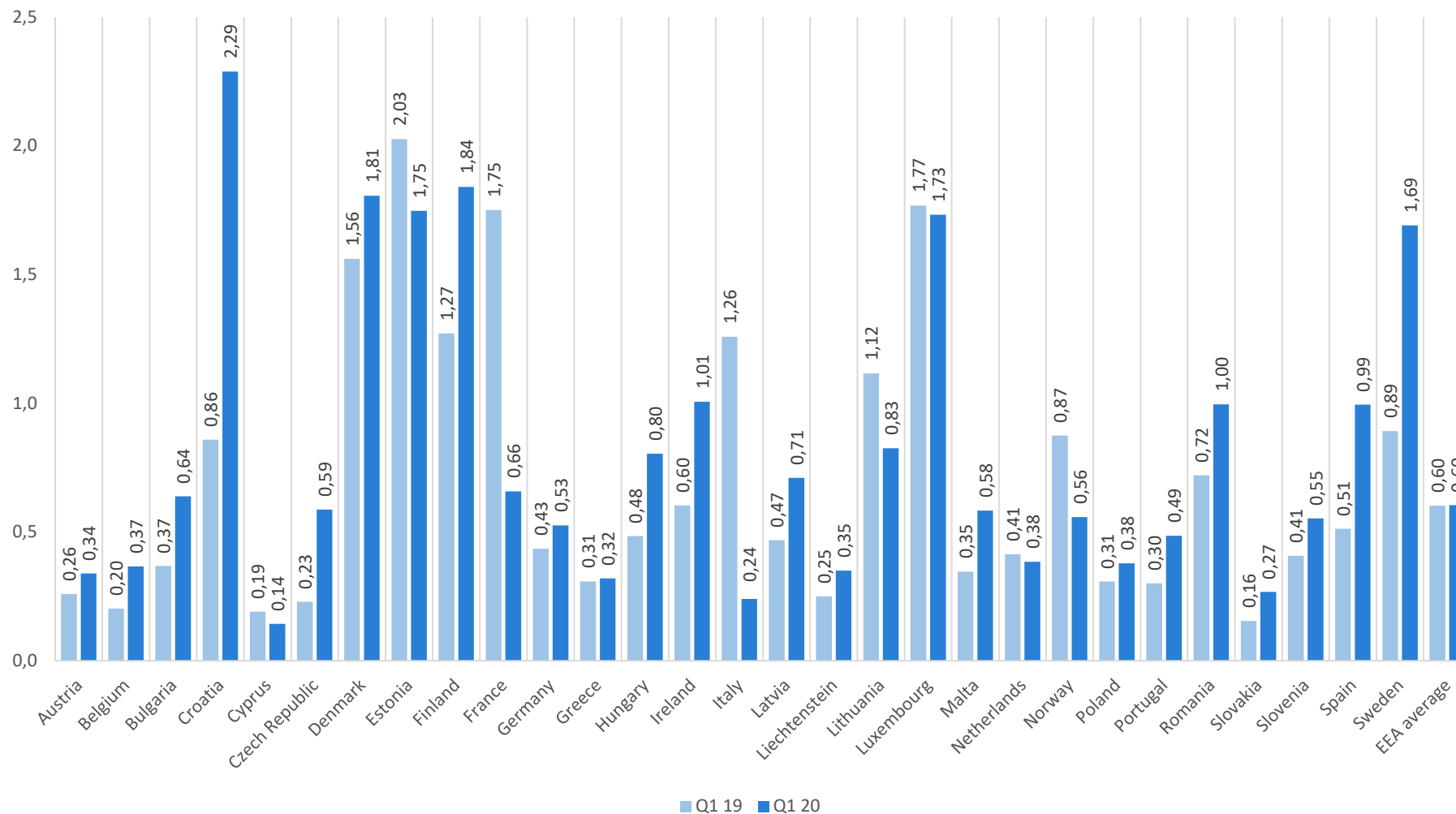


BEREC changed the way it presents consumption patterns for RLAH services in order to make it easier to interpret. Since Q2 18, the indicator has been calculated by dividing RLAH volumes by number of active subscribers with RLAH services that were roaming at least once in the concerned period in the EEA. This is to ensure that period-to-period changes in the indicator are not influenced by subscribers with different tariff plans. For a correct interpretation of the trend, the reader should take into account that Q4 17 and Q1 18 is calculated by dividing RLAH volumes by number of all active subscribers that were roaming at least once in the concerned quarter in the EEA.

In some cases, not all operators provided the data for RLAH subscribers.

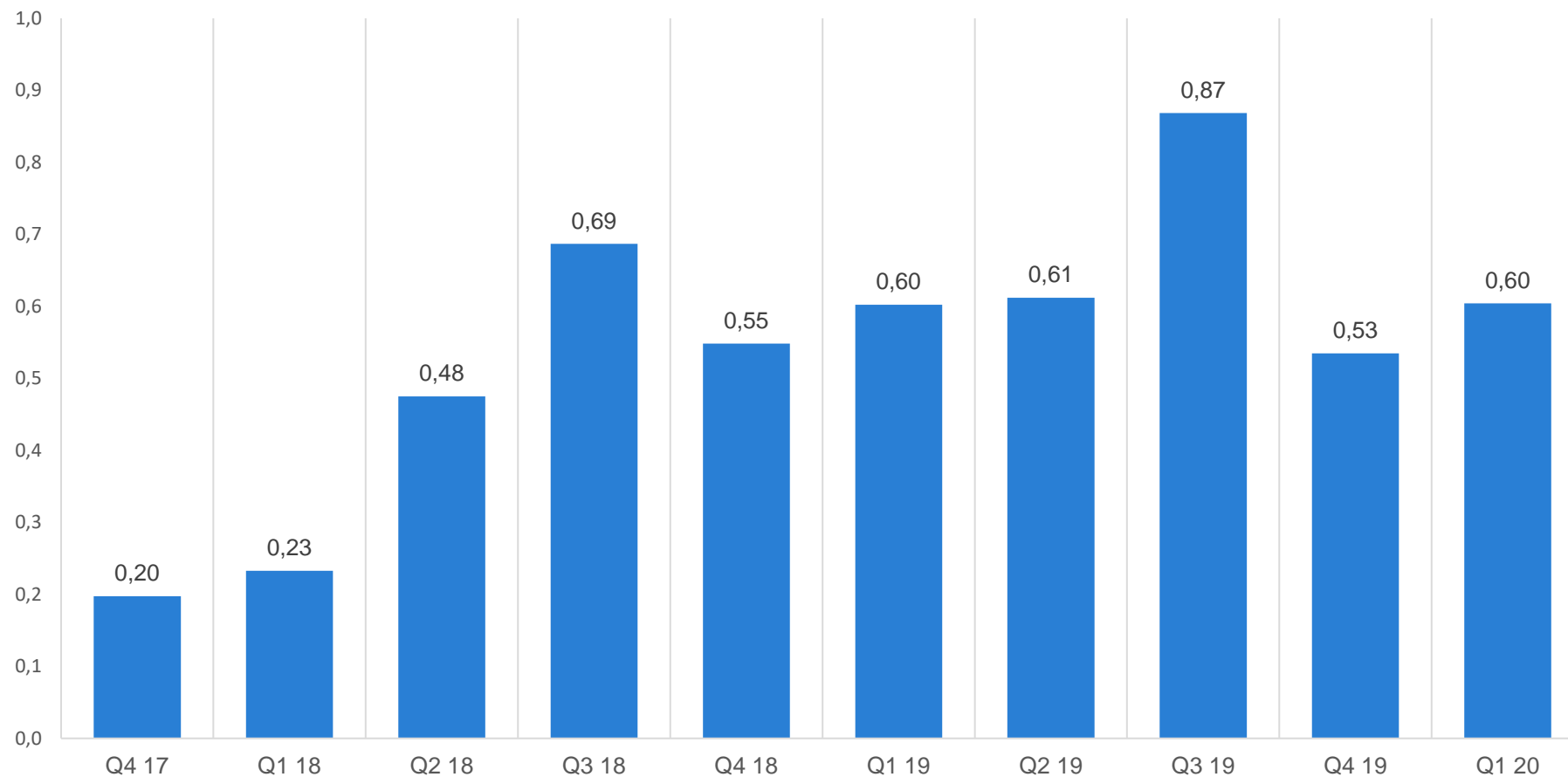
The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 9: RLAH, data services: average consumption per month per total number of roaming subscribers with active RLAH services (in GB), Q1 19 and Q1 20



In some cases, not all operators provided the data for RLAH subscribers.

Figure 10: RLAH, data services: EEA average consumption per month per total number of roaming subscribers with active RLAH services (in GB), Q4 17 – Q1 20

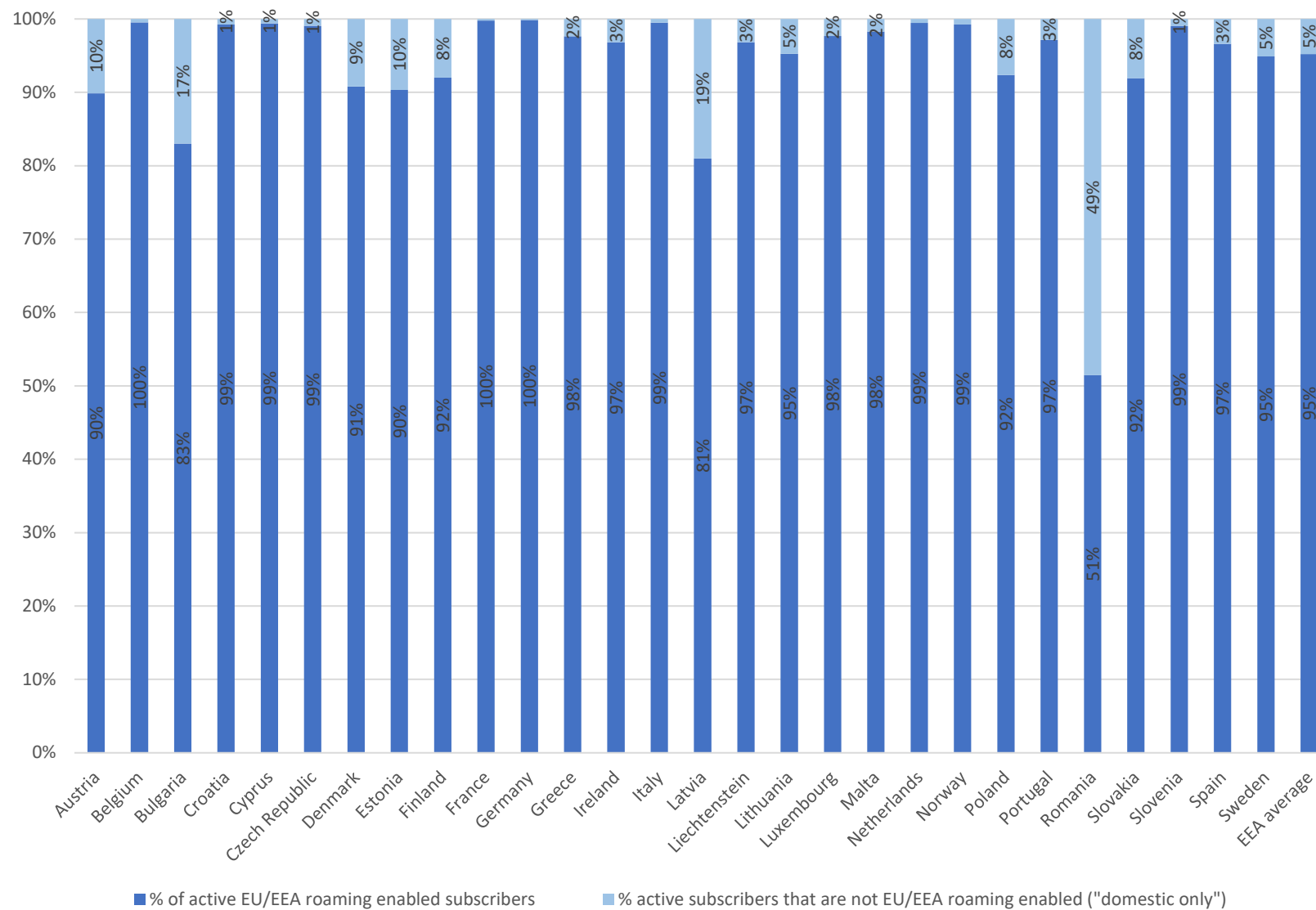


BEREC changed the way it presents consumption patterns for RLAH services in order to make it easier to interpret. Since Q2 18, the indicator has been calculated by dividing RLAH volumes by number of active subscribers with RLAH services that were roaming at least once in the concerned period in the EEA. This is to ensure that period-to-period changes in the indicator are not influenced by subscribers with different tariff plans. For a correct interpretation of the trend, the reader should take into account that Q4 17 and Q1 18 is calculated by dividing RLAH volumes by number of all active subscribers that were roaming at least once in the concerned quarter in the EEA.

In some cases, not all operators provided the data for RLAH subscribers.

The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 11: Share of total subscribers with EU/EEA roaming enabled, Q1 20

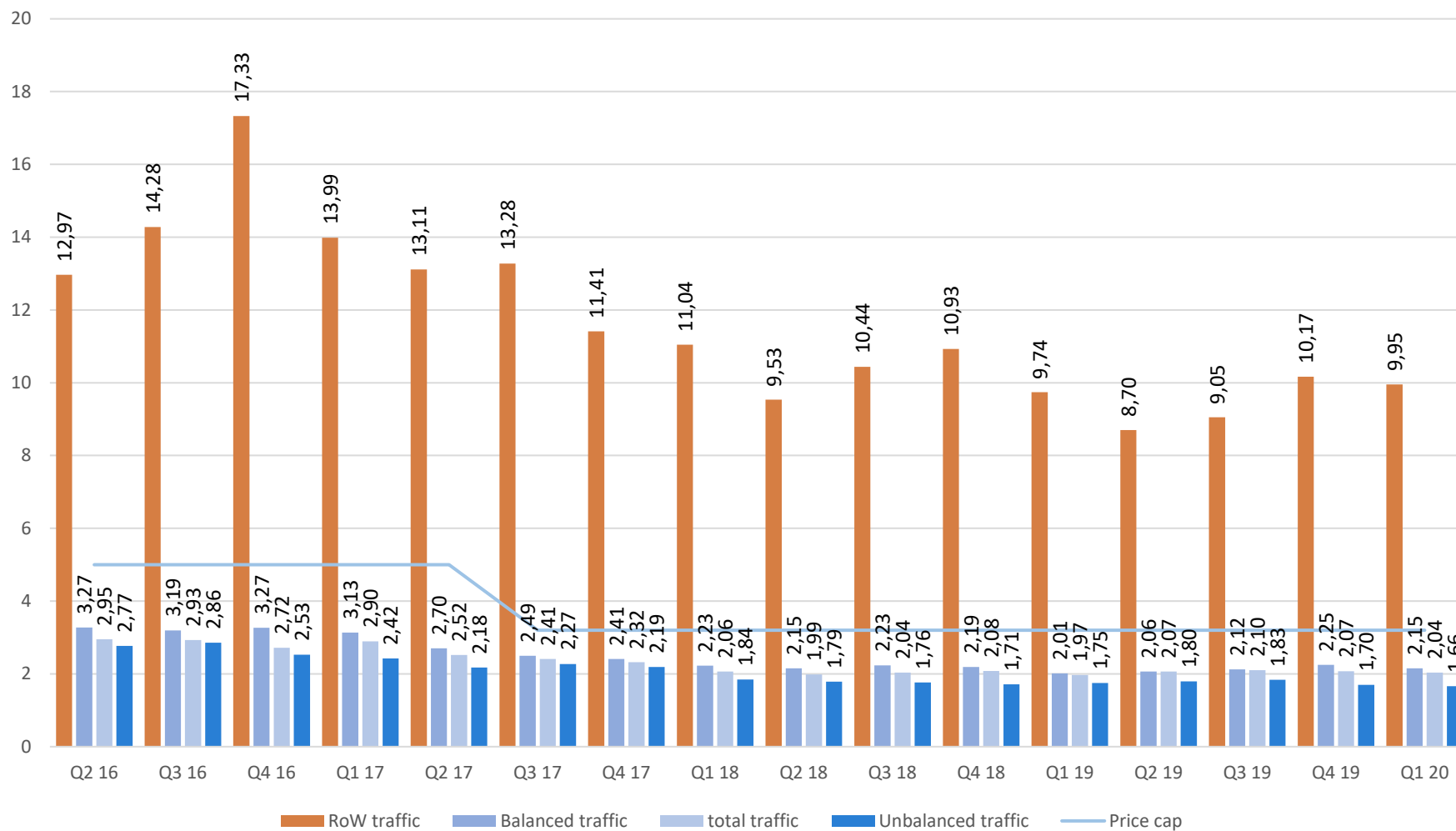


## **5.2. The development of Roaming Services**

### **5.2.1. Voice roaming services**

#### **5.2.1.1 Wholesale prices**

Figure 12: EEA and RoW average wholesale price per minute, Q2 16 – Q1 20 (balanced, unbalanced, total and RoW traffic)

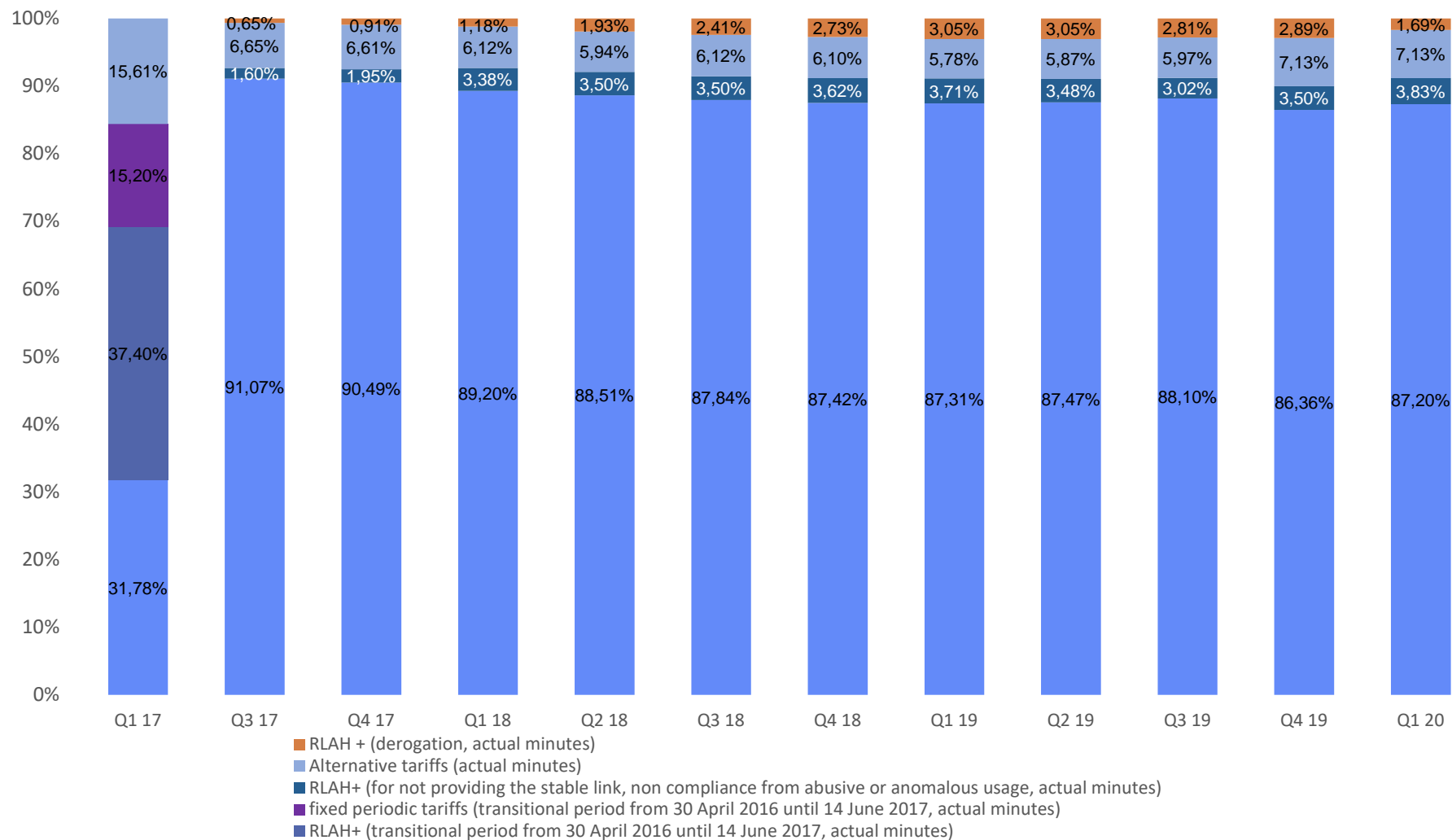


The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.



