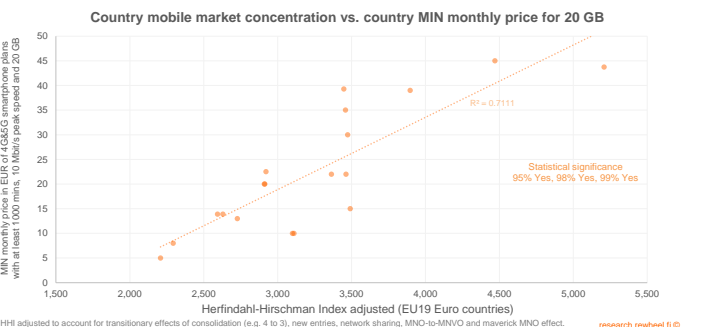
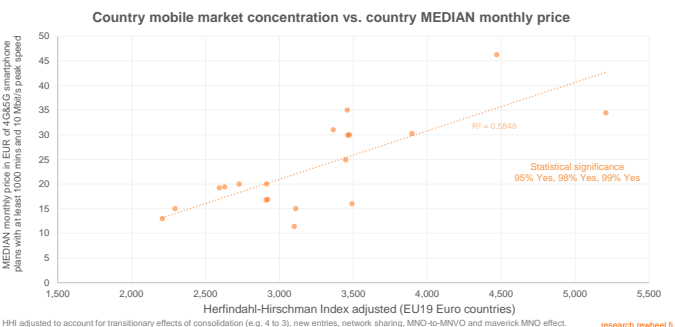
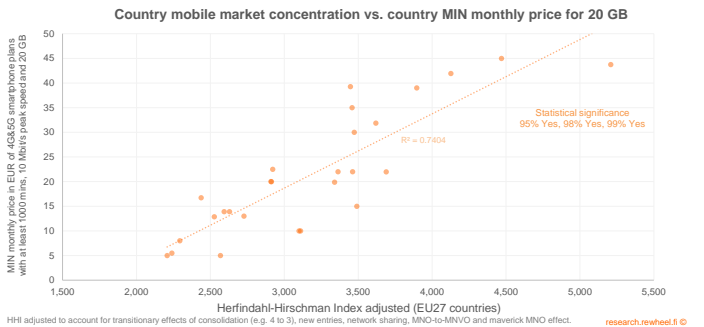
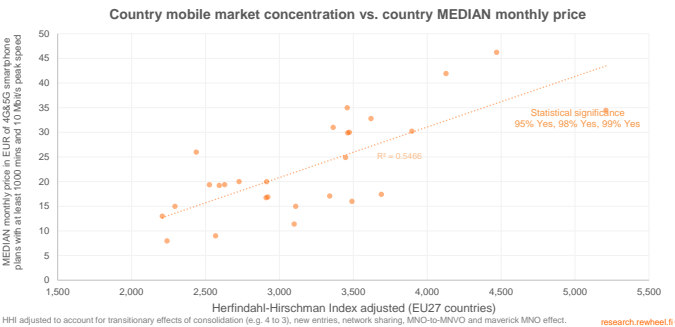
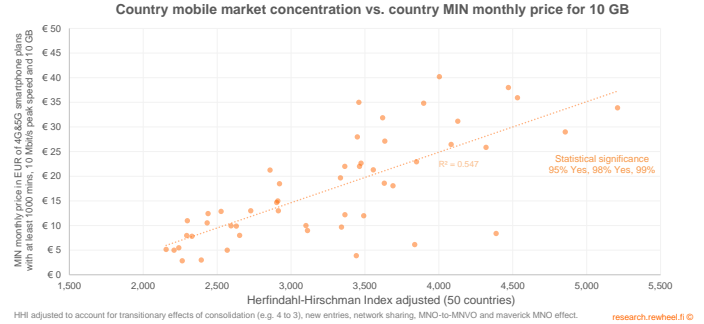
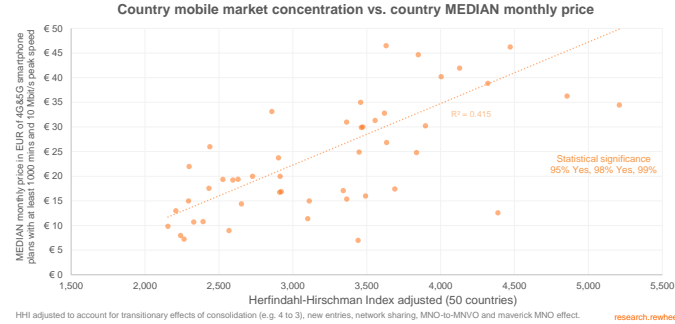


