Impact of liberalization policy on mobile market and average price per minute in the EU

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Abstract

The aim of the article is to apprehend the impacts of the liberalization policy of the European Union in the area of telecommunication market on evolution of mobile services in terms of alternative service providers and virtual mobile operators. The virtual operators whose development was multiplied by technological progress in the area of mobile services allowed for the availability of new and improved services to the customers which in turn bring to light the question of what role virtual operators played in the process of dropping prices in mobile phone contracts. Apart from the study of price development in the European Union, the article focuses on other factors which could determine price development of mobile phone contracts. The end of the article sheds a light on the arguable potential development of virtual operators in the Czech market.

Keywords: Mobile network operator, oligopoly, telecommunication market, termination rate, virtual operator

JEL classification: D43, L96, Q55, Z19

1. Preface

Several years ago it was relatively simple to have awareness about mobile services providers. In most of the countries there were two mobile network operators with very similar offer and no interest to compete against each other. That is far from the situation today, especially due to deregulation of telecommunication market and developments within mobile and broadband technology. The entrance barriers in the form of investments in radio network stations for new mobile providers become much more manageable. All these factors resulted in the launch of significant number of new mobile providers offering different services in the form of discount packages.

In 2001, when the first alternative provider came into existence in Denmark, almost all of the network (incumbent) operators were surprised with the scale of aggressive discount strategy demonstrated by new competitors. Within several days, conventional market hierarchy was changed by the emergence of a great number of new small alternative providers that were prepared to use unconventional methods in the battle for mobile customers.

The launch of alternative providers of mobile services was marked by the improvement of customer care and providing interesting offers to end users. A question of, whether increasing competition in retail mobile market may have an impact on prices in mobile phone contracts(contracts herein after) arises in connection with the launch of virtual operators in the Czech market. The aim of article is to answer this question by comparing prices per voice minute and determine whether there is a relationship between the price of services and the number of operators in the market. Due to the short arrival of alternative providers in the Czech market, we use data from mobile market in the European Union countries (mainly Western European countries as liberalization process have started in this region) after liberalization. The comparison made to Western Europe also offers the hypothesis that an increasing number of mobile providers may affect the policy of mobile operators. Stronger competition for consumers forced mobile virtual operators to direct their price policy in such a way that it is perceived positively by the public.

The paper is organized as follows: Presentation of mobile services providers in telecommunication market (Section 2) followed by a brief history of liberalization process (Section 3) with impact on telecommunication market (market value, number of mobile subscribers etc.).

Price comparison itself is described in Section 4. The study of prices per voice minute takes place in two steps: first, there is a study of the impact of the liberalization process itself to the prices per minute in the EU countries; then based on a comparison of mobile virtual operators and average price per minute, evaluation is done in regards to whether strong market competition in the presence of mobile virtual operators leads to lower price per minute. The comparison is based on the study carried out by Strand Consult Company, who investigated mobile prices in the countries (Denmark, Ireland, the United Kingdom) with comprehensive mobile virtual operators and found out positive correlation between both parameters.

Given the inconclusive results between the number of mobile virtual operators in the market and low price per call, a new hypothesis emerges: whether mobile virtual operators are able to influence prices per call at all and what other reasons may lead to lower price per mobile services. Faith in their impact on prices per call disrupt regulatory measures laid out by the European Commission and the European Regulator Associations (called BEREC) and increases pressure on prices per call which mobile operators have been facing in recent years through regulation of voice call termination on individual public mobile telephone networks (MTR, in short). The hypothesis of the influence of MTR along with other potential factors is dealt with in Section 5.

The final Section provides a short case study of the current situation of the Czech mobile market with controversy about possible scenario of development of mobile services in the upcoming years.

2. Terminology of telecommunication market

Liberalization process of the telecommunication market has arisen to a large number of operators with different activities of providing services and business strategies. Distinguishing between different types of mobile providers is best done by classifying mobile providers in a number of different technical-economic issues.