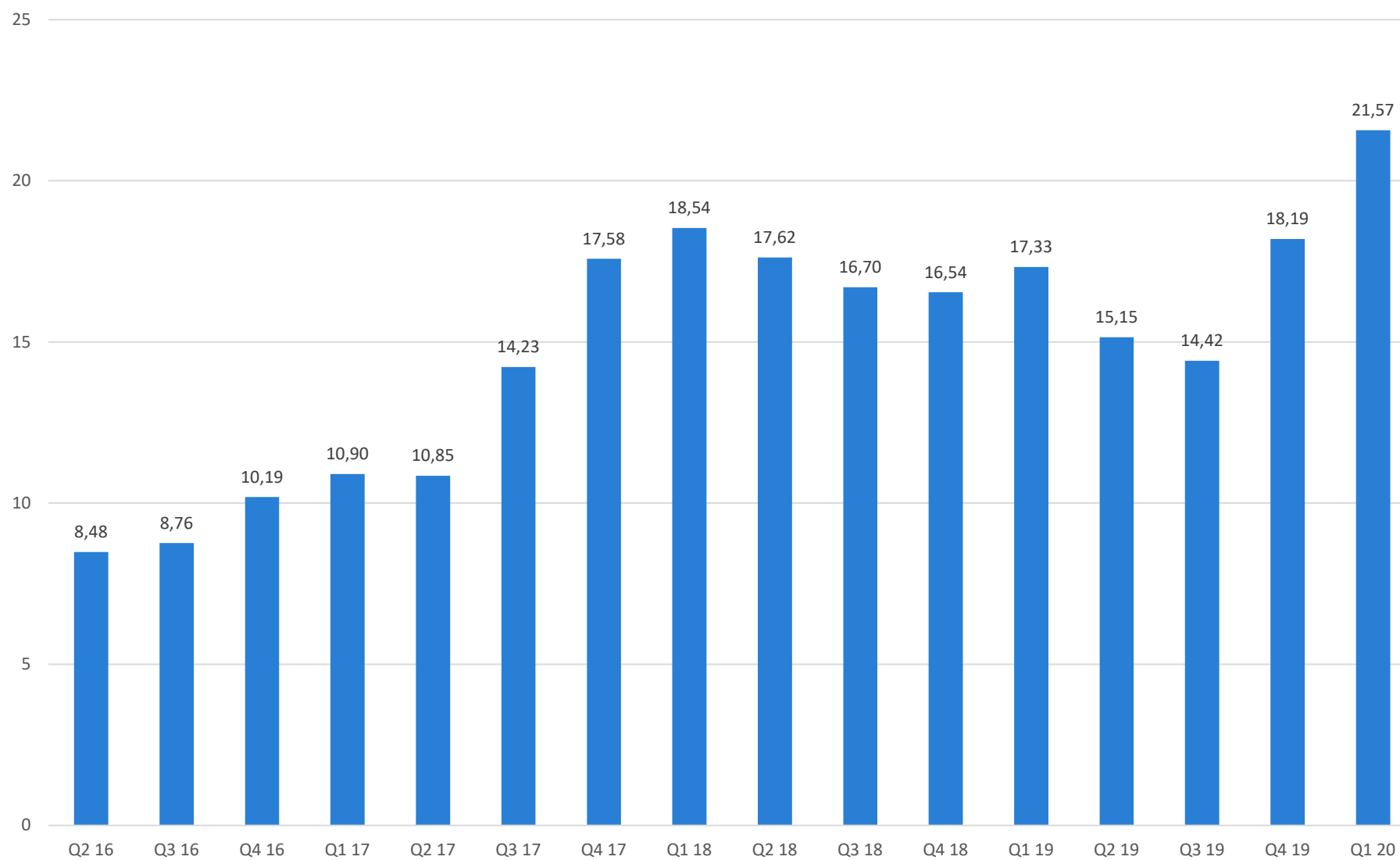
### **5.2.1.2 Consumption patterns**

Figure 13: EEA percentage and volumes of total minutes of calls made, Q1 17 – Q1 20



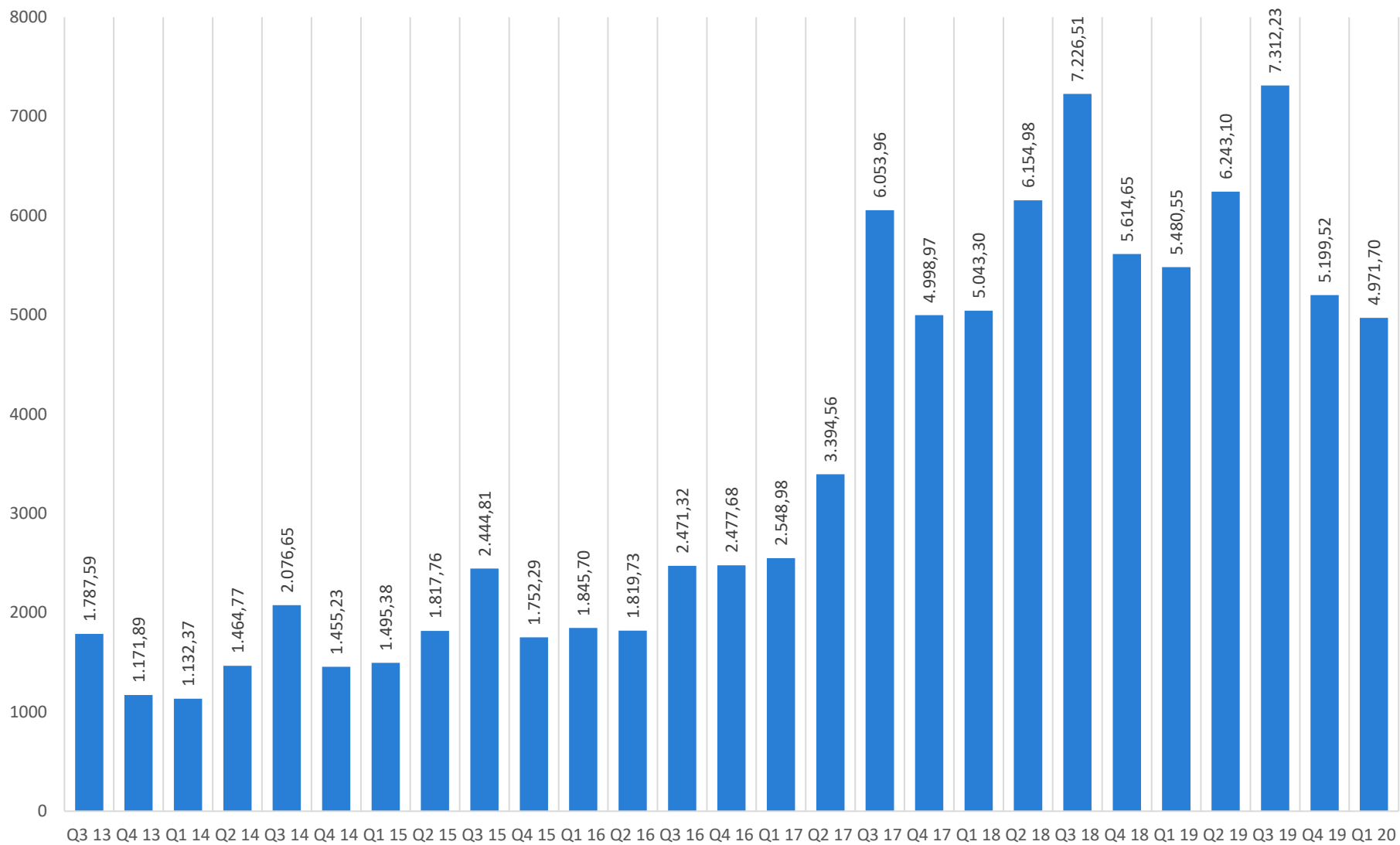
The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 14: Roaming calls made: EEA average number of minutes per month per total number of roaming subscribers Q2 16 – Q1 20



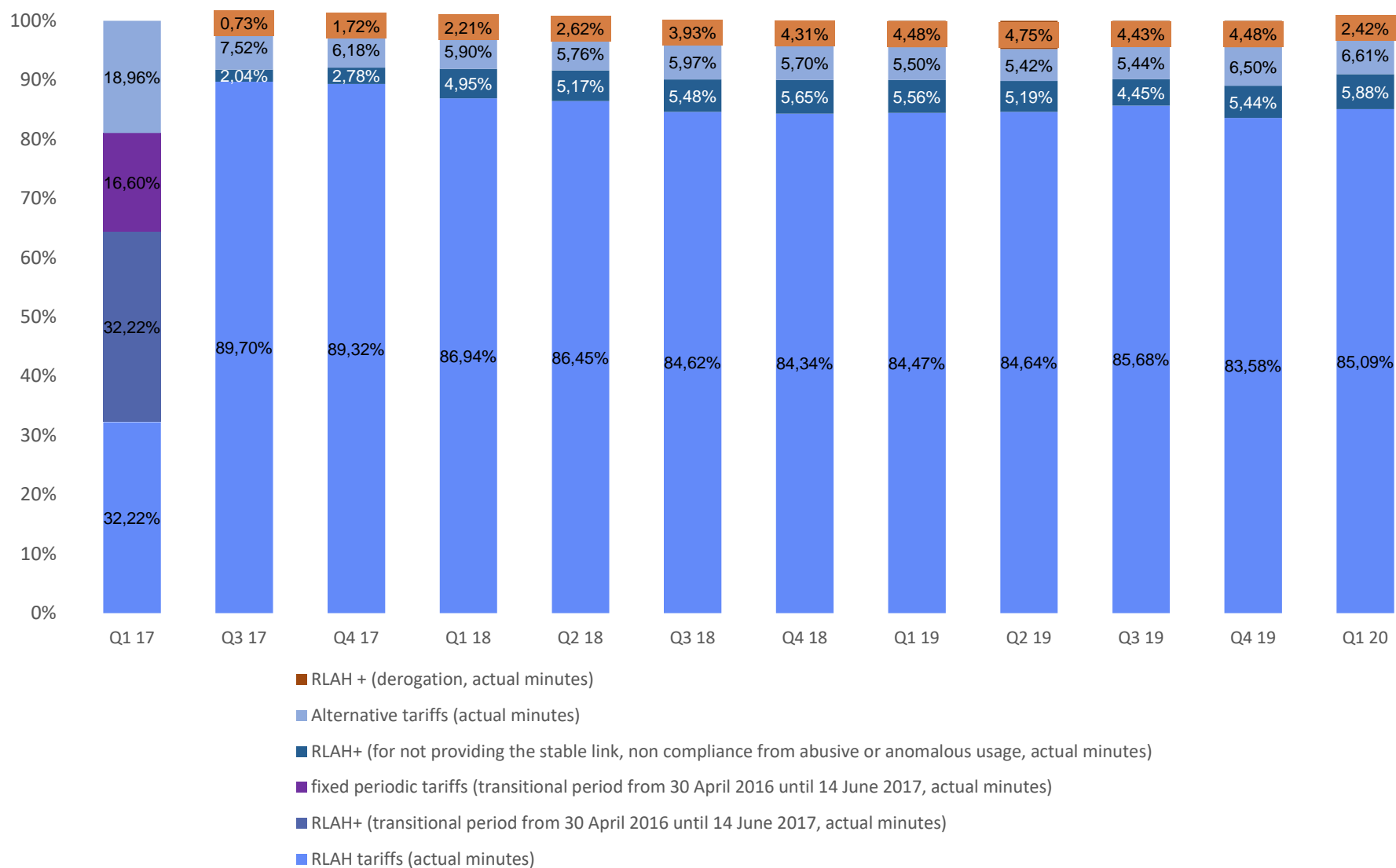
The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 15: EEA average: Roaming calls made traffic, (millions of minutes), Q3 13 – Q1 20



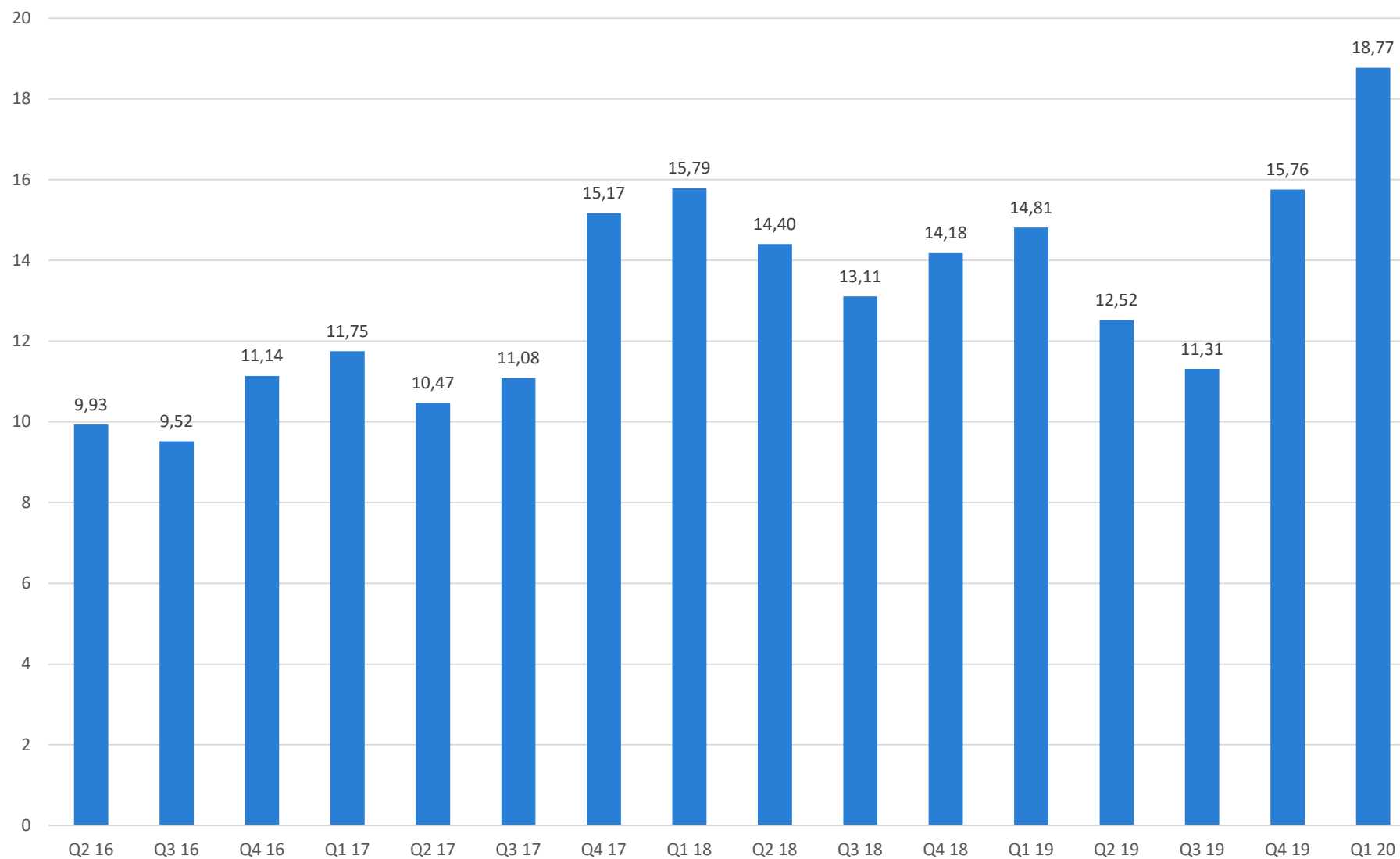
The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 16: EEA volumes and percentage of total minutes of calls received, Q1 17 – Q1 20



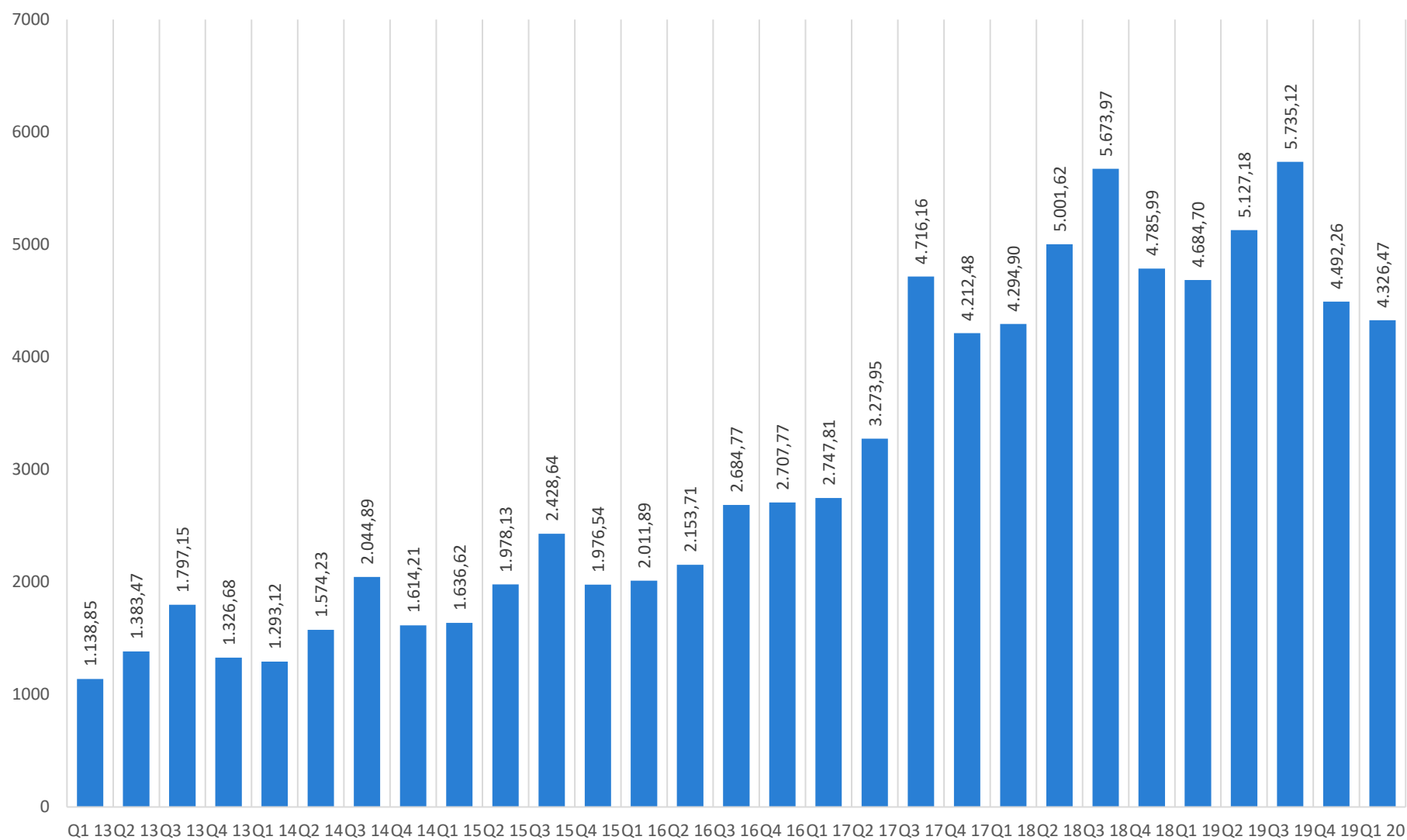
The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 17: Roaming calls received: EEA average number of minutes per month per total number of roaming subscribers, Q2 16 – Q1 20