## Mobile prices are 2x to 5x lower in markets with 4 or more MNOs

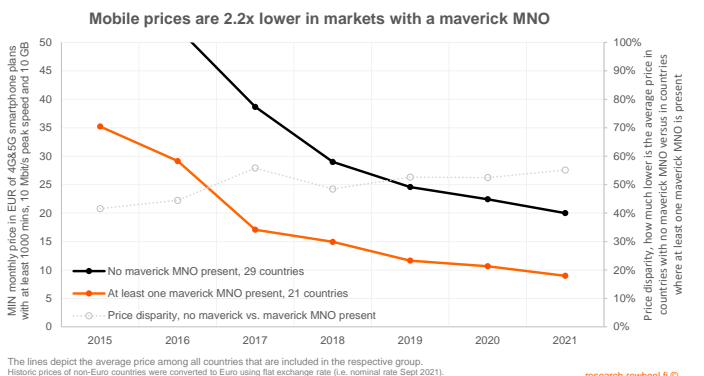
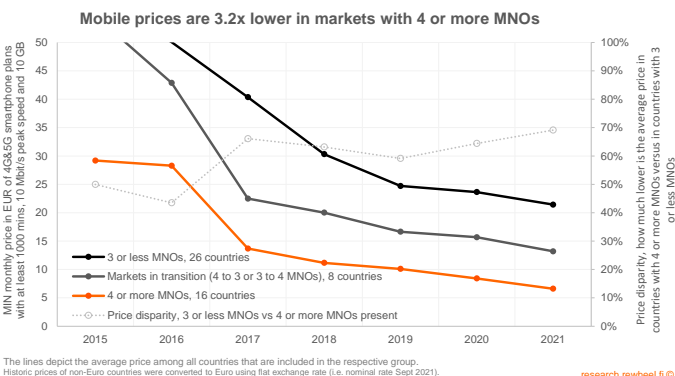
What are the factors that significantly affect mobile prices? Market concentration has a statistically significant effect on mobile prices. The lower the market concentration (HHI) the lower price. The number of mobile network operators (MNOs) has an even stronger statistically significant effects on mobile prices. The higher the number of MNOs the lower the price. The presence of a maverick (disruptive firm) has as well a significant lowering effect on mobile prices.

Rewheel research PRO study – January 2022



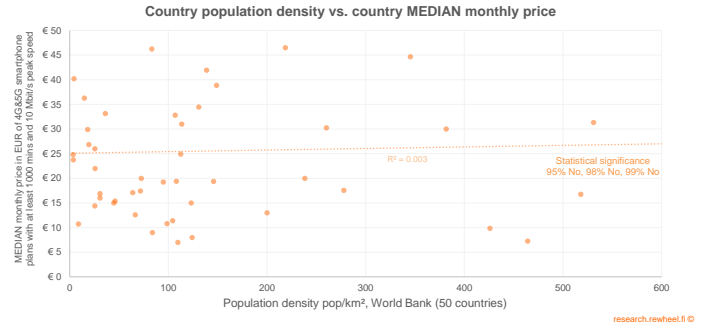
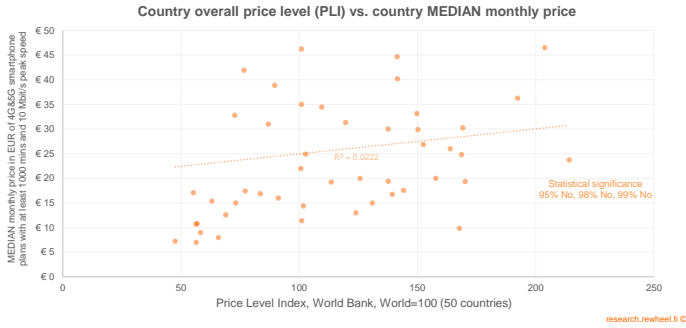
### How much lower are prices in markets with 4 or more MNOs and in markets where a maverick MNO is present?