Main provider of mobile services is *Mobile Network Operator* (MNO). MNO as the only provider owns rights over the radio frequency provides the whole services from building network, maintenance and innovation to selling their offers to retail or wholesale customers.

The EU liberalization policy and efforts to increase competition led the network operator to disclose its network to the alternative providers – *Service Providers* – based on wholesale contract with MNO and using the infrastructure of MNO. SIM-based mobile services could have been offered without owning a radio network or rights to the radio frequency (Kiiski et al., 2004).

The rise of mobile services and mobile devices led to the establishment of *Mobile Virtual Network Operator* (MVNO). MVNO is an alternative mobile service provider which operates under lower costs thanks to their specialization in specific service; provision of on-line services instead of classic branches. The only thing MVNO is missing is the right over radio frequency. To provide a full scale of mobile services for their own subscribers, MVNO buys radio capacity from licensed MNO (Kiiski at al., 2004).

Even within MVNO itself there are several types of service providers based on the core network, radio frequencies and on the network infrastructure. The lower level of MVNO called *Branded Reseller* (Soft MVNO) buys his basic product (packages) from network operator and then sells it as a mobile offering under its own brand (Strand Consult, 2006). Branded Reseller provides marketing and its business model focuses on customers with lower consumption. Reseller does not have its own core network and neither provides customer care nor billing. It deals only with marketing and sales in the retail market.

Looking at the other side of mobile providers, there is a comprehensive Mobile Virtual Network Operator (Full MVNO) which in addition to retail services provides value-added services and also has access to the core network. Unlike the MNO, MVNO does not own rights over radio frequencies and radio access network (services rented from MNO), however, MVNO designs its own mobile phone plans, issues its own SIM cards and provides customer care, billing or marketing.

Lastly, mobile services can be provided by Mobile Virtual Network Enabler (MVNE), which owns part of the core network, but does not hold rights over radio frequency. Based on the agreement with MNO, MVNE can make its network accessible to other interested parties (other Service Providers) to provide mobile services. Difference between MNO, MVNO and service provider is shown in Figure 1.

3. Mobile market evolution

For most of the 1980s and early 1990s, telephone operators in most European countries were ineffective service providers with high fees per minute, long lead times for subscribers to order subscriptions and limited coverage of area outside the cities. In 1999, in the year of liberalization, *"universal service became a reality in most European countries, publicly-owned firms were being privatized and competition were being permitted"* (Gual et. al, 1998, pp. 67).

Figure 1 Hierarchical structure of the mobile network operators

MNO structure	Radio access (only MNO)	Core network	Application platform	Customer Care	Billing service	Management	Marketing & Sales (Brand)	Retail market
MVNE		X	X	X	X	X		
MVNO		X	X	X	X	X	X	X
Service Provider				X	X	X	X	X
Branded Reseller							X	X

Technological changes resulting partly from the decreasing costs for long-distance calls, but lower costs were not transformed to fees for the connection which delivers calls to the individual subscribers. *"This technological revolution altered the perception that telecoms were a national monopoly requiring a single vertically-integrated provider"* (Gual et al., 1998, pp. 67-68). As a result of dominant position of one or two operators on the market, there were different prices per local and long-distance (national) calls which did not match the costs of providing voice services. Local calls were offered below costs and long-distance calls were charged significantly above costs. This policy of dominant operator inhibited potential competitors who were not able to compete with incumbent operators in terms of price in local

calls area. Despite this "imbalance", technological progress continued in most European countries.