The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 18: EEA roaming calls received traffic, Q1 13 – Q1 20 (millions of minutes)



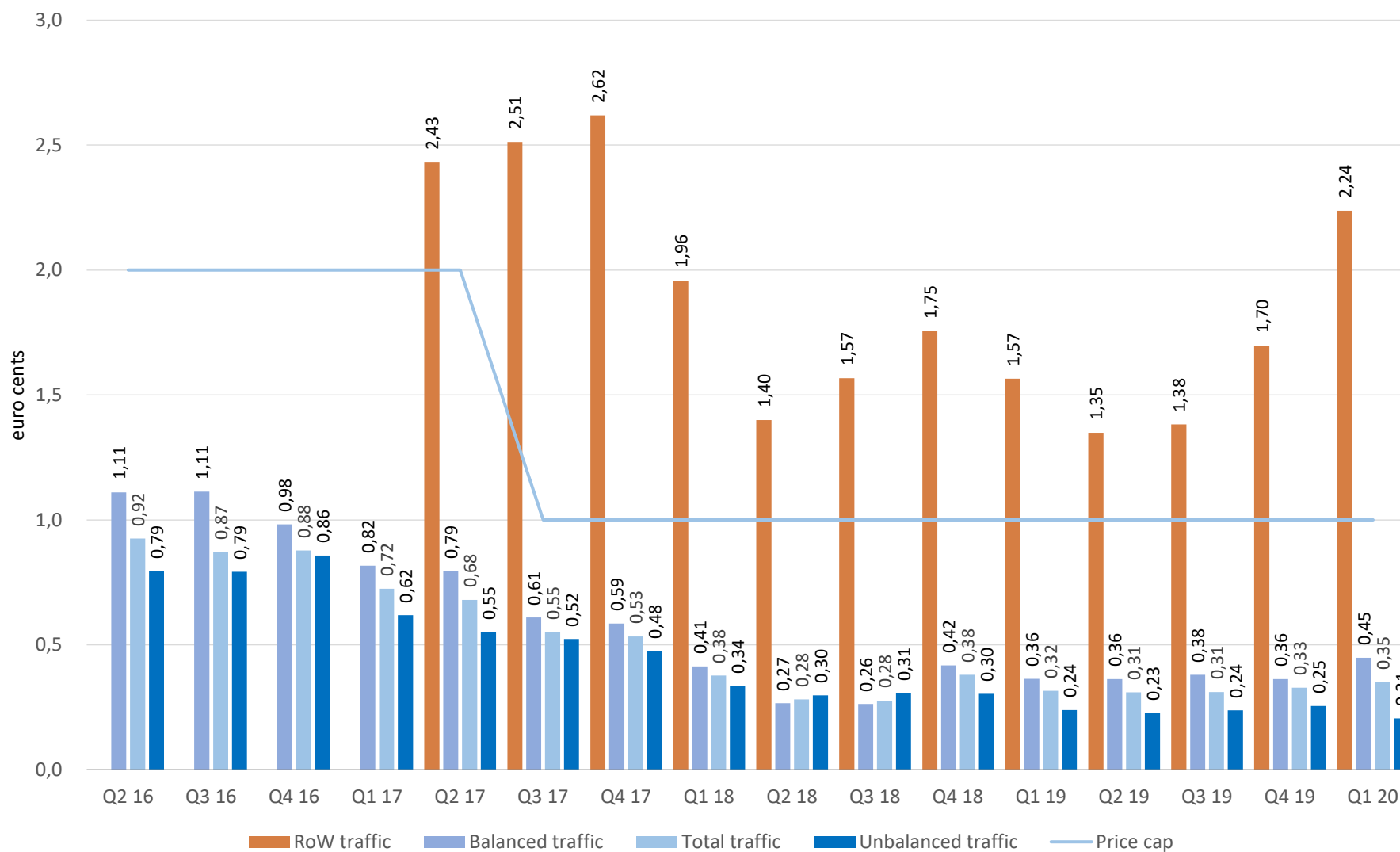
The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

## **5.2.2. SMS roaming services**

### **5.2.2.1 Wholesale prices**



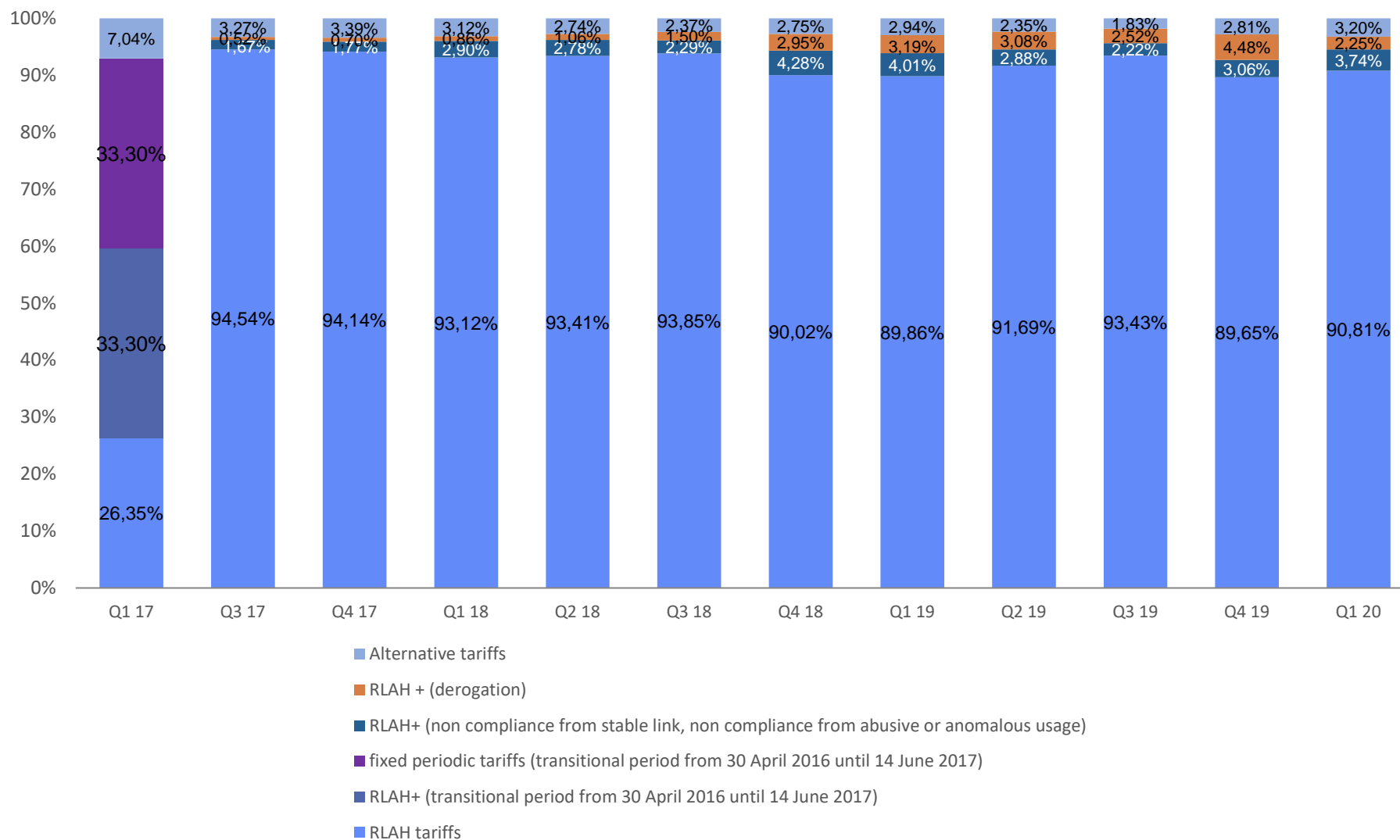
Figure 19: EEA average wholesale price per roaming SMS, Q2 16 – Q1 20 (balanced, unbalanced total and RoW traffic)



The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

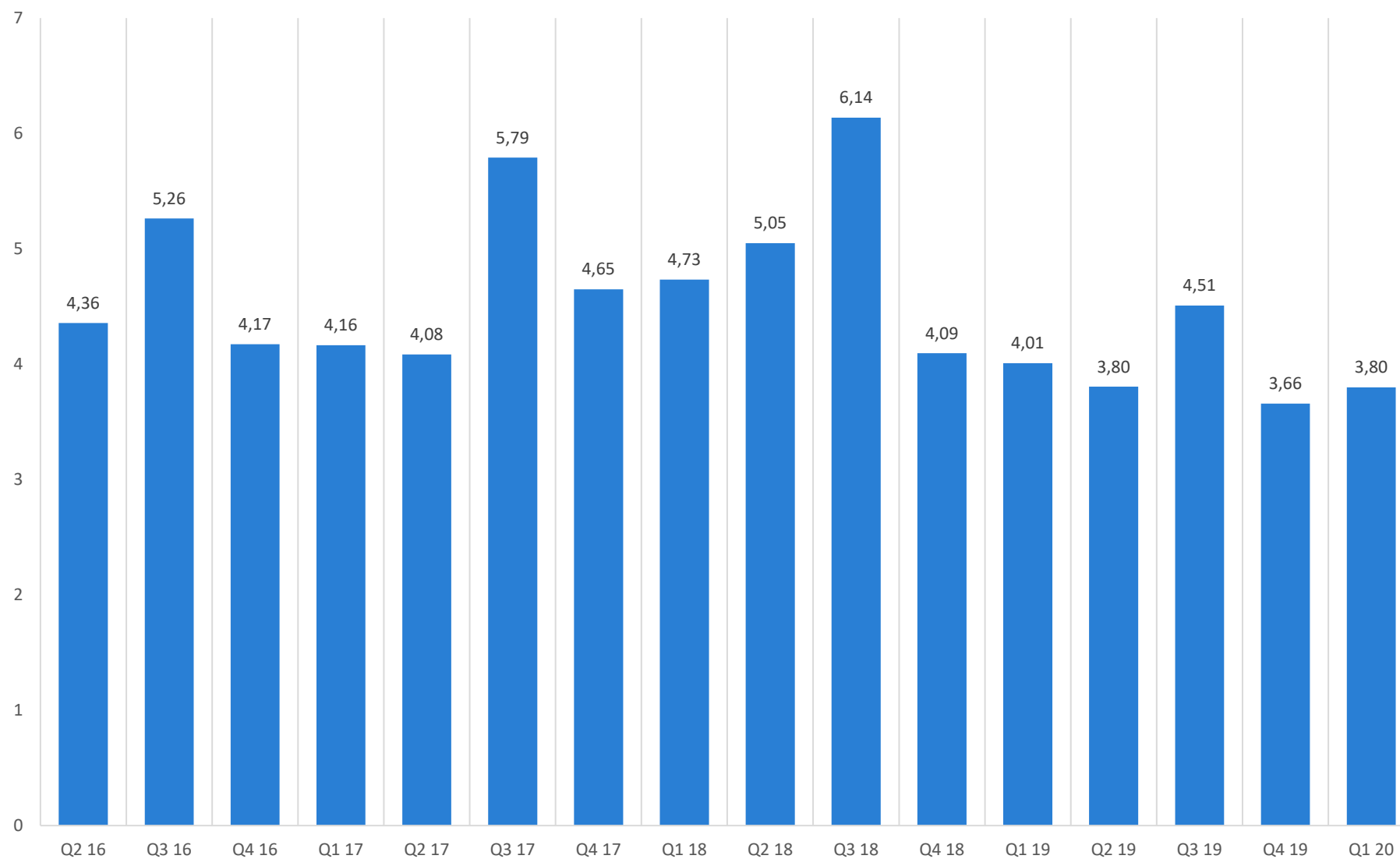
### **5.2.2.2 Consumption patterns**

Figure 20: EEA percentage of SMS sent, Q1 17 – Q1 20



The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 21: EEA average number of SMS per month per total number of roaming subscribers, Q2 16 – Q1 20

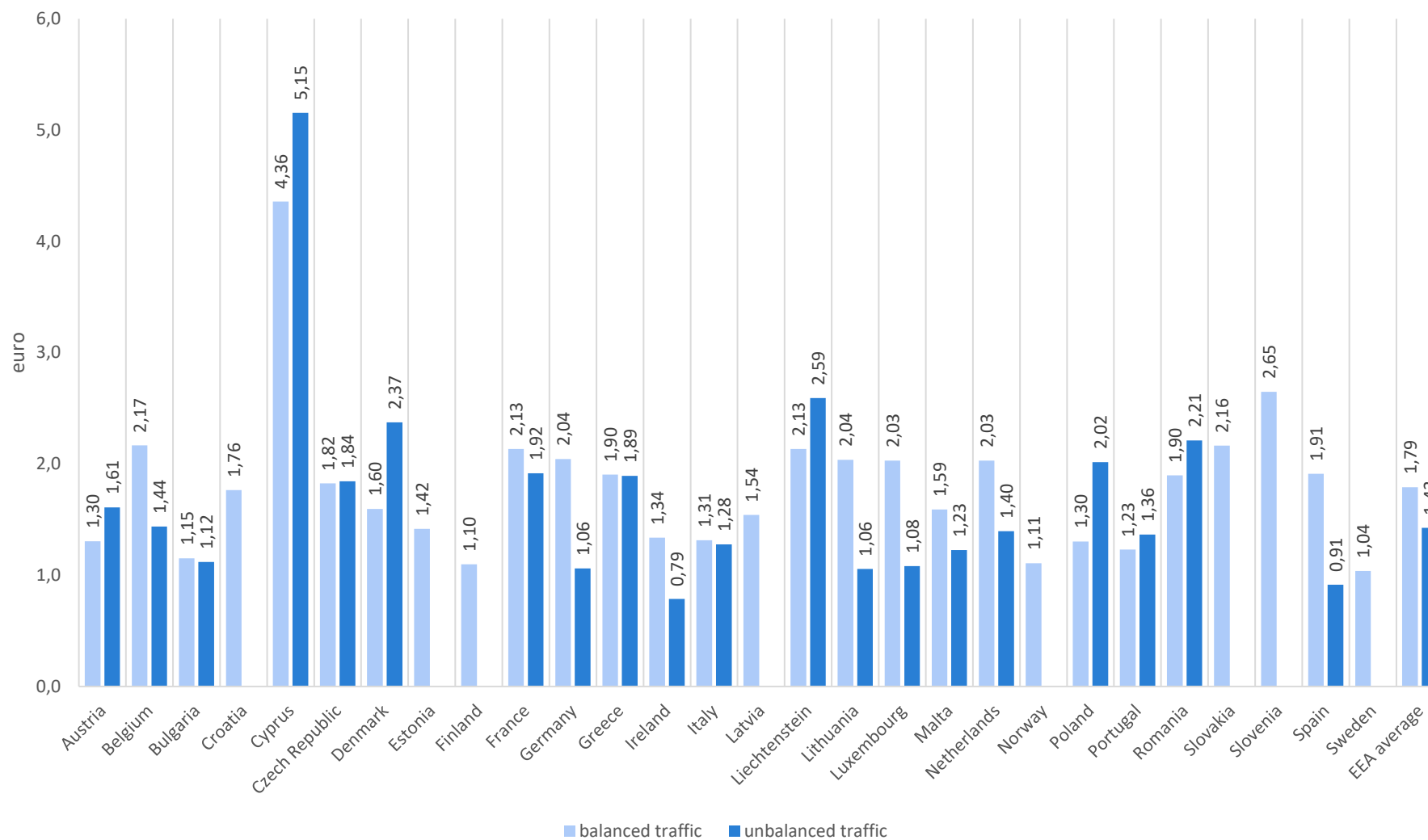


The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

## **5.2.3.Data roaming services**

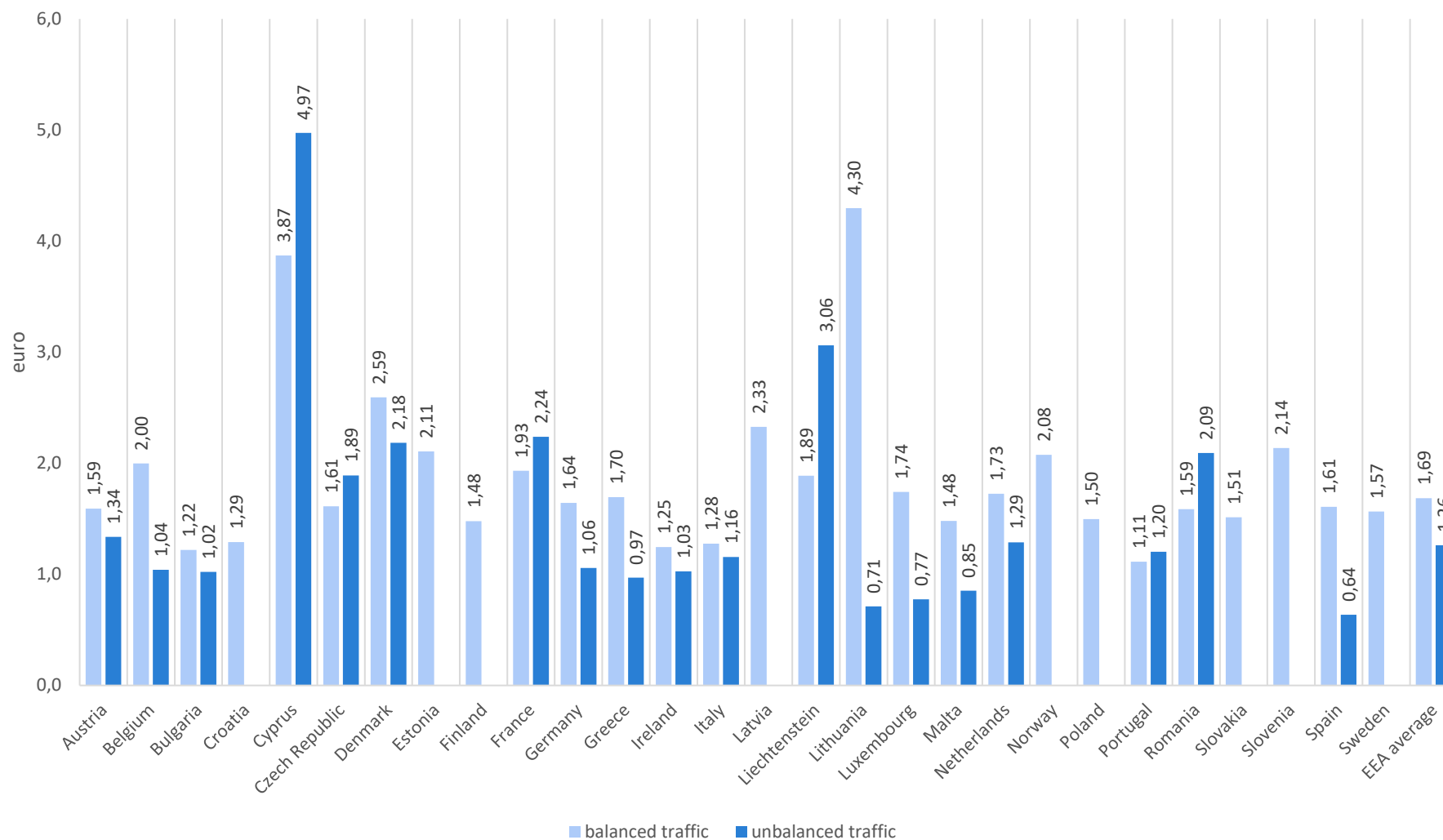
### **5.2.3.1 Wholesale prices**

Figure 22: Average wholesale data price per GB (balanced and unbalanced traffic), Q4 19