- Monthly prices are, in average, 2x to 3.1x lower in markets with 4 or more MNOs than in markets with 3 or less MNOs while the gigabyte (unit) price is 5.4x lower.
- Monthly prices are, in average, 1.4x to 2.1x lower in markets where a maverick MNO is present than in markets where no maverick MNO is present while the gigabyte price is 2.2x lower.
- The price disparity in markets with 4 or more MNOs versus markets with 3 or less MNOs significantly increased the last six years. Monthly and gigabyte prices have been falling faster in markets with 4 or more MNOs.

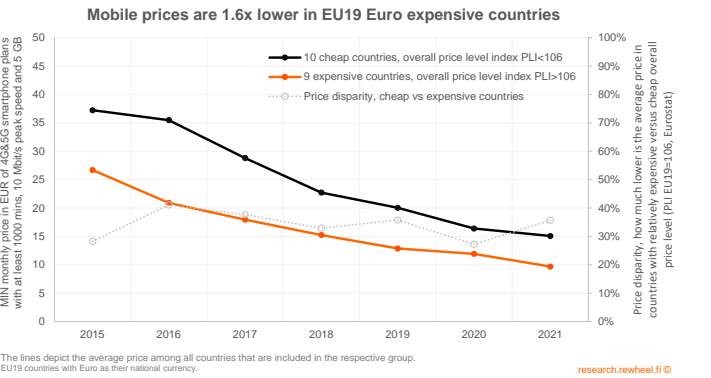
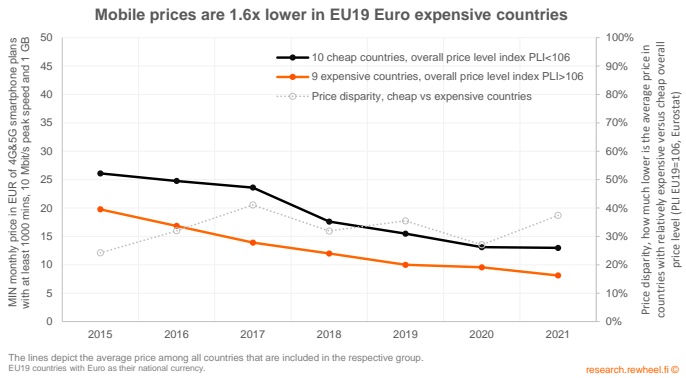


**What are the factors that do not affect mobile prices?**

- There is no link between the country overall price level (comparative price level index, PLI) and mobile prices.
- There is no link between the country population and mobile prices.
- There is no link between the country share of rural population and mobile prices.
- There is no link between the country land area and mobile prices.
- There is no link between the country population density and mobile prices.
- There is no link between the country mobile networks' performance and mobile prices.



**Mobile prices are not higher in more expensive countries**



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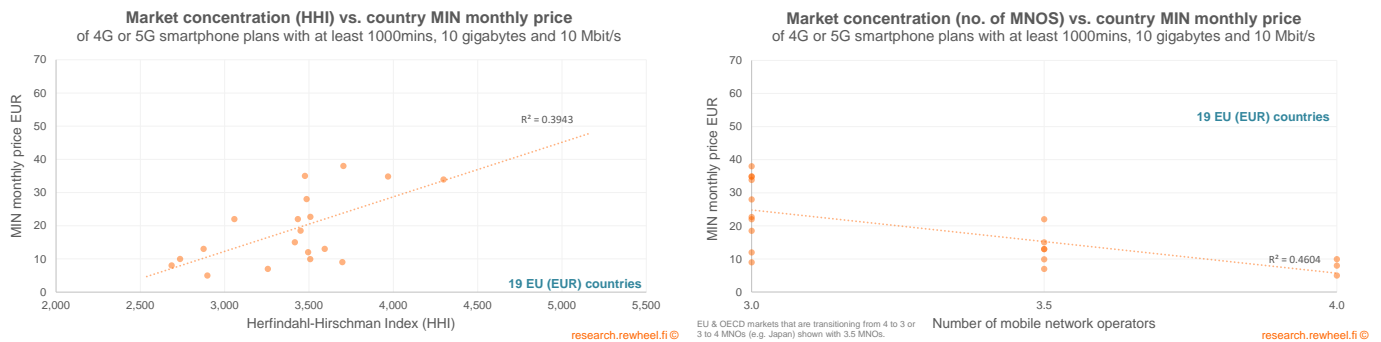
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# 1 Context and methodology

## 1.1 Study context

What are the factors that significantly affect mobile prices?

In December 2020, in a study<sup>1</sup> titled “4G&5G prices are 2x to 4x lower in markets with four MNOs”, we showed that market concentration measured by the Herfindahl-Hirschman Index (HHI) has a statistically significant effect on mobile prices. The higher the market concentration the higher the price. In the same study we showed that the number of mobile network operators (MNOs) present in a mobile market has an even stronger statistically significant effect on mobile prices. The higher the number of effective MNOs the lower the price. The presence of a maverick MNO (a disruptive firm such as Iliad in France and Italy) was also shown to have a quantifiable significant lowering effect on mobile prices.



In our December 2020 study we further showed that there is no link between the country overall price level (PLI), the country population, the country land area, the country population density, the country average mobile network download speed and mobile prices. All the above non-competition related factors do not systematically and significantly affect mobile prices.

Our December 2020 study was not our first study that concluded that mobile prices are predominantly determined by competition related factors and are not linked to other exogenous economic or geo-population factors such as the country overall price level, GDP per capita, disposable income, population density, etc. Our first study<sup>2</sup> that showed that mobile prices are predominantly determined by the degree of effective competition (i.e., number and type of mobile network operators present in a market) was released nine years ago, in December 2012. The dependency of mobile prices upon effective competition (i.e., number and type of MNOs present) was reaffirmed in our “Tight oligopoly mobile markets” 2015<sup>3</sup> and 2016<sup>4</sup> studies and in our January 2019 study<sup>5</sup> titled “4G prices as a function market concentration, number of MNOs, operator subscriber share, position, group affiliation and country general price level”.

When presented with studies (e.g., Ofcom’s UK econometric 2015 study<sup>6</sup>) showing that mobile prices are higher in markets where fewer mobile network and/or no maverick operators are present the industry often claims that mobile prices are higher in some markets not as a result of weaker competition but due to the higher country overall price level, higher taxes, higher costs of building and maintaining mobile networks due to large population, higher share of rural population, large land area, challenging terrain, low population density, high population density (paradoxically), higher average mobile network speeds, more robust and better network performance, etc.

We have repeatedly and consistently invalidated all these unsubstantiated claims in our research studies. We have found no apparent link between the country’s mobile price level and economic or geo-population factors.