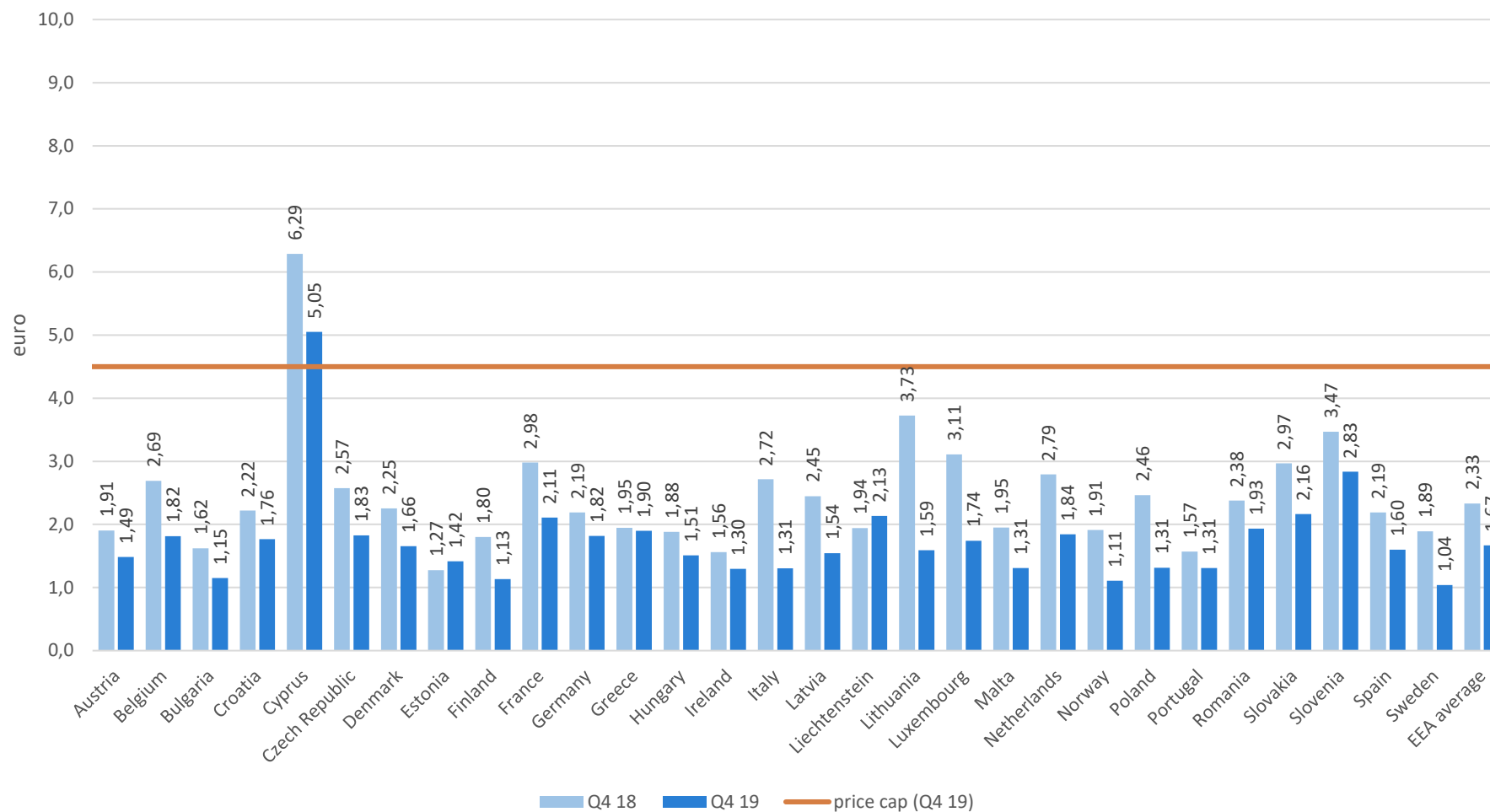
Portugal: the number of operators that reported data for calculating these estimates (disaggregated for balanced and unbalanced traffic) is different from the number of operators that reported data for calculating the estimates (non-disaggregated) in Figure 24 and Figure 25.

Figure 23: Average wholesale data price per GB (balanced and unbalanced traffic), Q1 20



Portugal: the number of operators that reported data for calculating these estimates (disaggregated for balanced and unbalanced traffic) is different from the number of operators that reported data for calculating the estimates (non-disaggregated) in Figure 24 and Figure 25.

Figure 24: Total traffic: average wholesale data price per GB, Q4 18 and Q4 19



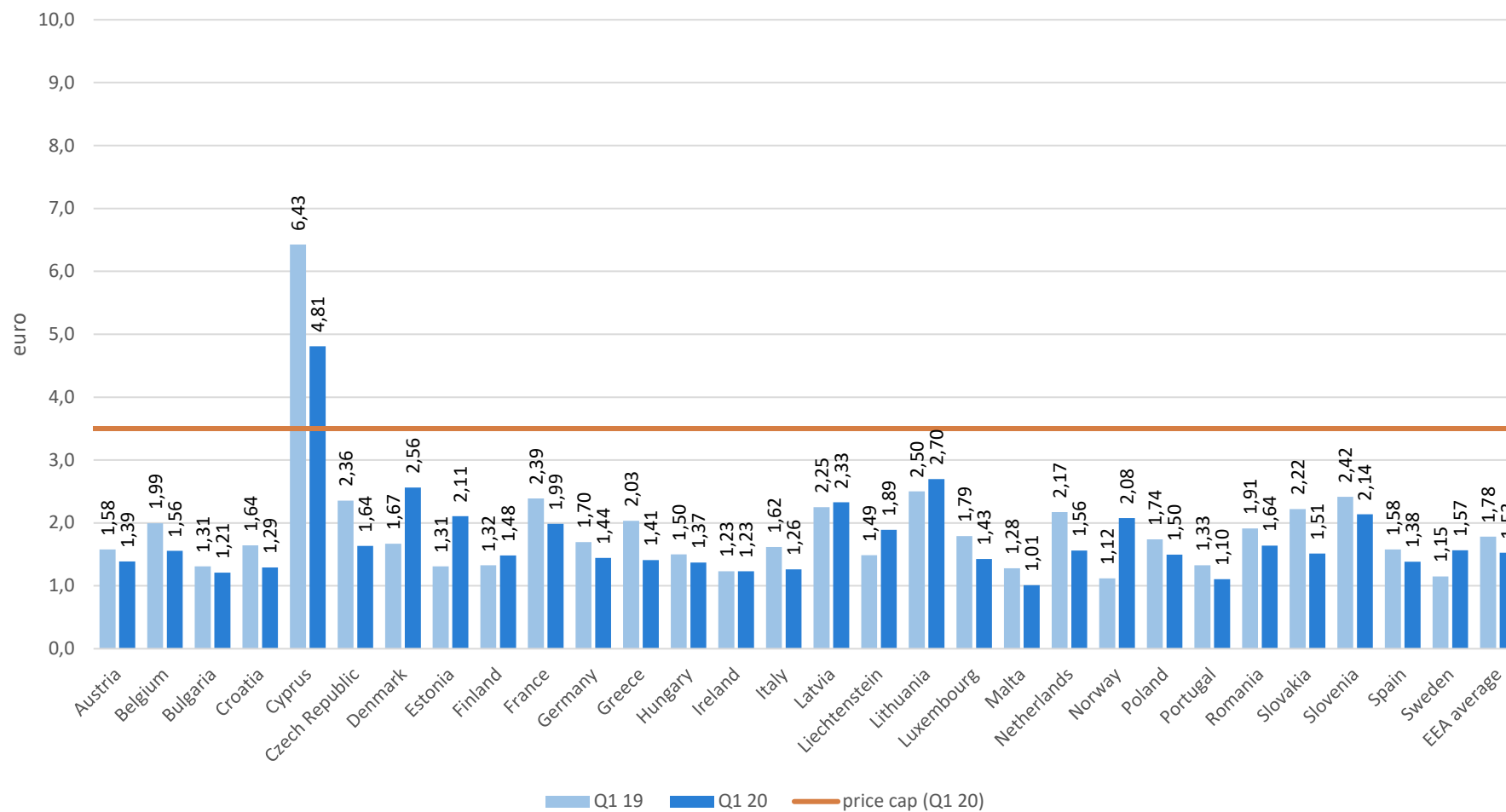
Portugal: the number of operators that reported data for calculating these estimates is different from the number of operators that reported data for calculating the estimates (disaggregated for balanced and unbalanced traffic) in Figure 22 and Figure 23.

Cyprus: The discrepancy is due to the fact the wholesale data reported by operators corresponds to the actual period used, but the revenues reported by the operators are the revenues received (not billed).

EEA average (Q4 2019) excludes: Cyprus.



Figure 25: Total data traffic: average wholesale data price per GB, Q1 19 and Q1 20

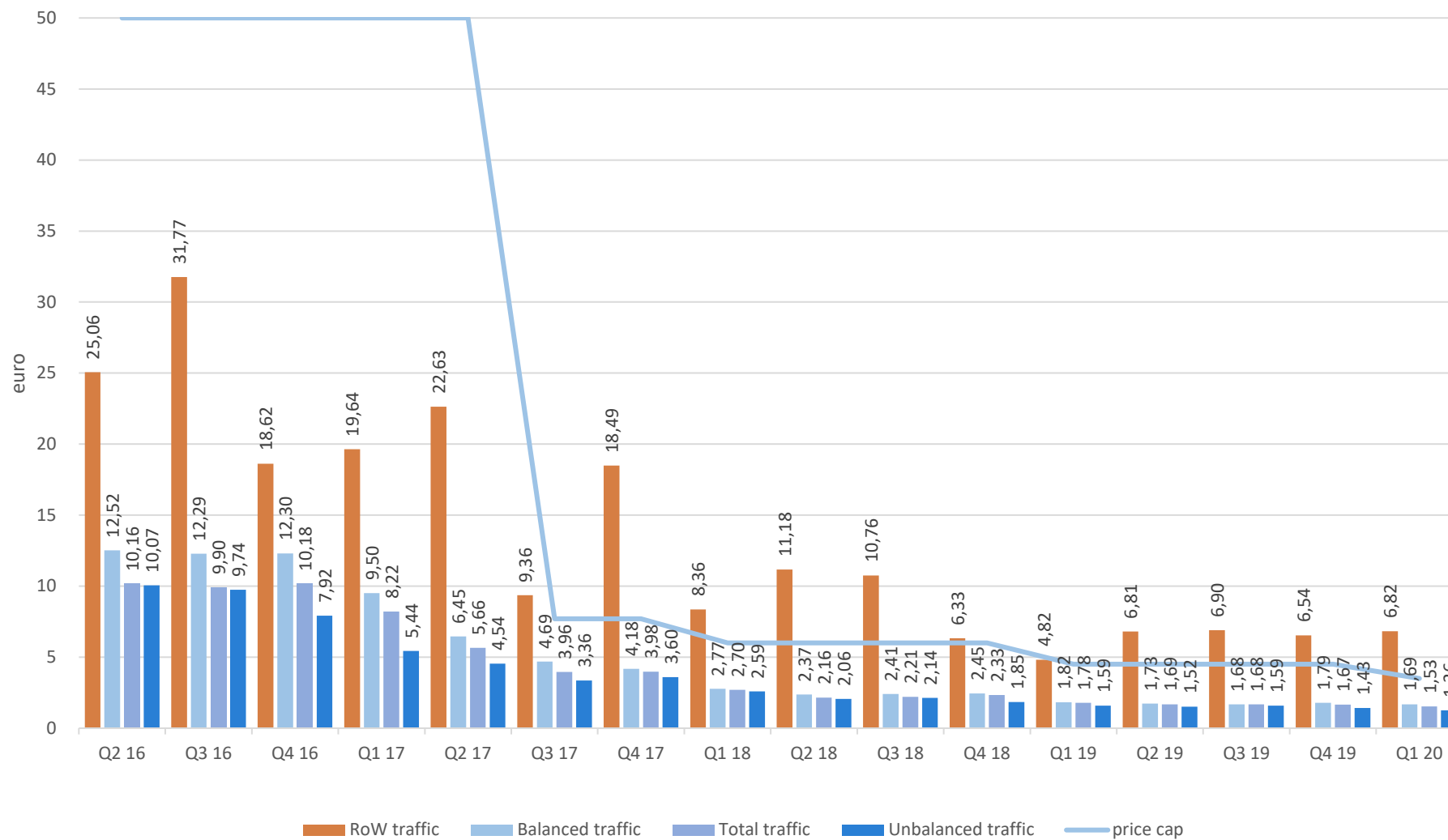


Portugal: the number of operators that reported data for calculating these estimates is different from the number of operators that reported data for calculating the estimates (disaggregated for balanced and unbalanced traffic) in Figure 22 and Figure 23.

Cyprus: The discrepancy is due to the fact the wholesale data reported by operators corresponds to the actual period used, but the revenues reported by the operators are the revenues received (not billed).

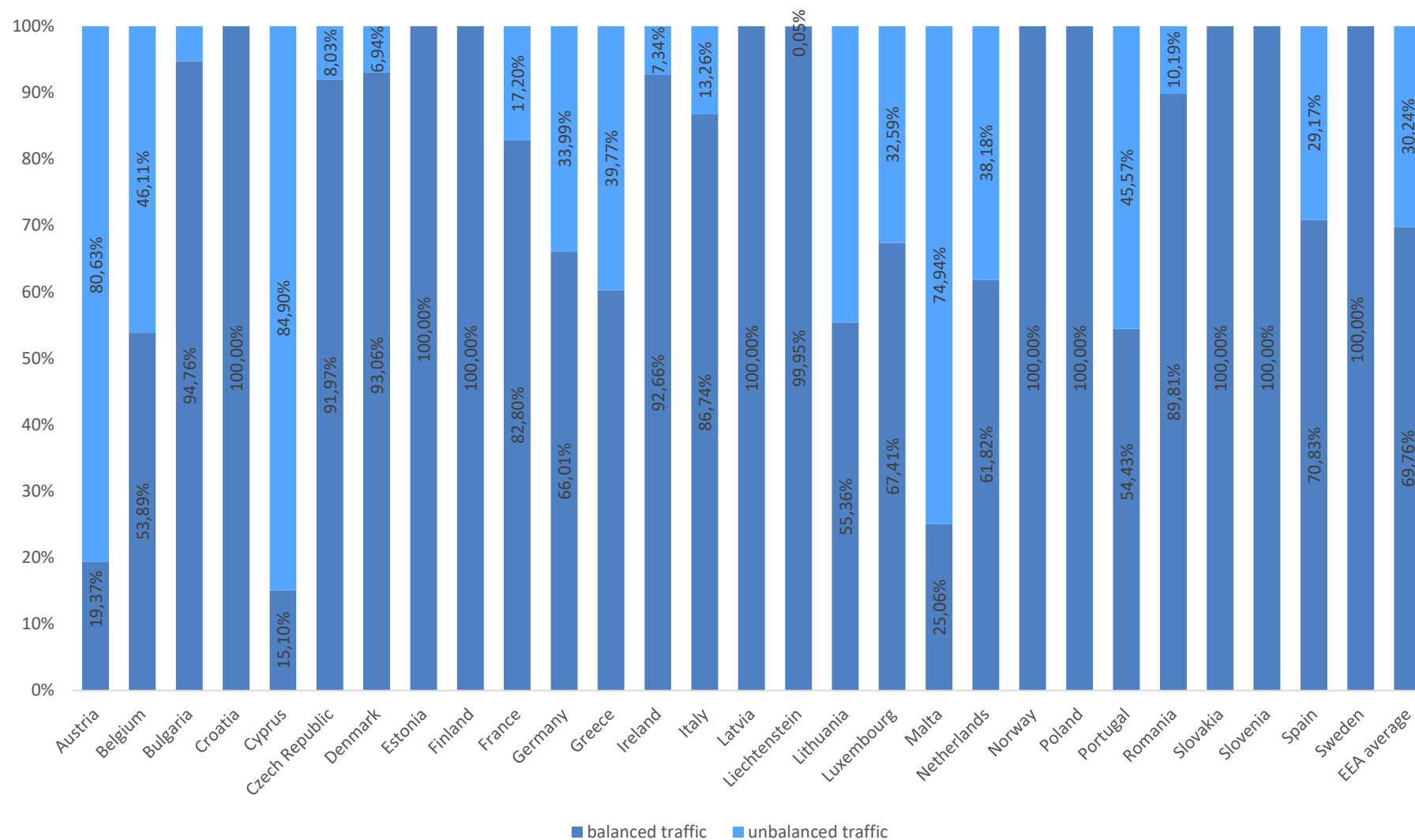
EEA average (Q4 2019) excludes: Cyprus.

Figure 26: EEA average wholesale data price per GB, Q2 16 – Q1 20 (balanced, unbalanced, total traffic, RoW traffic)



The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 27: Proportion of balanced and unbalanced traffic within EEA countries, data services, wholesale roaming inbound, Q1 20



Portugal: the number of operators that reported data for calculating these estimates (disaggregated for balanced and unbalanced traffic) is different from the number of operators that reported data for calculating the non-disaggregated estimates.