<sup>1</sup>[https://research.rewheel.fi/downloads/4G\\_5G\\_prices\\_2x\\_to\\_4x\\_lower\\_in\\_markets\\_with\\_4\\_MNOs\\_PUBLIC.pdf](https://research.rewheel.fi/downloads/4G_5G_prices_2x_to_4x_lower_in_markets_with_4_MNOs_PUBLIC.pdf)

<sup>2</sup>[http://research.rewheel.fi/downloads/Rewheel\\_EU27\\_smartphone\\_tariff\\_competitiveness\\_report\\_December\\_2012\\_HIGHLIGHTS.pdf](http://research.rewheel.fi/downloads/Rewheel_EU27_smartphone_tariff_competitiveness_report_December_2012_HIGHLIGHTS.pdf)

<sup>3</sup>[http://research.rewheel.fi/downloads/Tight\\_oligopoly\\_mobile\\_markets\\_EU28\\_04012016\\_PUBLIC.pdf](http://research.rewheel.fi/downloads/Tight_oligopoly_mobile_markets_EU28_04012016_PUBLIC.pdf)

<sup>4</sup>[http://research.rewheel.fi/downloads/Tight\\_oligopoly\\_mobile\\_markets\\_EU28\\_2016\\_PUBLIC.pdf](http://research.rewheel.fi/downloads/Tight_oligopoly_mobile_markets_EU28_2016_PUBLIC.pdf)

<sup>5</sup>[http://research.rewheel.fi/downloads/4G\\_prices\\_vs\\_number\\_MNOs\\_position\\_share\\_concentration\\_PUBLIC.pdf](http://research.rewheel.fi/downloads/4G_prices_vs_number_MNOs_position_share_concentration_PUBLIC.pdf)

<sup>6</sup>[https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0019/74107/research\\_document.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0019/74107/research_document.pdf)

For example, in our March 2020 study<sup>7</sup> commissioned by the Greek national competition authority titled “*Review of mobile data connectivity competitiveness in Greece within the wider context of digital economy competitiveness*” we showed that Greek mobile prices are among the highest in EU & OECD markets even after the Greek mobile telephony tax is excluded. We reaffirmed the finding that Greece is the most expensive mobile market in EU in April<sup>8</sup> and November<sup>9</sup> 2021 follow-up studies.

Another prominent example can be found in our September 2019 study<sup>10</sup> titled “*Root cause of weak competition in the Canadian wireless market*” and our follow-up studies<sup>11,12</sup> that examine the competitiveness of Canadian wireless prices. Therein we showed that Canadian wireless prices are among the highest in the world due to the absence of effective network-based competition (i.e., Canada is a de-facto network duopoly).

Herein, we set out to re-examine the dependency of mobile prices upon competition related and non-competition related factors using the latest data sets available (e.g., World Bank, OECD and Eurostat comparative price level data sets and mobile prices from 50 countries), a broader set of non-competition related factors (e.g., share of rural population) and a refined data analysis methodology.

The analysis presented herein reaffirms all our previous findings. Market concentration has a statistically significant effect on mobile prices. The lower the market concentration (HHI) the lower price. The number of effective mobile network operators (MNOs) has an even stronger statistically significant effects on mobile prices. The higher the number of effective MNOs the lower the price. The presence of a maverick MNO has as well a significant lowering effect on mobile prices.

## 1.2 Methodology

Rewheel’s bi-annual releases have been tracking and analysing mobile (4G and 5G) prices in 41 EU & OECD countries since the first half of 2014. In 2020 we added to the list of 41 EU & OECD countries Brazil, China, Colombia, India, Russia, and South Africa. In the 1H2021 release we added Kuwait, Malaysia, and Saudi Arabia bringing the total to 50 countries. The 50 countries that are now tracked have a combined population of ~4.8 billion (more than 60% of the world’s population). The latest 2H2021 release contains 1,888 smartphone plan tariffs, 683 mobile broadband plan tariffs and 310 wireless broadband (FWA) plan tariffs that were sold by more than 170 mobile network operators, 94 operator sub-brands and 65 MVNOs present in the 50 European, American, Asia Pacific, Middle East and African countries. The entire database contains ~27,000 tariff plans. The data collection methodology, mobile tariff eligibility rules and currency conversion methodology is available in the public version of the latest 2H2021 study<sup>13</sup>.

Herein, we examine the dependency of mobile prices upon six non-competition related factors. The non-competition related factors are; country population (World Bank data), country share of rural population (World Bank data), country land area (World Bank data), country population density (World Bank data), country overall price level (PLIs using three sets of comparative indices from the World Bank, OECD and Eurostat) and country mobile network performance (Tutela<sup>14</sup> data).

We further examine the dependency of mobile prices upon three competition related factors.

- Market concentration measured by the Herfindahl-Hirschman Index (HHI) based on MNO subscriber shares.
- Market concentration measured by the number of effective MNOs present in a mobile market. The number of nominal (licensed MNOs with substantial spectrum holdings and independent own radio network infrastructure) is adjusted to account for the effects of market consolidation, new entries, anti-competitive network sharing, MNO-to-MVNO transitions and maverick MNO presence.
- Market concentration measured by a Herfindahl-Hirschman Index (HHIa) score that is adjusted to account for the number of effective MNOs.

<sup>7</sup>[https://epant.gr/files/2020/connectivity/Greek\\_mobile\\_data\\_connectivity\\_competitiveness\\_review\\_March2020\\_PUBLIC.pdf](https://epant.gr/files/2020/connectivity/Greek_mobile_data_connectivity_competitiveness_review_March2020_PUBLIC.pdf)

<sup>8</sup>[https://research.rewheel.fi/downloads/Greece\\_most\\_expensive\\_mobile\\_market\\_EU\\_PUBLIC\\_VERSION.pdf](https://research.rewheel.fi/downloads/Greece_most_expensive_mobile_market_EU_PUBLIC_VERSION.pdf)

<sup>9</sup>[https://research.rewheel.fi/downloads/The\\_3-MNO\\_Greek\\_market\\_is\\_the\\_most\\_expensive\\_market\\_in\\_EU\\_PUBLIC\\_VERSION.pdf](https://research.rewheel.fi/downloads/The_3-MNO_Greek_market_is_the_most_expensive_market_in_EU_PUBLIC_VERSION.pdf)

<sup>10</sup>[http://research.rewheel.fi/downloads/Root\\_cause\\_weak\\_competition\\_Canada\\_wireless\\_market\\_PUBLIC.pdf](http://research.rewheel.fi/downloads/Root_cause_weak_competition_Canada_wireless_market_PUBLIC.pdf)

<sup>11</sup>[https://research.rewheel.fi/downloads/Canada\\_most\\_expensive\\_wireless\\_market\\_world\\_PUBLIC\\_VERSION.pdf](https://research.rewheel.fi/downloads/Canada_most_expensive_wireless_market_world_PUBLIC_VERSION.pdf)

<sup>12</sup>[https://research.rewheel.fi/downloads/Canada\\_needs\\_new\\_maverick\\_mobile\\_network\\_operator\\_PUBLIC\\_VERSION.pdf](https://research.rewheel.fi/downloads/Canada_needs_new_maverick_mobile_network_operator_PUBLIC_VERSION.pdf)

<sup>13</sup>[https://research.rewheel.fi/downloads/The\\_state\\_of\\_4G\\_5G\\_pricing\\_16\\_release\\_2H2021\\_countries\\_PUBLIC\\_VERSION.pdf](https://research.rewheel.fi/downloads/The_state_of_4G_5G_pricing_16_release_2H2021_countries_PUBLIC_VERSION.pdf)

<sup>14</sup><https://www.tutela.com/blog/global-mobile-experience-2021>

We examine the dependency of the six non-competition and the three competition related factors upon monthly and unit prices. We use two monthly price metrics and one unit price metric detailed below:

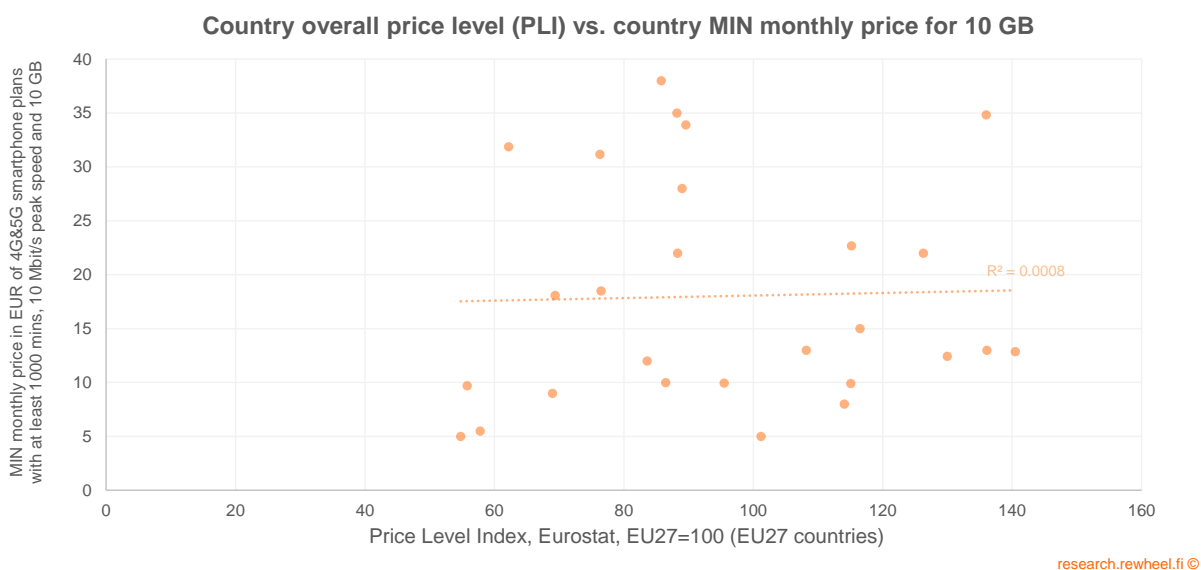
- the *MEDIAN monthly price* of 4G and 5G smartphone plans with at least 1000 minutes (to all domestic mobile & fixed networks) and 0.5 Mbit/s peak speed.
- the *MIN monthly price* for a 4G or 5G smartphone plan with at least 1000 minutes (to all domestic mobile & fixed networks), 10 Mbit/s peak speed and 1, 5, 10, 20, 50 or 100 gigabytes.
- the *MEDIAN gigabyte (unit) price* of 4G and 5G smartphone plans with at least 1000 minutes (to all domestic mobile & fixed networks) and 0.5 Mbit/s peak speed.

The *MEDIAN monthly price* is the median monthly retail price (including VAT and other applicable taxes) per country among all eligible tariffs logged in the database.

The *MEDIAN gigabyte price* is the median gigabyte price (retail monthly price including VAT and other applicable taxes divided by the included gigabyte allowance) per country among all eligible tariffs logged in the database.

The *MIN monthly price for 1, 5, 10, 20, 50 or 100 gigabytes* is the lowest monthly retail price (including VAT and other applicable taxes) per country among all eligible tariffs that were logged in the database that included at least 1000 minutes, 1, 5, 10, 20, 50 or 100 gigabytes and had a peak speed of at least 10 Mbit/s for High Definition (1080p) video.

We plot the price metrics against the non-competition and competition related factors and examine the degree of linear relationship between the two variables. For example, the scatter plot below depicts the relationship between the country overall price level (Eurostat PLI) and the country *MIN monthly price for 10 GB*. The sample size includes the EU27 countries and the  $r$  (Pearson coefficient) and  $R^2$  values are almost zero indicating no correlation (link) between the two variables.



We designate factors that significantly affect mobile prices the factors where we observe statistically significant uniformly positive or negative linear correlations across the three price metrics and across the three groups of countries (the group of 50 European, American, Asian Pacific, Middle East and African countries, the group of EU27 countries that share a common regulatory framework and the group of EU19 Euro countries that share both a common regulatory framework and a common currency).