### **5.2.3.2 Consumption patterns**

Figure 28: Percentage of retail data roaming services, Q1 20

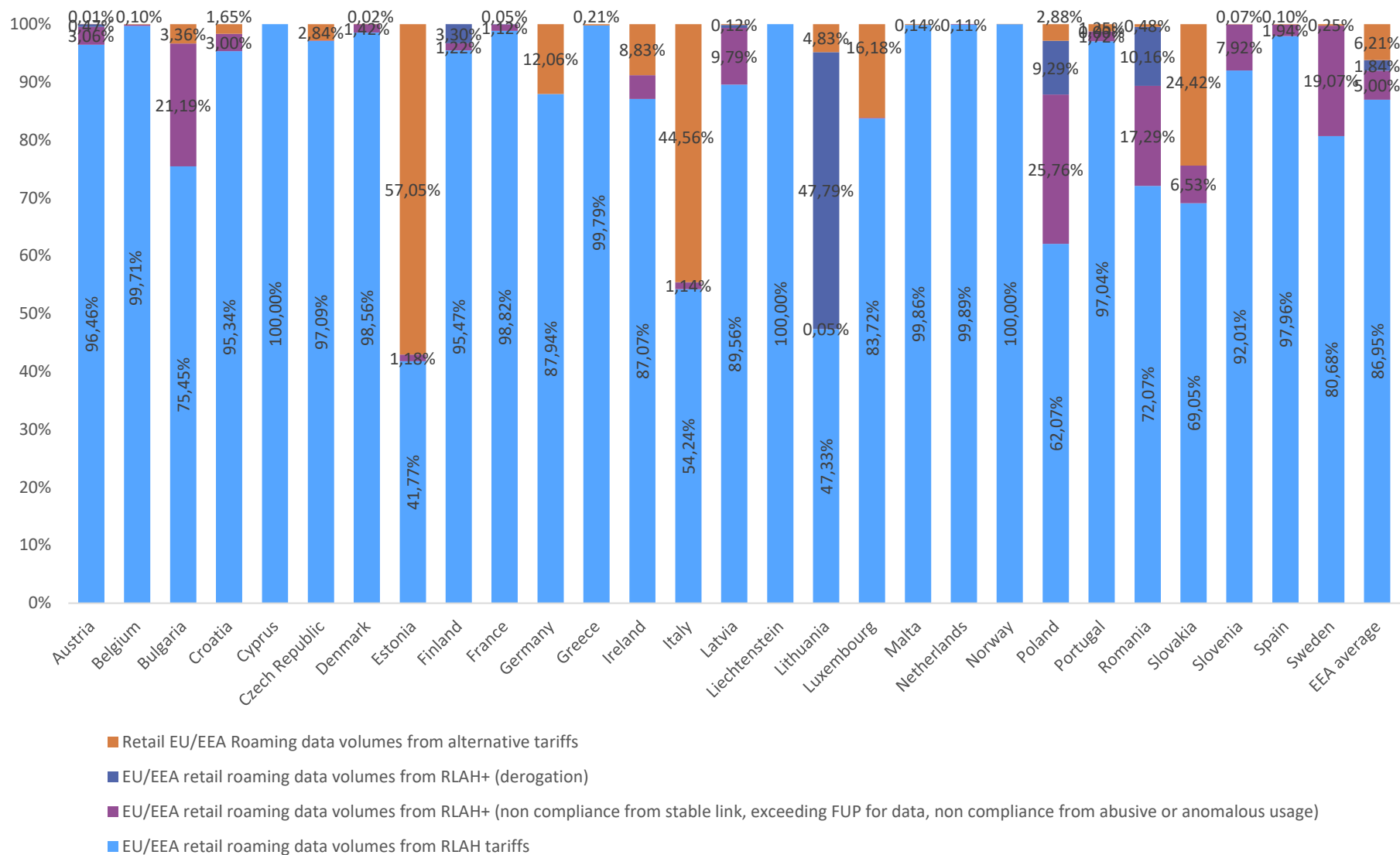
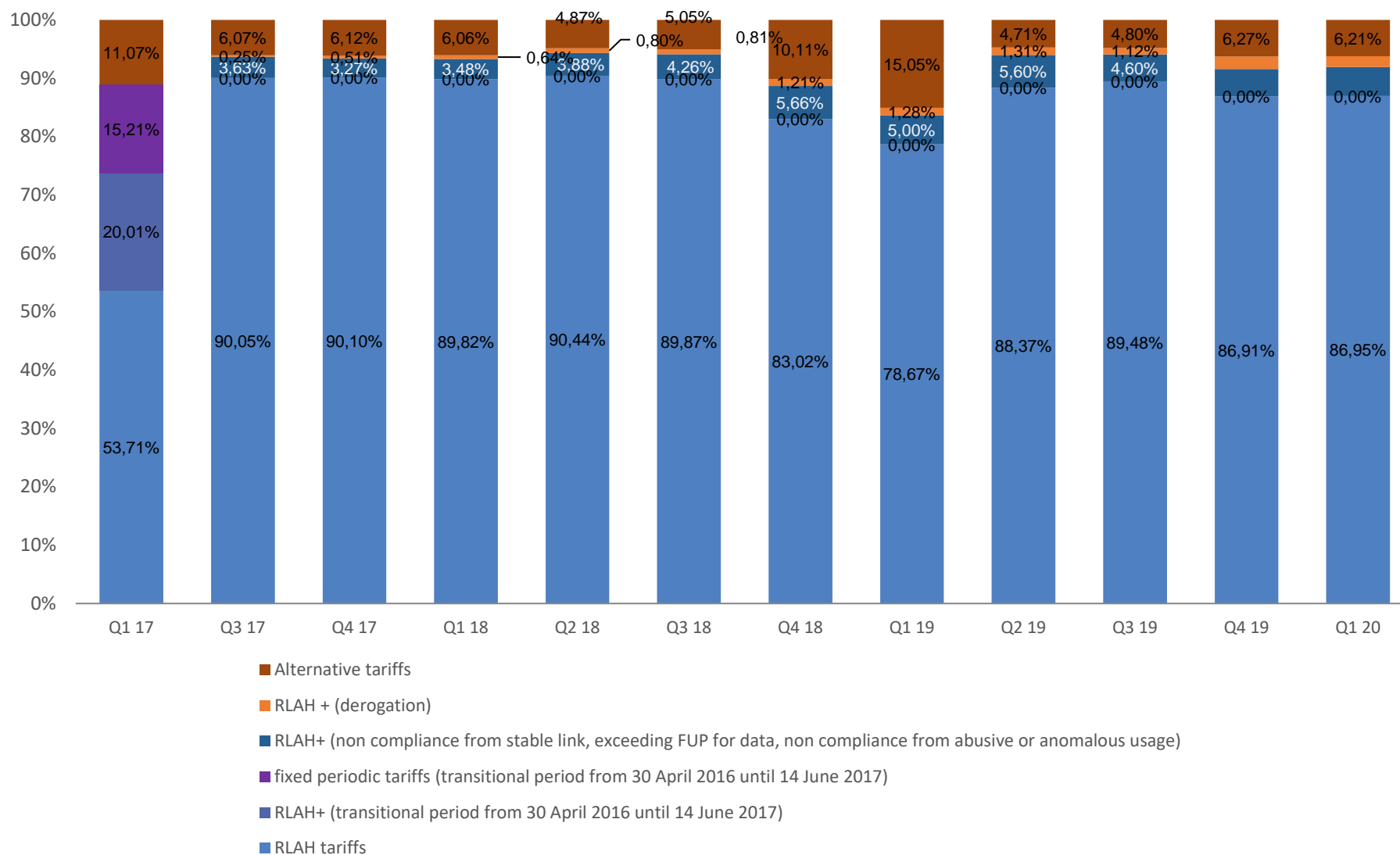
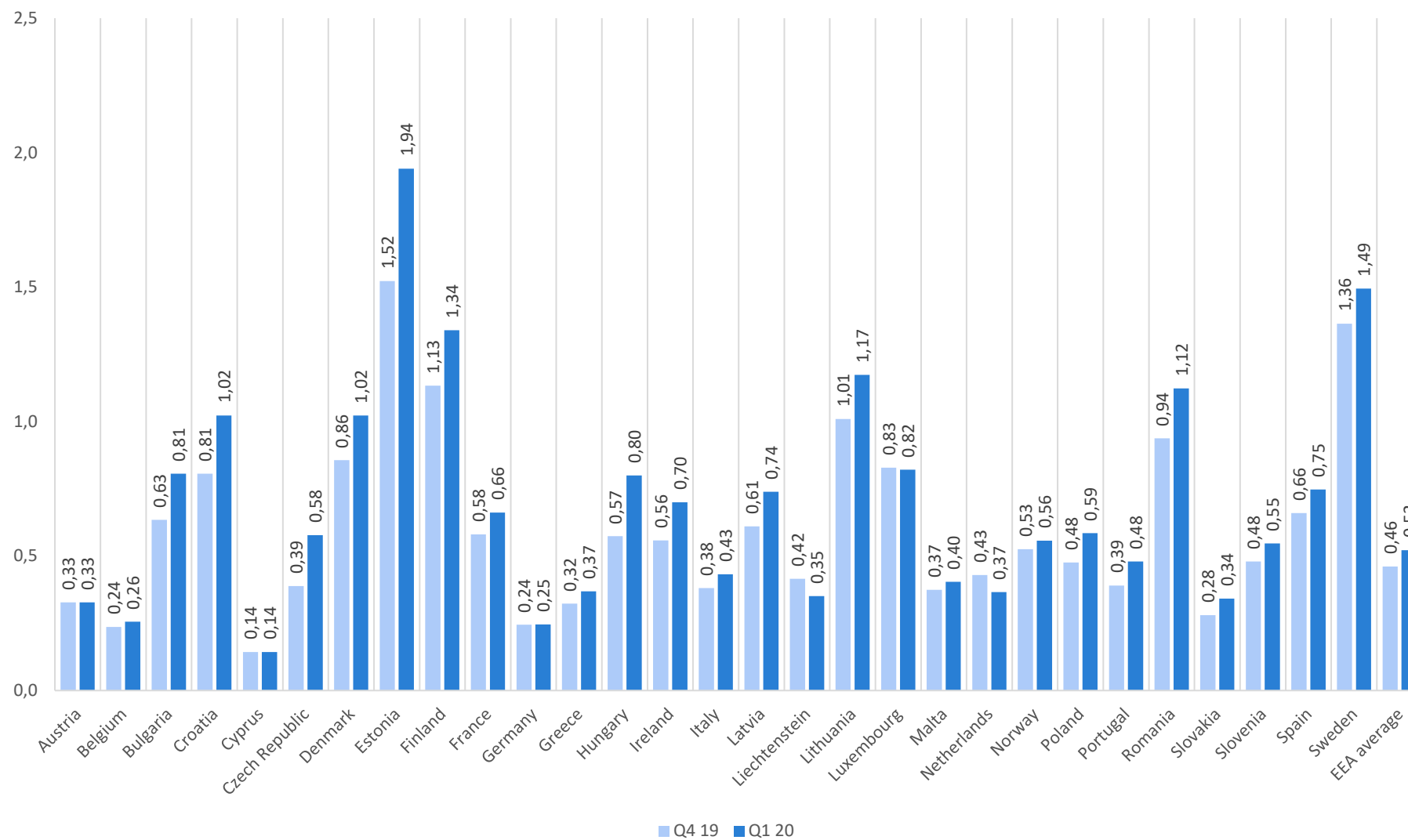


Figure 29: EEA average: percentage of retail data roaming services, Q1 17 – Q1 20



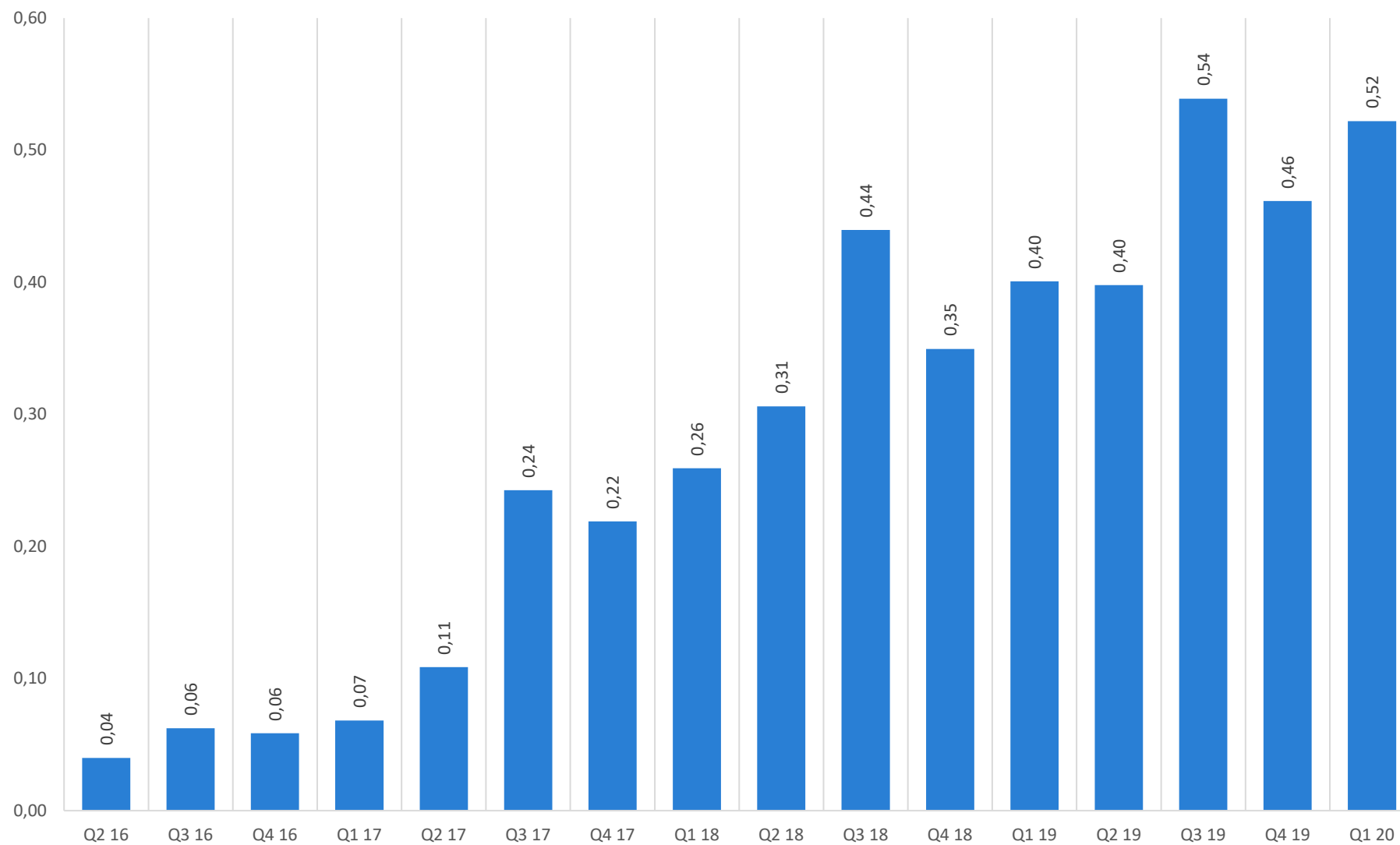
The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 30: Average data consumption per month per total number of roaming subscribers (in GB), Q4 19 and Q1 20



In some cases, not all operators provided the data for RLAH subscribers.

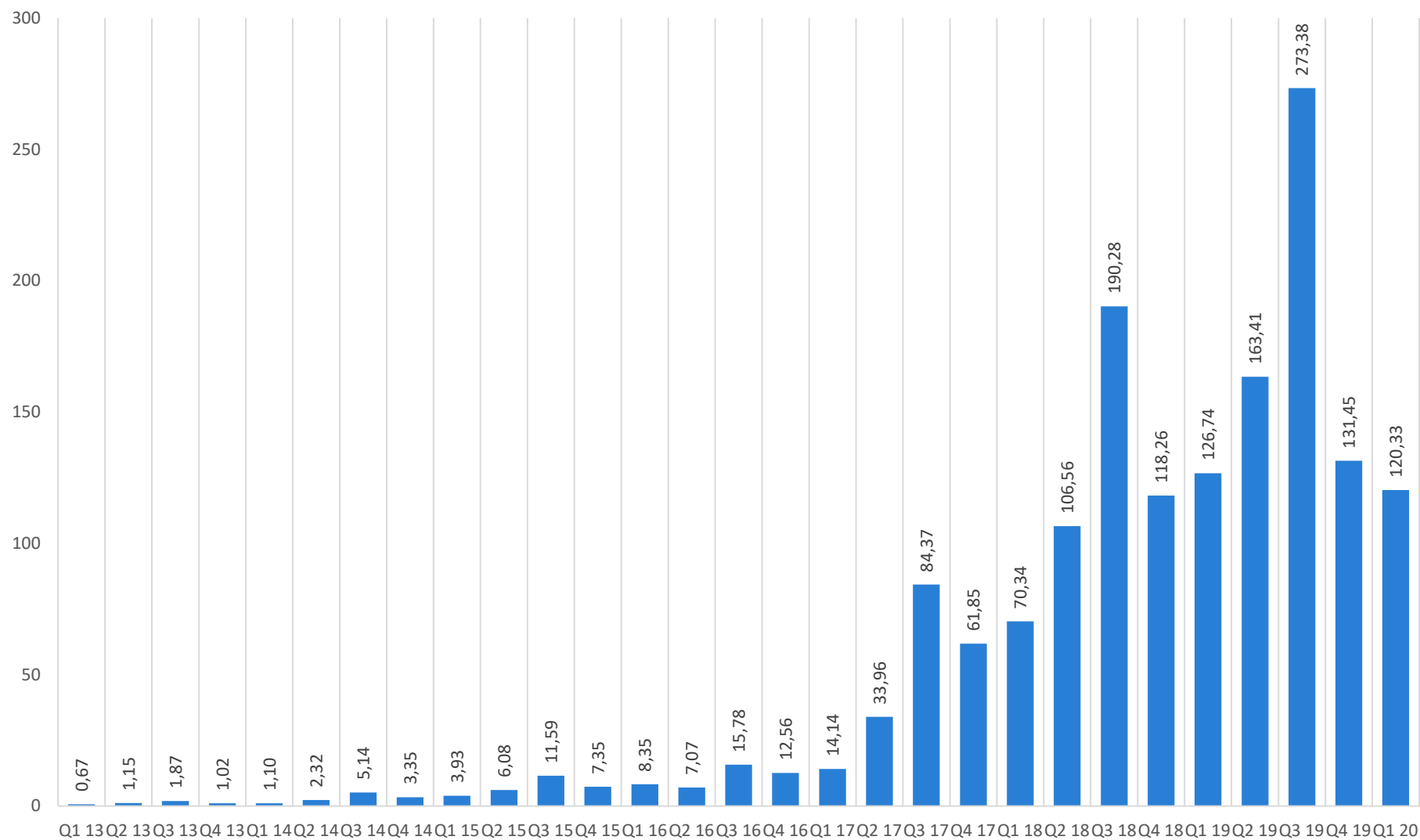
Figure 31: EEA average consumption per month per total number of roaming subscribers (in GB), Q2 16 – Q1 20



The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.



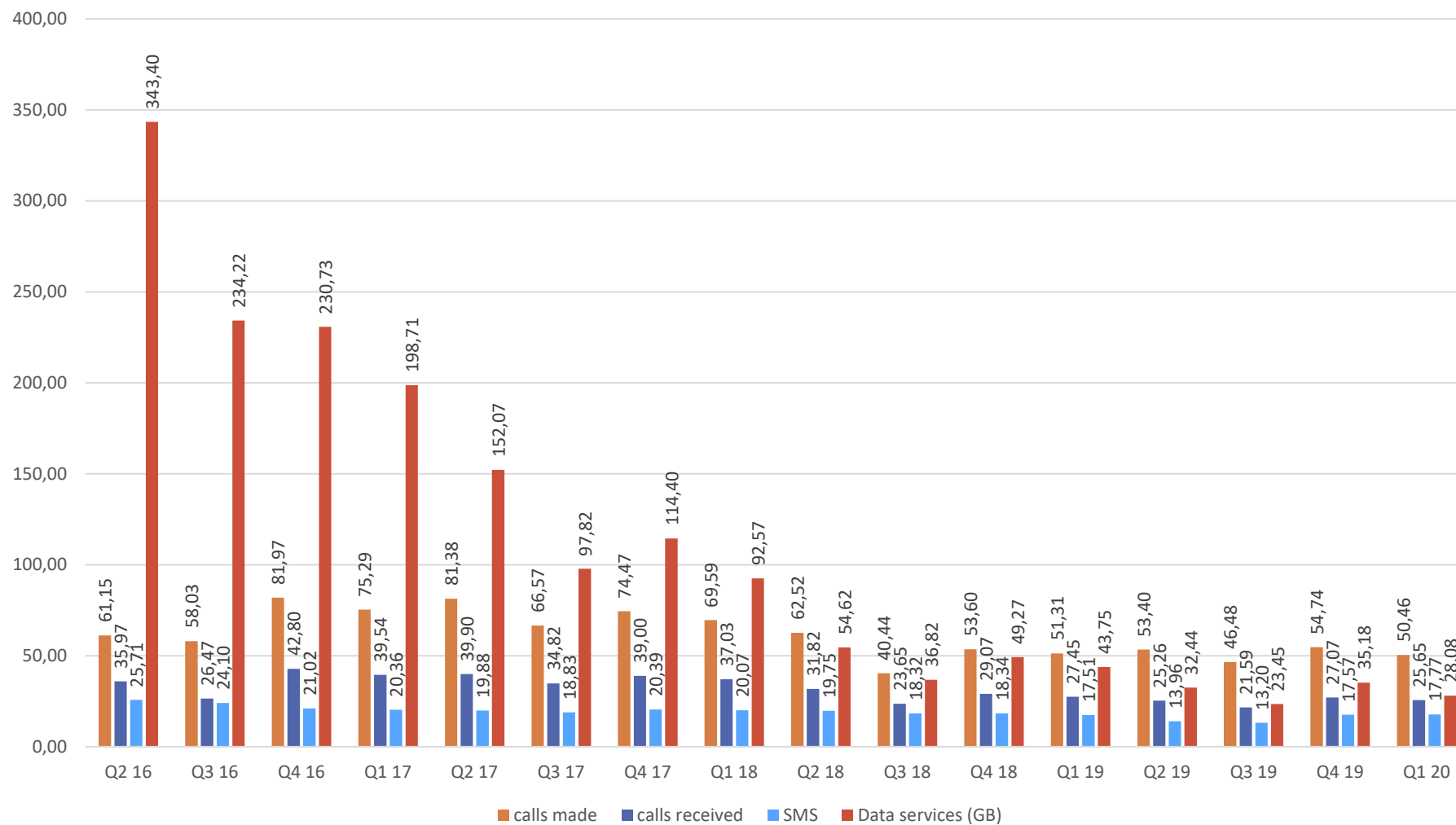
Figure 32: EEA Retail data traffic, Q1 13 – Q1 20 (millions of GB)