Our latest analysis reaffirms our earlier findings. Mobile prices are significantly affected by competition related factors. We found no apparent link between mobile prices and the country overall price level – mobile prices are not higher in more expensive countries – or links between mobile prices and geo-population factors such as population density, share of rural population, etc.

## About Rewheel

Mobile data pricing, mobile operator competitiveness rankings, market modelling & analysis, competition analysis (consolidation, 4 to 3 mobile mergers, effective remedies, new market entries), MNO near-zero marginal data cost, MVNO economics, mobile capacity-only play, mobile centric convergence (MCC) pro-competitive strategies and 4<sup>th</sup> MNO business case.

Founded in 2009 and incorporated in Finland, Rewheel is a privately owned independent telecom research firm and boutique management consultancy. Our clients are mobile network operators, telco groups, MVNO groups, competition authorities, telecom sector regulators, governments, global internet firms, mobile data-centric start-ups, PE and VC investors.

Rewheel has delivered management consultancy work for clients in the United Kingdom, United States, Ireland, Switzerland, Finland, Sweden, Belgium, Greece, Poland, Slovenia, Hungary, Russia, Romania.

The following authorities have acquired access to Rewheel's independent pricing, mobile market competitiveness, 4 to 3 merger analysis and remedy assessment research: The European Commission Directorate for Competition, the United States Department of Justice, the New York, California and many other US State Attorney General Offices, the national competition authorities of Canada, Australia, the Netherlands and Greece, the Ministry of Economic Affairs of the Netherlands, the Ministry of Industry and Trade of Czechia, the Korean Electronics and Telecommunication Research Institute, the sector regulators of the United Kingdom, Germany, France, the Netherlands, Ireland, Finland, Portugal, etc.

Rewheel's mobile data pricing, strategy, competition analysis, merger assessment, network economics, spectrum, profitability and competitiveness focused reports have been cited by OECD Economic Surveys, The Economist, The Financial Times, The New York Times, Reuters, Bloomberg, WSJ and publicly referenced by the UK telecoms regulator Ofcom, BIPT, Vodafone, Telefonica, Tele2, Elisa, DNA, GSMA, VPs of the EU Commission responsible for Competition, MEPs, IEEE, ITU.

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⇒ [https://research.rewheel.fi/downloads/The\\_state\\_of\\_4G\\_5G\\_pricing\\_16\\_release\\_2H2021\\_operators\\_PUBLIC\\_VERSION.pdf](https://research.rewheel.fi/downloads/The_state_of_4G_5G_pricing_16_release_2H2021_operators_PUBLIC_VERSION.pdf)

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#### The state of 4G and 5G pricing, 1H2021 – operator rankings

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#### Is Greece the most expensive mobile market in EU?

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#### Is Canada the most expensive wireless market in the world?

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#### The state of 4G and 5G pricing, 1H2021 – country rankings

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#### 5G capacity potential—more than 500 gigabytes/sub/month

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#### 1&1 Drillisch's 4<sup>th</sup> MNO entry in Germany – Will it work?

⇒ [http://research.rewheel.fi/downloads/1&1\\_Drillisch\\_4th\\_MNO\\_entry\\_Germany\\_PUBLIC\\_VERSION.pdf](http://research.rewheel.fi/downloads/1&1_Drillisch_4th_MNO_entry_Germany_PUBLIC_VERSION.pdf)

#### 4G&5G prices are 2x to 4x lower in markets with four MNOs

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#### 4G&5G connectivity competitiveness 2020

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#### The state of 4G&5G broadband pricing – 2H2020

⇒ [http://research.rewheel.fi/downloads/The\\_state\\_of\\_4G\\_5G\\_pricing\\_DFMonitor\\_14\\_release\\_2H2020\\_PUBLIC.pdf](http://research.rewheel.fi/downloads/The_state_of_4G_5G_pricing_DFMonitor_14_release_2H2020_PUBLIC.pdf)

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