The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

#### **5.2.4.RoW retail roaming prices**

Figure 33: EEA average retail prices for RoW roaming services, Q2 16 – Q1 20



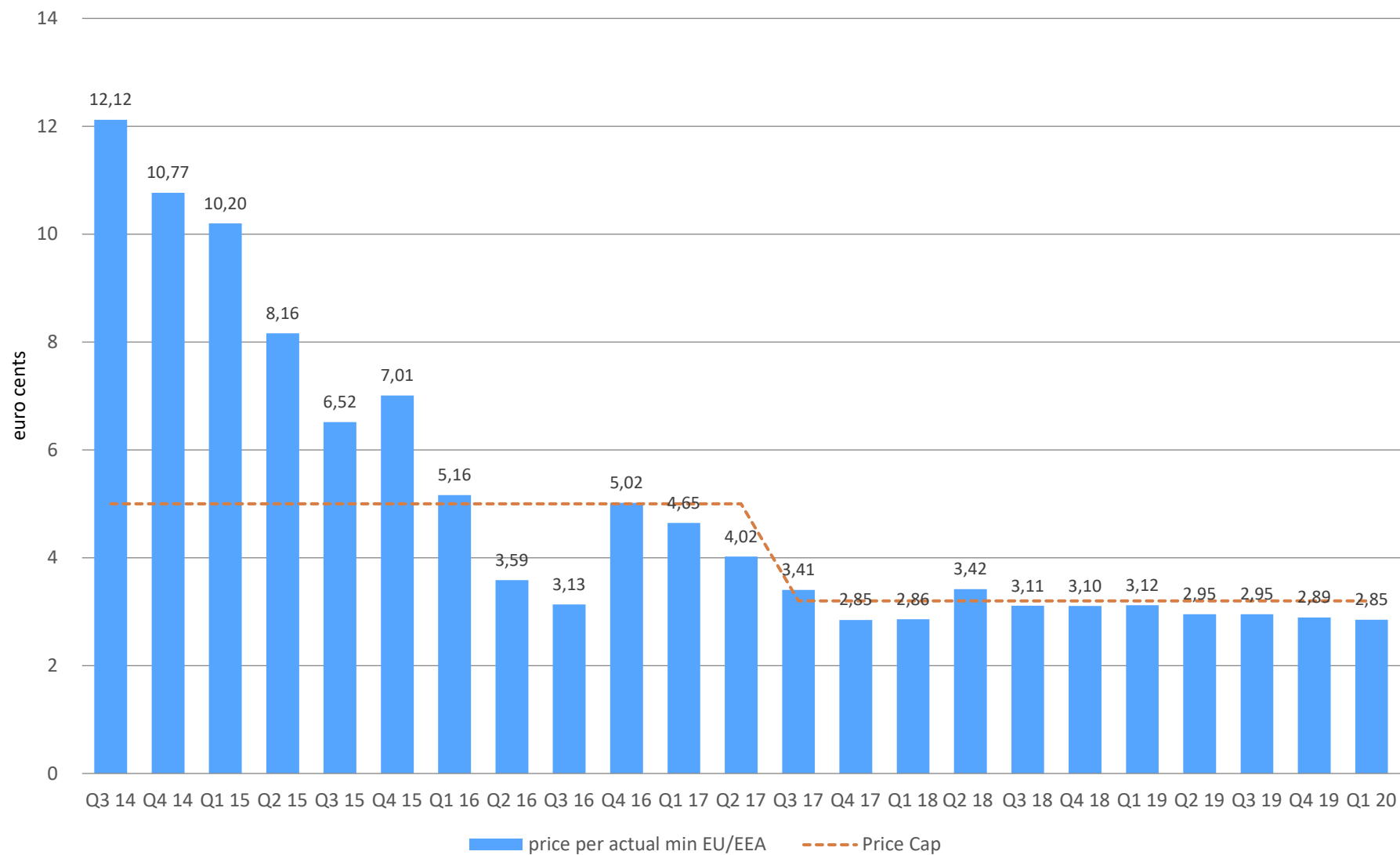
Voice and SMS services: prices are expressed in Euro cents.

Data services: prices are expressed in Euro.

The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

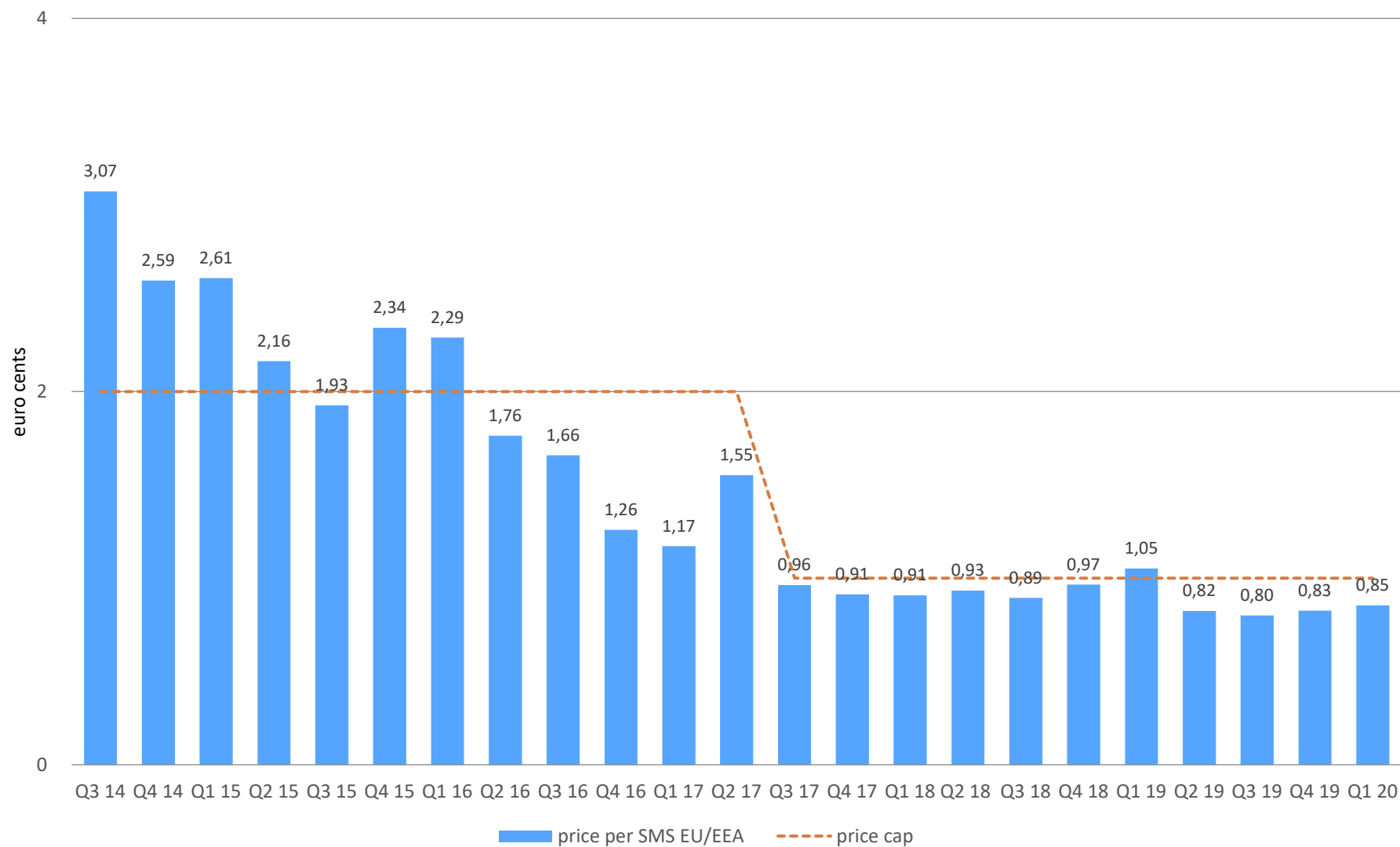
### **5.3. Wholesale roaming (outbound): Agreements**

Figure 34: Wholesale averages outbound roaming: Voice: Agreements applying Article 3 Roaming Regulation, Q3 14 – Q1 20



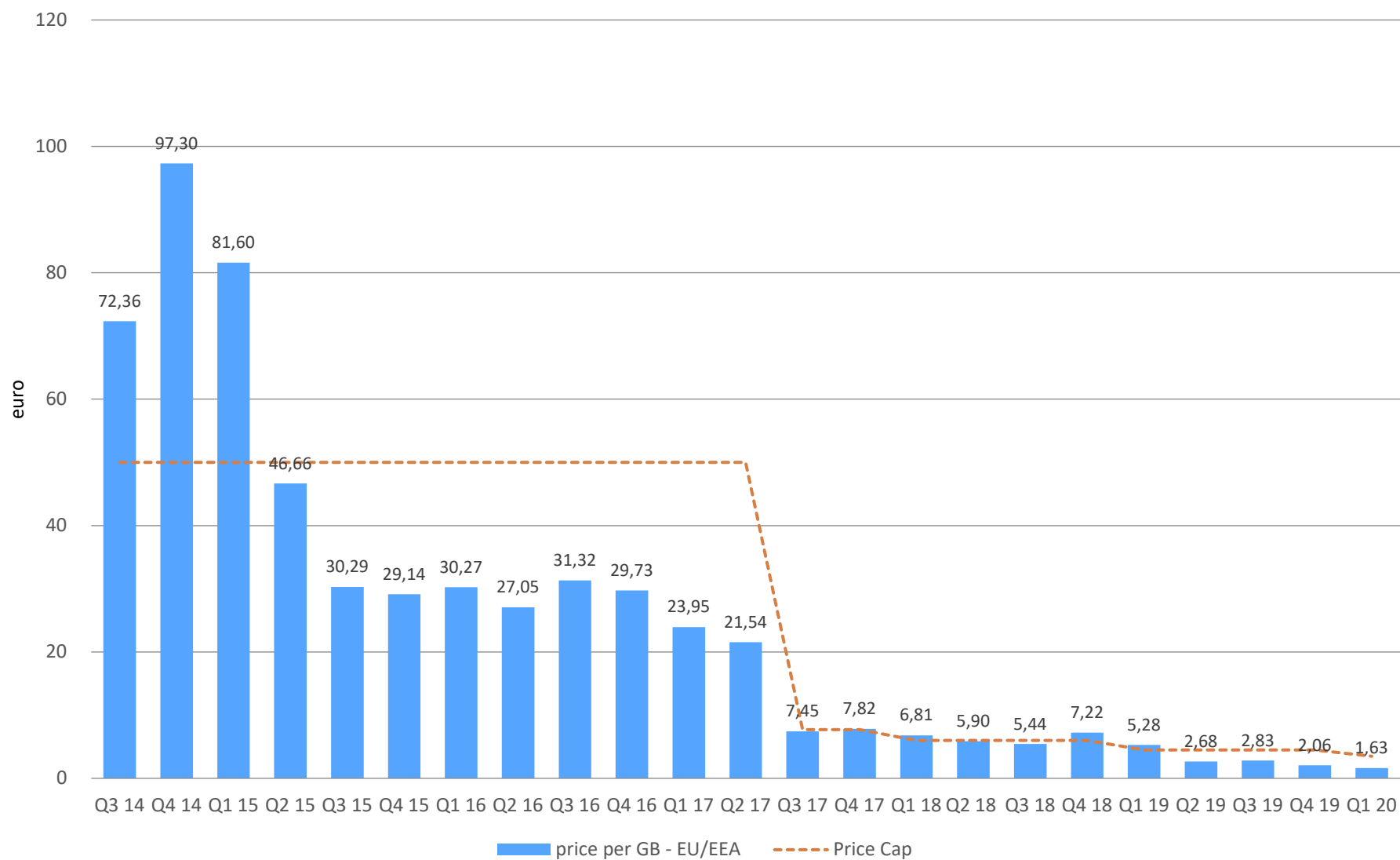
The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 35: Wholesale averages outbound roaming: SMS Agreements applying Article 3 Roaming Regulation, Q3 14 – Q1 20



The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 36: Wholesale EEA average outbound roaming: Data, Agreements applying Article 3 Roaming Regulation, Q3 14 – Q1 20



The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

## **5.4. MNOs and MVNOs data**



#### **5.4.1. Consumption patterns for domestic mobile retail services**

Figure 37: Domestic data services, average consumption per month per total number of subscribers (GB), MNOs and MVNOs, Q1 20

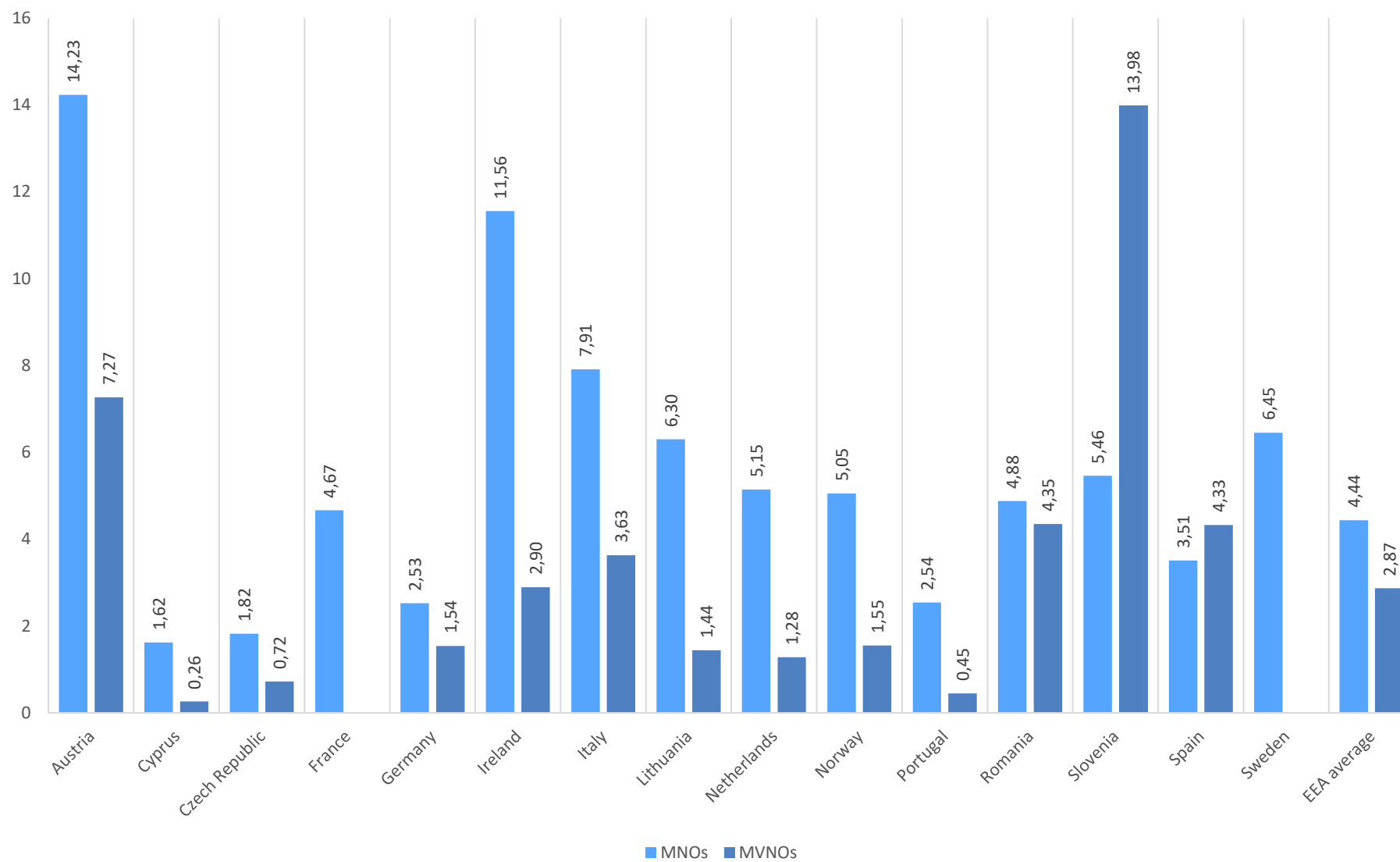
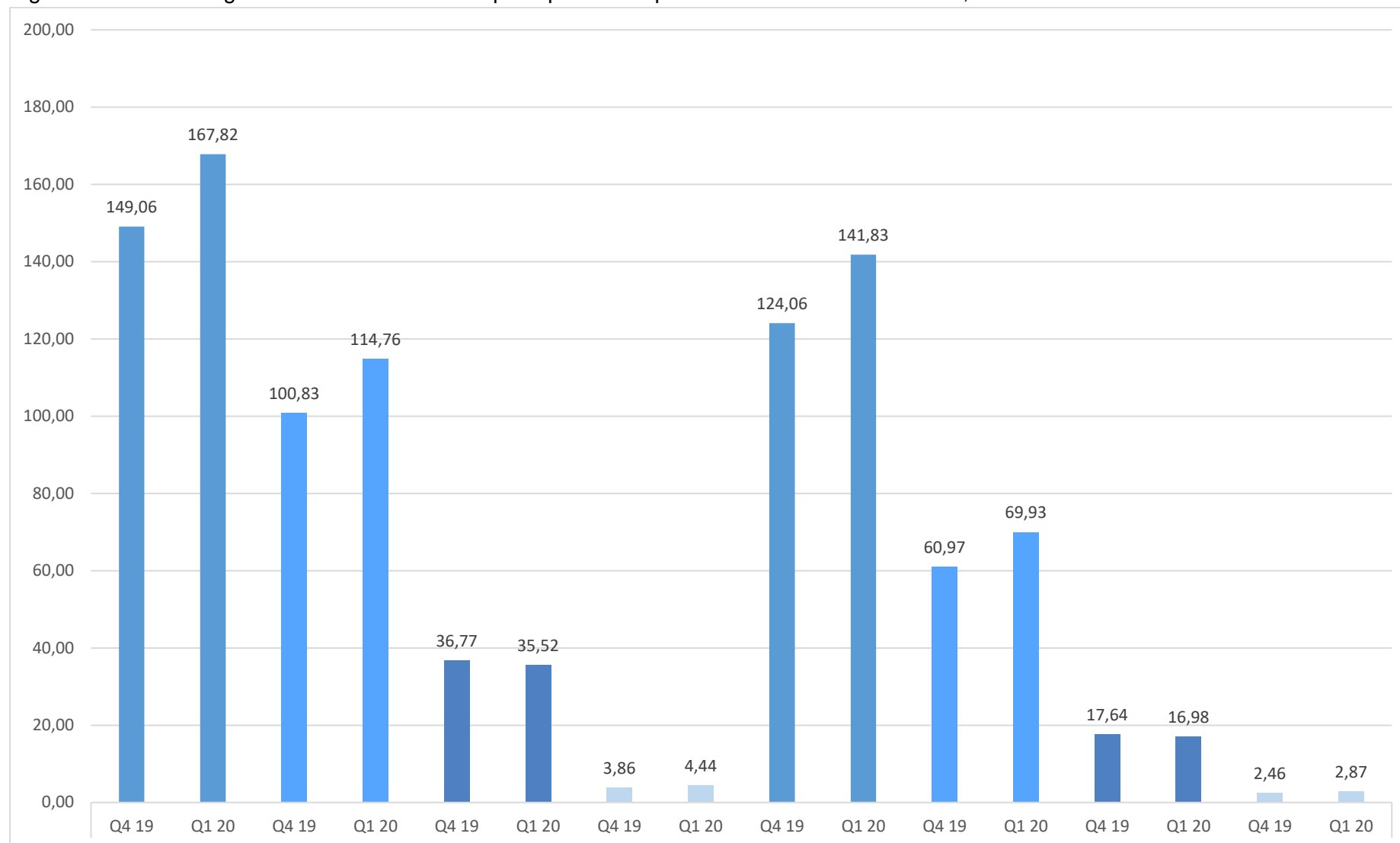


Figure 38: EEA average mobile services consumption per month per total number of subscribers, Q4 19 and Q1 20



The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

Figure 39: MNOs: share of total subscribers with EU/EEA roaming enabled, Q1 20

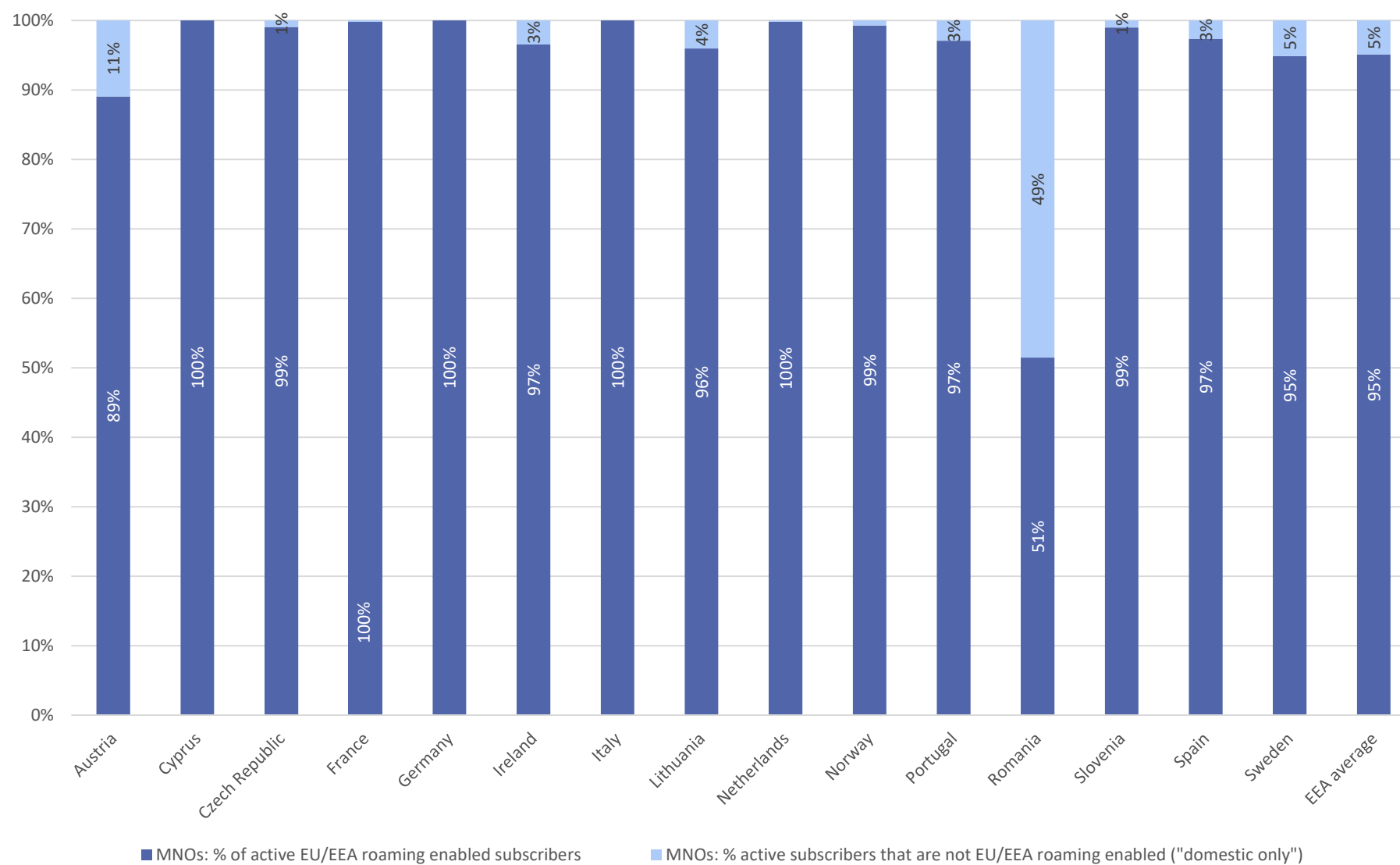
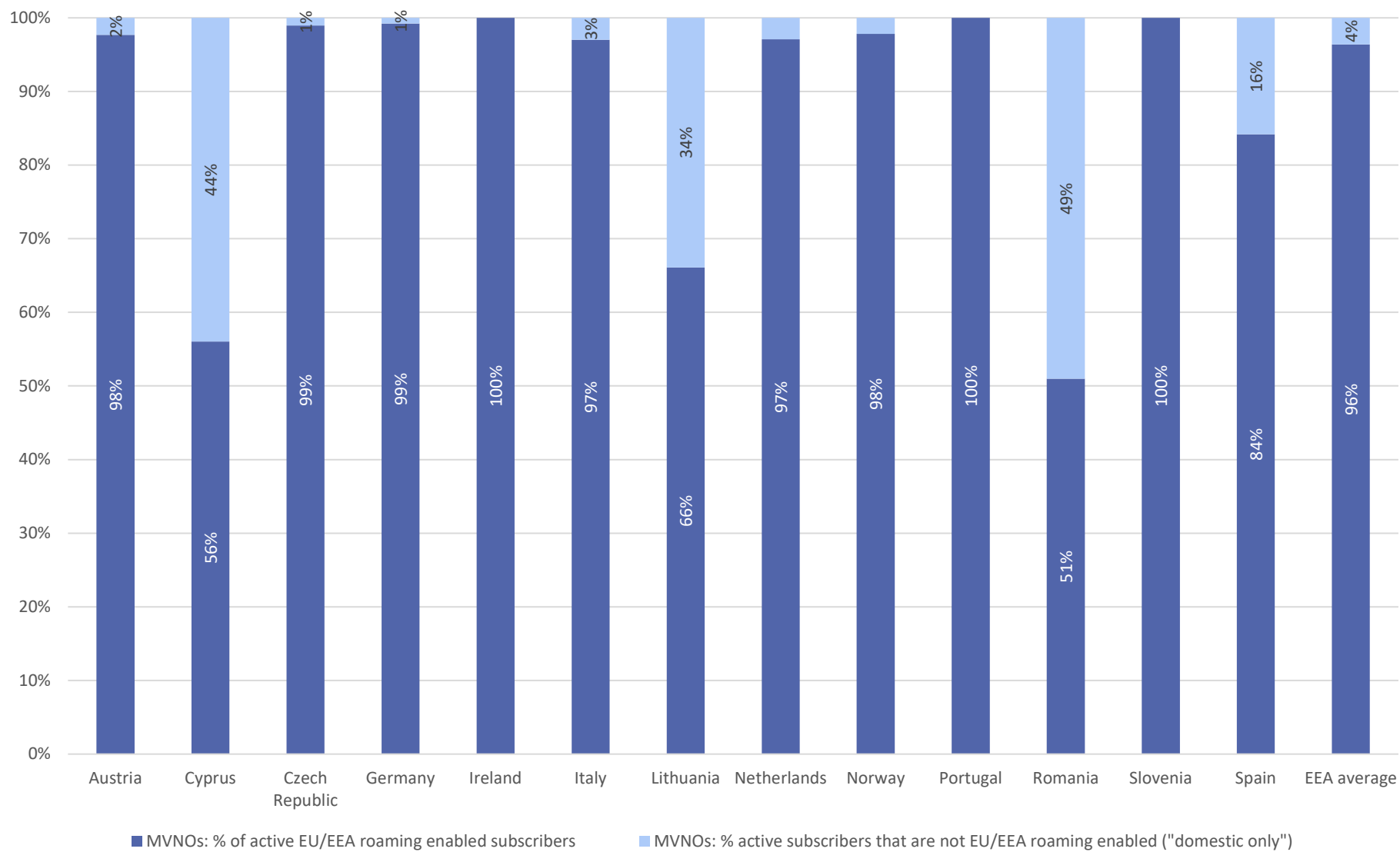
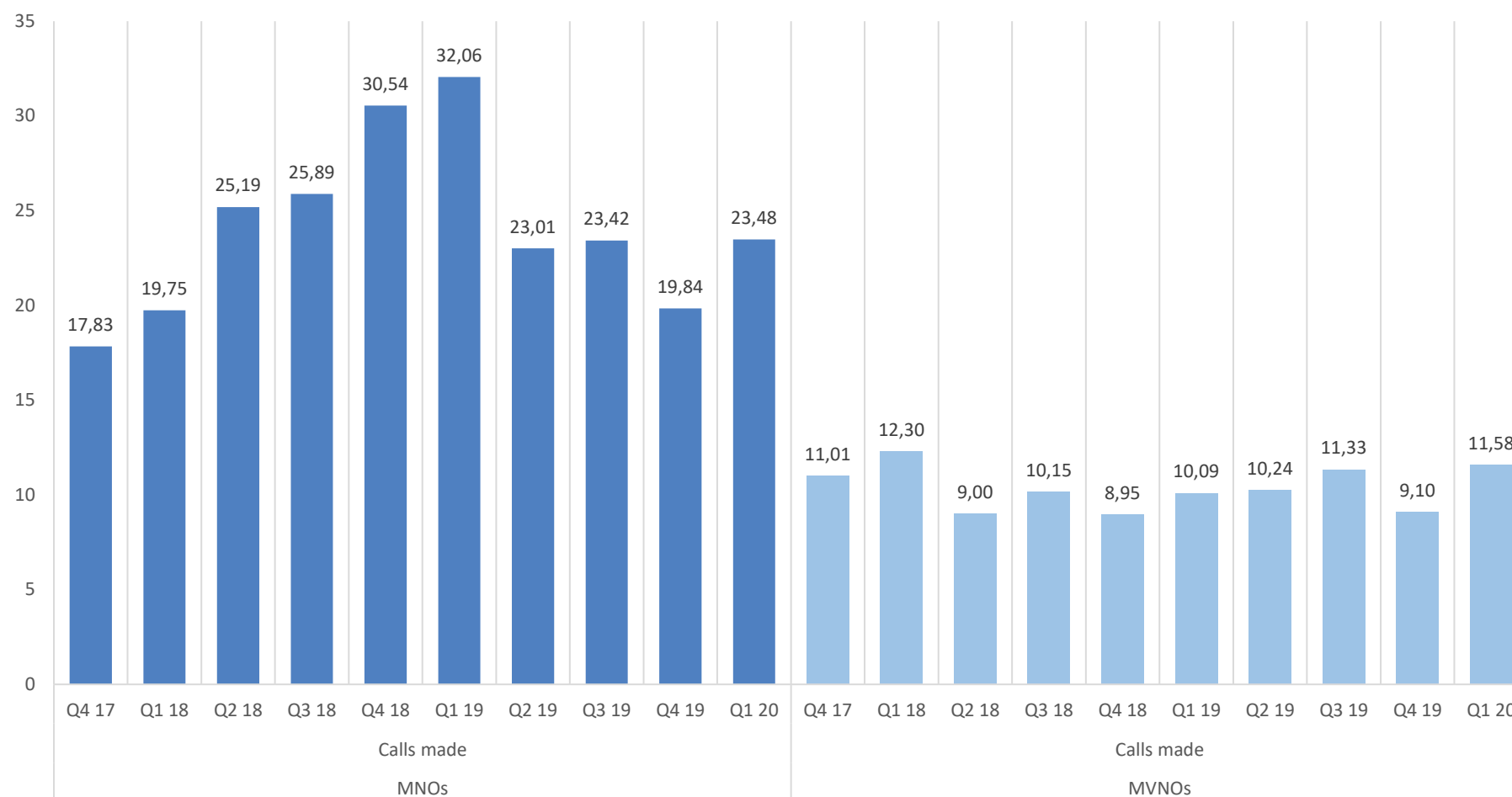


Figure 40: MVNOs: share of total subscribers with EU/EEA roaming enabled, Q1 20



#### **5.4.2. Consumption patterns for RLAH services (voice, SMS and data)**

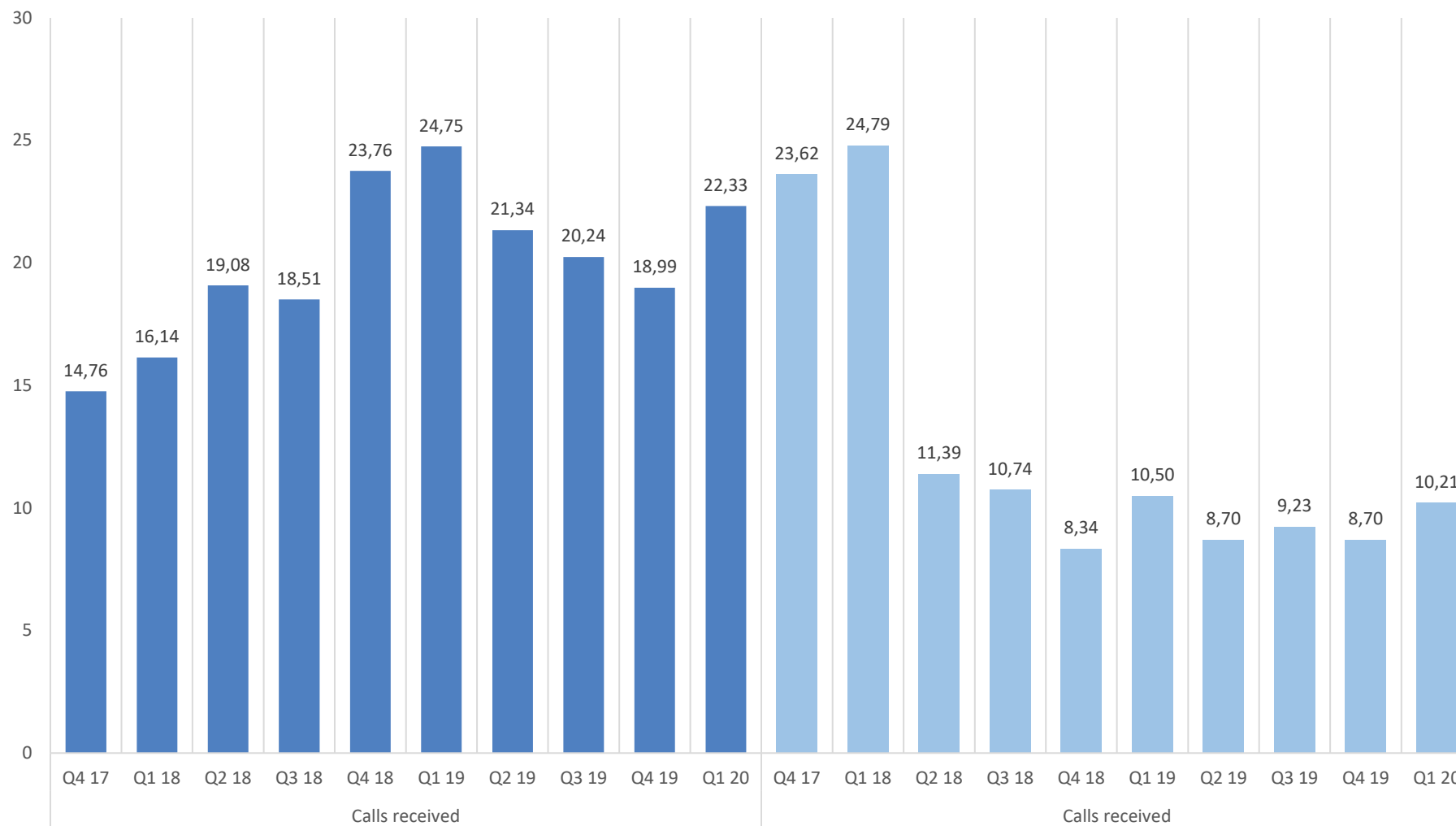
Figure 41: RLAH, calls made: EEA average number of RLAH minutes per month per roaming subscribers, MNOs and MVNOs, Q4 17 – Q1 20



BEREC changed the way it presents consumption patterns for RLAH services in order to make it easier to interpret. Since Q2 18, the indicator has been calculated by dividing RLAH volumes by number of active subscribers with RLAH services that were roaming at least once in the concerned period in the EEA. This is to ensure that period-to-period changes in the indicator are not influenced by subscribers with different tariff plans. For a correct interpretation of the trend, the reader should take into account that Q4 17 and Q1 18 is calculated by dividing RLAH volumes by number of all active subscribers that were roaming at least once in the concerned quarter in the EEA.

The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

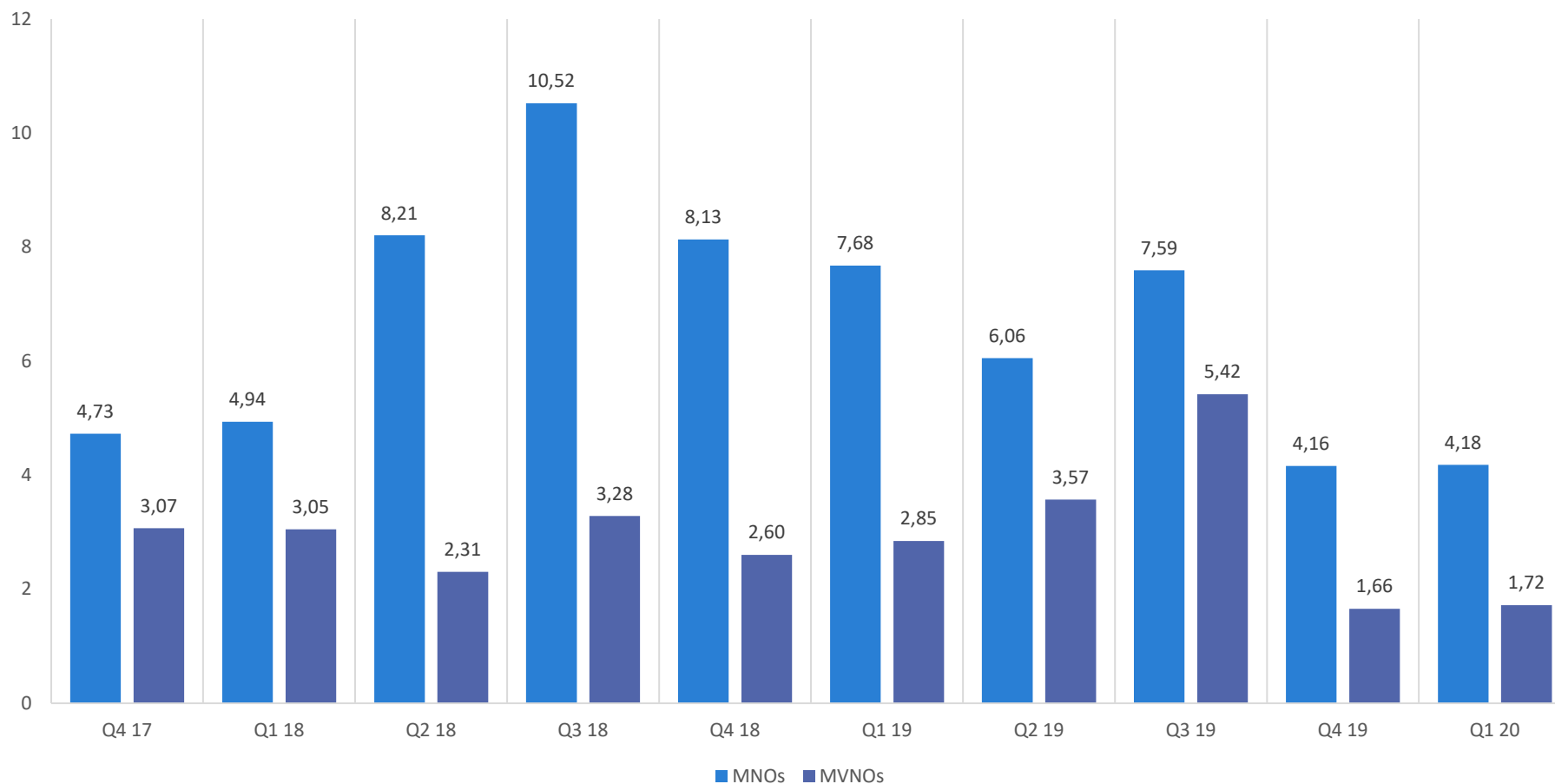
Figure 42: RLAH, calls received: EEA average number of RLAH minutes per month per roaming subscribers, MNOs and MVNOs, Q4 17 – Q1 20



The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

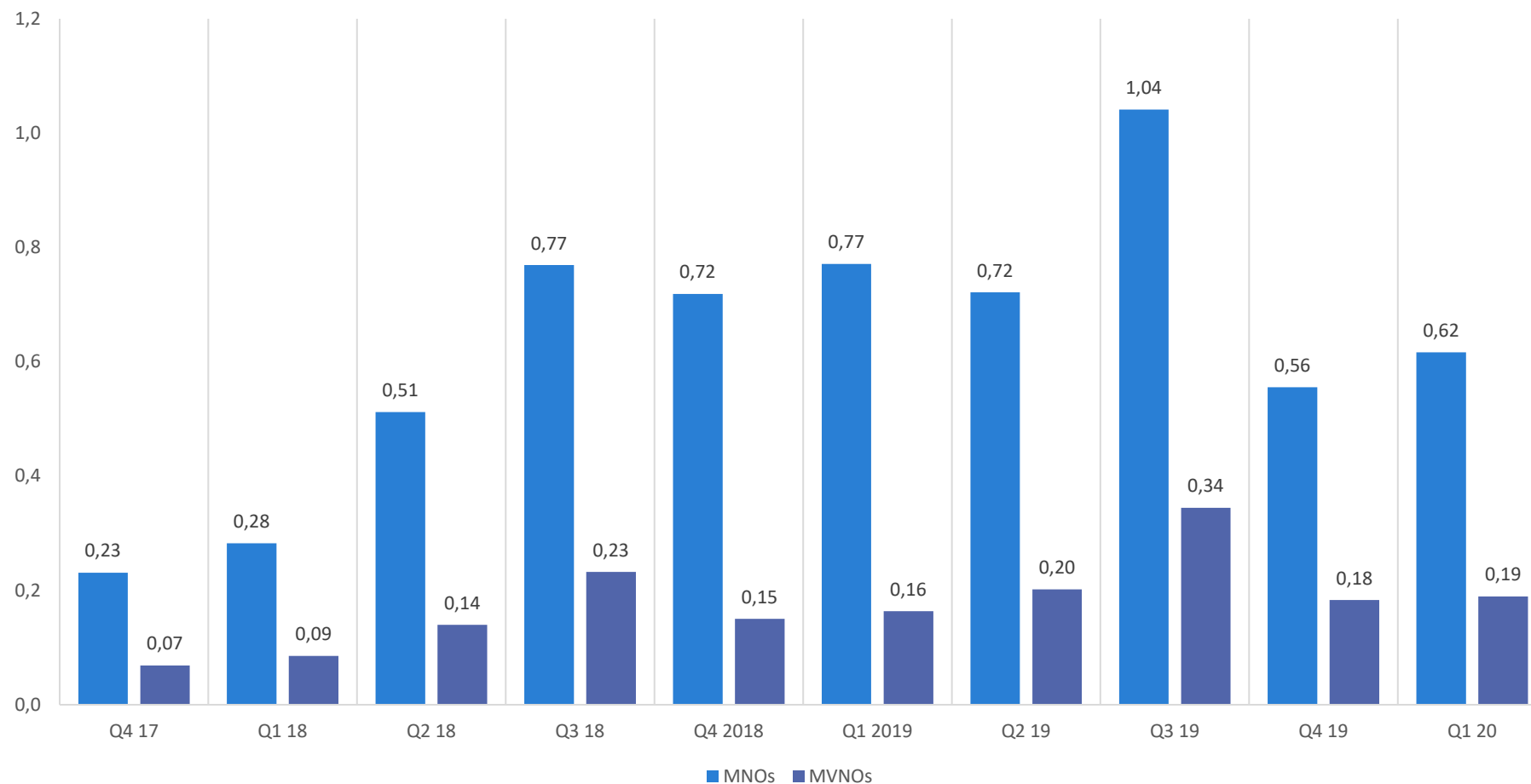


Figure 43: RLAH, SMS services: EEA average number of SMS per month per total number of roaming subscribers, MNOs and MVNOs, Q4 17 – Q1 20



BEREC changed the way it presents consumption patterns for RLAH services in order to make it easier to interpret. Since Q2 18, the indicator has been calculated by dividing RLAH volumes by number of active subscribers with RLAH services that were roaming at least once in the concerned period in the EEA. This is to ensure that period-to-period changes in the indicator are not influenced by subscribers with different tariff plans. For a correct interpretation of the trend, the reader should take into account that Q4 17 and Q1 18 is calculated by dividing RLAH volumes by number of all active subscribers that were roaming at least once in the concerned quarter in the EEA. The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

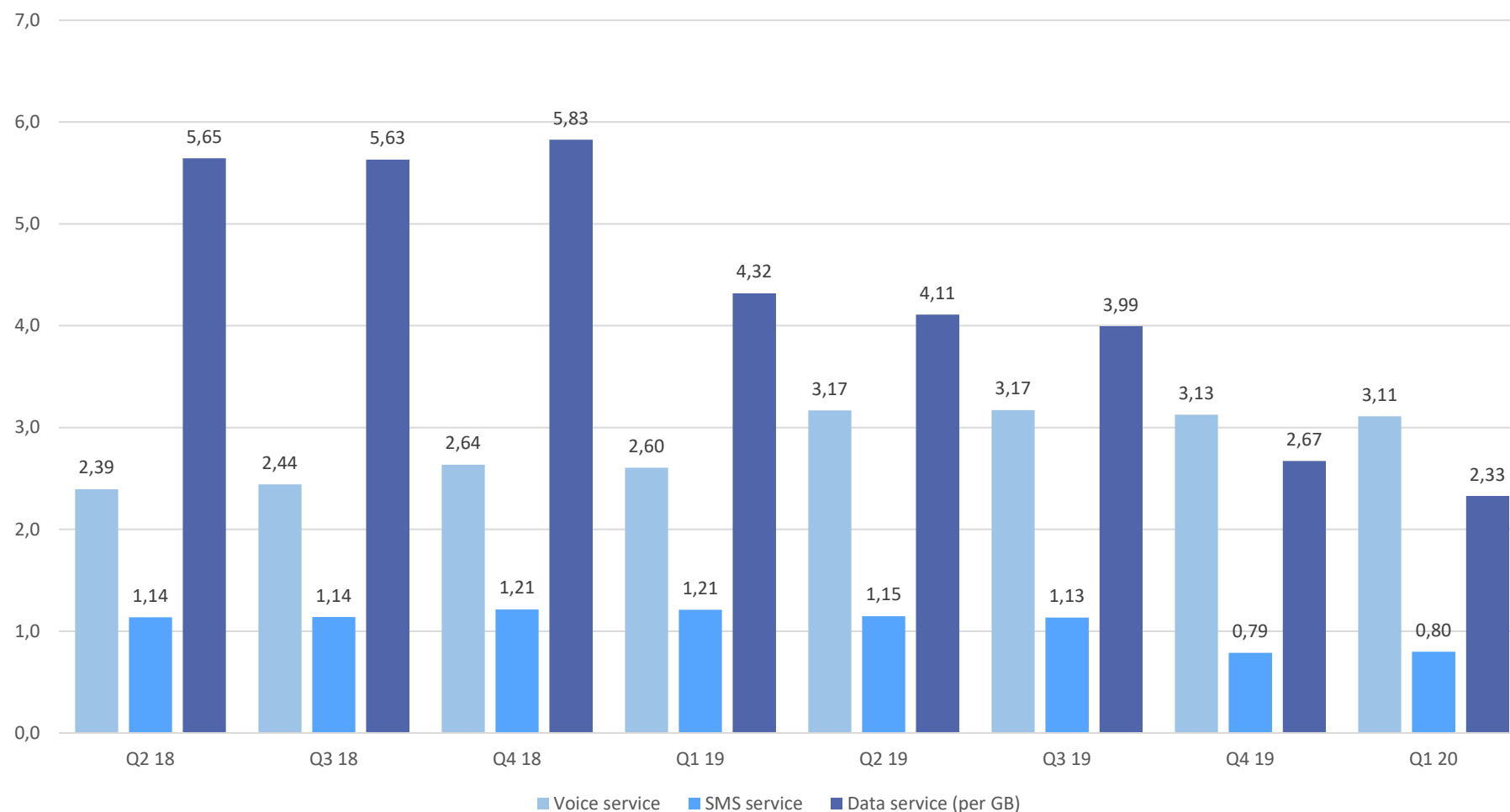
Figure 44: RLAH, data services: EEA average number of GB per month per total number of roaming subscribers, MNOs and MVNOs, Q4 17 – Q1 20



BEREC changed the way it presents consumption patterns for RLAH services in order to make it easier to interpret. Since Q2 18, the indicator has been calculated by dividing RLAH volumes by number of active subscribers with RLAH services that were roaming at least once in the concerned period in the EEA. This is to ensure that period-to-period changes in the indicator are not influenced by subscribers with different tariff plans. For a correct interpretation of the trend, the reader should take into account that Q4 17 and Q1 18 is calculated by dividing RLAH volumes by number of all active subscribers that were roaming at least once in the concerned quarter in the EEA. The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

**5.4.3. Payment to the host operator for the provision of wholesale international roaming services**

Figure 45: EEA average of payment to the host operator for the provision of wholesale roaming services (per unit), MVNOs, Q2 18 – Q1 20



Voice and SMS services: prices are expressed in Euro cents.

Data services: prices are expressed in Euro

The EEA average includes United Kingdom operators' data until Q3 2019, but not for the last two quarters.

## Annex I: Methodology for the data collection

Because of the broad scope and complexity of the new requirements stemming from the Roaming Regulation, new key indicators have been developed for the data collection. In addition, while the results are derived from the same questionnaire, the methodology used for some data from these new key indicators can differ between countries for a number of reasons. Particularly relevant are the following reasons:

- Differences in the methods used by operators to allocate volumes for the different roaming services: comparability of data between different tariffs is affected by a number of reporting criteria, including roaming consumption from the volumes in the domestic mobile tariff plan (RLAH), the use of roaming services in excess of the limits of the FUP or if roaming is not periodic (RLAH+, non-compliance from abusive or anomalous usage);
- Difficulties in estimating the actual revenues for the roaming services and the mobile domestic services: as most of the operators provide domestic bundled services, it is therefore difficult to allocate revenues to the different domestic individual services (e.g.: fixed voice, mobile, internet, TV);
- Difficulties in differentiating between domestic-only and intra-EEA: due to the introduction of Roam Like at Home rules, it has become difficult to determine the part of the domestic revenues only relative to intra-EEA roaming communications for these bundled tariff plans. For these tariffs, it is only possible to separate the revenues relative to the roaming surcharge applied (e.g. when the roaming Fair Use Policy is exceeded).

In consideration of these difficulties, the report made use of the following assumptions:

- all revenues resulting from bundles that include mobile services are allocated to domestic services regardless of whether the mobile service is provided in the domestic network (domestic service) or in a visited network (roaming service). Thus, the domestic revenues now include the intra-EEA roaming component from RLAH tariffs. Any other type of revenue (such as those originating from fixed telephone service or fixed internet service, sale of mobile devices, the initial one-time charge for a new/renewed subscription, subscription fees to other non-telecommunication services, etc.) should not be contained, despite the difficulties in allocating the revenues only relative to mobile services. Revenues from international mobile calls/SMS may also be included;
- the retail intra-EEA roaming revenues are only relative to the revenues resulting from the roaming surcharges (the domestic price component of the roaming service is excluded from the “retail intra-EEA roaming revenues”) and were included in the “Retail domestic revenues”).

While the measurement of balanced and unbalanced traffic should include volumes and revenues from all operators per country, such information is currently only available for a limited number of NRAs. For some countries, even if a data set is available, not all operators are included. The results related to the EEA average wholesale prices should be subject to

cautious interpretation, because some countries were not able to submit comparable data on balanced/unbalanced and total traffic.

Considering the aforementioned difficulties in obtaining reliable and comparable data, for some indicators, there is a limited number of countries which have opted for not supplying the data relative to those indicators. This is not at all unusual for a comprehensive data collection of this type. In most cases, the NRA was able to work with each company to resolve or alleviate the problem. In other cases, where system upgrades are necessary to comply with the new format of the data collection, the operator was asked to provide the best possible estimate currently available and to complete upgrades in time to provide high quality data for the next data collection. Some NRAs expressed major data quality challenges at the national operators' level as well as the use of different reporting systems by operators.

At the wholesale level, operators often receive discounts based on variables like volume of traffic, calculated at the end of a 12-month period. When providing data for these reports, operators may estimate the effect of such discounts on data for each quarter. Because the actual discount may vary from the estimate, there may be an apparently 'anomalous' result for the quarter when the discount is actually applied. This should be kept in mind when comparing wholesale figures for different quarters in the same year.

In a few cases, the number of operators changed, which may cause an apparent changes in volumes and revenues between quarters.

When wholesale prices are above the price caps, in most cases the reason is that the average price to comply with the Regulation is the annual price and not a quarterly one, and in such cases some quarters compensate for others. Another reason may also be inaccuracies in reporting for the data collection itself.

For ease of comparison, the Euro is used throughout this Report. Within the EEA, currency fluctuations between the Euro and other national currencies are likely to have affected the average prices reported for EEA countries outside the Euro zone.

Conversion of gigabytes to megabytes was done in line with Recital 17 of the Regulation (EU) 2017/920 of the European Parliament and of the Council of 17 May 2017 amending Regulation (EU) No 531/2012, which results in 1 gigabyte (GB) being equal to 1000 megabytes (MB). Operators may apply a different formula, which may slightly affect the accuracy of data.

All retail prices included in the charts exclude VAT. They are an average of prices paid by postpaid and prepaid tariff plan customers. All averages are based on billed minutes of voice calls or billed GB of data, unless expressly stated otherwise.

With regard to wholesale roaming resale access according to Article 3 (4) of the Roaming Regulation, MNOs may charge fair and reasonable prices for components not covered by paragraph 3. Prices may thus be higher than the price caps given in Article 7 (1), Article 9 (1) and Article 12 (1). Some data also include volumes and tariffs coming from roaming in non-EU countries in Europe. It should also be noted that the average wholesale roaming voice tariff for agreements applying Article 3 of the Roaming Regulation might be above the cap because the calculation is based on actual minutes (the Regulation permits to invoice 30 seconds for calls that are shorter).

The EU Roaming Regulation also applies to the EEA EFTA States Norway, Iceland and Liechtenstein and this Report includes indicators from Norway and Liechtenstein.

## Annex II: List of respondents

Operators that provided data for the period 1 October 2019 – 31 March 2020:

### Austria

A1 Telekom Austria  
 ATK  
 HoT Telekom  
 Hutchison 3G Austria  
 Kabelplus  
 LTK  
 Lycamobile  
 Mass Response  
 MTEL  
 Porsche Smart Mobility  
 RTK  
 Russmedia  
 Smartspace  
 T-Mobile Austria

### Belgium

Proximus  
 Telenet Group  
 Orange Belgium

### Bulgaria

Bulgarian Telecommunication Company  
 (Vivacom)  
 Telenor Bulgaria  
 A1 Bulgaria

### Croatia

Hrvatski Telekom  
 A1 Hrvatska  
 Tele2

### Cyprus

Cablenet  
 Cyta  
 EPIC  
 Primetel

### Czech Republic

O2 Family  
 ČEZ Prodej  
 O2 Czech Republic  
 Tesco Mobile ČR

T-Mobile Czech Republic  
 Vodafone Czech Republic

### Denmark

Hi3G Denmark  
 TDC  
 Telenor  
 TeliaDanmark

### Estonia

AS EMT  
 Elisa Eesti  
 OÜ Top Connect  
 TELE 2 Eesti

### Finland

Ålands Telekommunikation  
 DNA  
 Elisa Corporation  
 Telia Finland  
 European Mobile Operator (MOI)

### France

EI Telecom  
 Free Mobile  
 Orange Caraïbe  
 Orange France  
 SFR  
 SRR

### Germany

Telekom Deutschland GmbH  
 Telefónica Germany GmbH & Co. OHG  
 Vodafone GmbH

### Greece

COSMOTE Mobile  
 Vodafone Panafon  
 Wind HellasTelecommunications

### Hungary

Telenor Magyarország Zrt.



Magyar Telekom Nyrt.  
Vodafone Magyarország Zrt.  
UPC Mobile  
Digi Kft.

### **Ireland**

Eircom Limited  
Hutchison 3G Ireland  
Tesco Mobile Ireland  
Vodafone Ireland

### **Italy**

Digi Italy  
ERG Mobile  
Iliad  
Fastweb  
Tre  
Kena Mobile  
Lycamobile  
Nextus  
Noitel  
Optima  
Poste Pay  
Tim  
Tiscali  
Vodafone  
Wind

### **Latvia**

Bite Latvia  
Latvijas Mobilais Telefons  
Tele2

### **Liechtenstein**

Salt (Liechtenstein)  
Telecom Liechtenstein  
Swisscom (Schweiz)

### **Lithuania**

Bite Lietuva  
Eurocom  
Telia Lietuva  
Tele2  
Teledema

### **Luxembourg**

POST  
Proximus Luxembourg

Orange Communications Luxembourg

### **Malta**

Melita Mobile,  
Mobisile Communications (GO Mobile)  
Vodafone Malta

### **Netherlands**

KPN  
Lebara  
Lycamobile Distribution  
Tele2 Netherlands  
T-Mobile Netherlands  
Vodafone Libertel

### **Norway**

Ice  
Lycamobile  
Telenor  
Telia Norge

### **Poland**

Aero2  
P4  
Polkomtel  
T-Mobile Polska  
Orange Polska

### **Portugal**

NOS Comunicações, S.A  
MEO – Serviços de Comunicações e Multimédia, S.A.  
Vodafone Portugal – Comunicações Pessoais, S.A.  
NOWO Communications, S.A  
ONITELECOM - Infocomunicações, S.A  
Lycamobile Portugal, Lda

### **Romania**

Orange Romania  
RCS&RDS  
Vodafone Romania  
Lycamobile  
Telekom Romania Communications  
Telekom Romania Mobile Communications  
Digital Cable Systems  
AKTA Telecom

### **Slovak Republic**

O2 Slovakia  
Orange Slovensko  
Slovak Telekom  
SWAN Mobile

**Slovenia**

TELEKOM SLOVENIJE, D.D.  
A1 Slovenija d.d.  
TELEMACH D.O.O.  
T-2 d.o.o.  
IZI mobil, d.d.  
HOT mobil, telekomunikacije in storitve  
d.o.o.  
Mega M d.o.o.  
SoftNET d.o.o.

**Spain**

Digi Spain  
Euskaltel  
Orange  
TelefónicaMóviles de España  
Vodafone  
Yoigo

**Sweden**

Hi3G Access  
Telenor Sverige  
Telia Company  
Tele2 Sverige