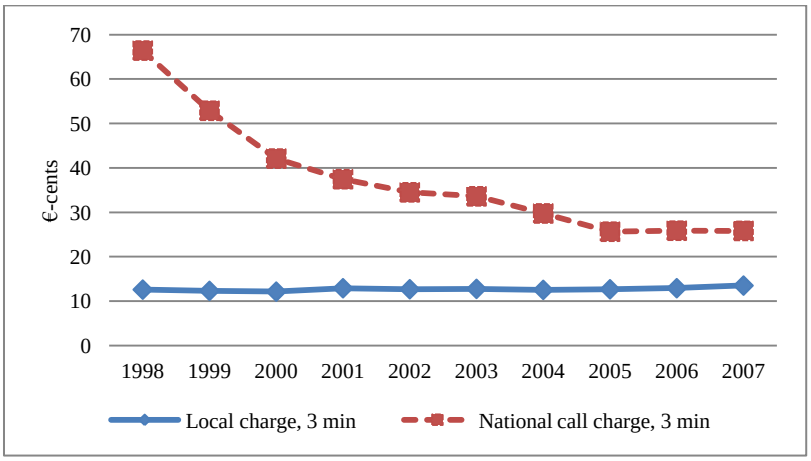
In response to this technological progress, the EU initiated market liberalization in telecommunications. The EU's approach has broadened significantly since 1993 when the Council of EU issued resolution, which not only paved the way for liberalization of voice telephony and the network infrastructure, but also determined the major principles of the regulatory Framework for the introduction of competition.[1] In addition, this resolution (directive) required that EU member states have to ensure that any service provider, which obtains a dominant position in the public communications market, has to grant access to the network on a transparent and non-discriminatory behave (basis) as well as with reasonable prices. The resolution (Directive) imposed an obligation for the complete liberalization of telecommunications infrastructure and services by January 1, 1998 (Kaiser, 2001).

Since then, mobile market has being increasingly influenced by the presence of an increasing number of different types of mobile providers. In that connection the term „mobile provider" has today become a very wide common denominator, that covers everything from large mobile operators (MNOs) to the smallest Branded Resellers (BRs).

3.1 Changes in market in response of liberalization

First visible change in the market corresponds to Gual's study (1998). As you can see on Figure 2, wide disproportionality between local and national calls in the end of 1990s indicates average price per long-distance phone calls were dropping thanks to alternative providers of mobile (voice) services. Incumbent operators could not afford to leave prices on high level and continuous drop in prices started.

Figure 2 Local and long-distance (national) call charge, 3 min

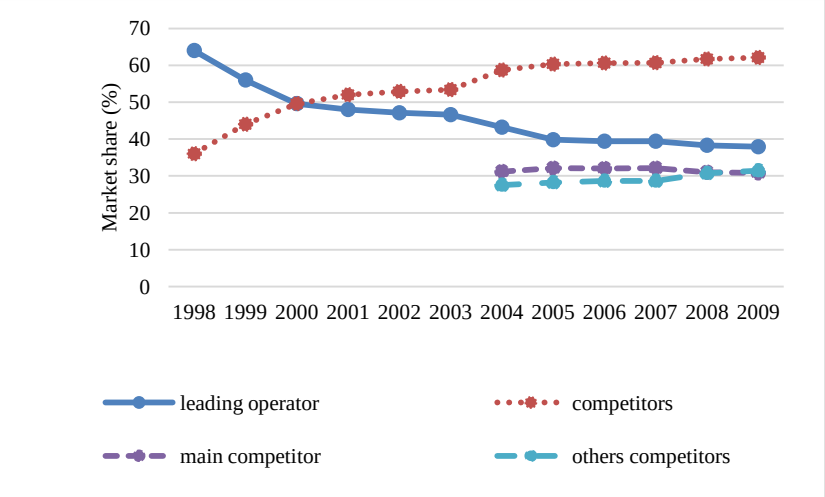


Due to the discount policy of alternative providers, telecommunication market divided and market shares of individual operators collided into one another. Figure 3 shows that while in 1998 leading operator controlled almost 70 % of telecommunication market, two years later

[1] The whole name of resolution is: Council Resolution of 7 on universal service principles in the telecommunications sector, 16. 2. 1994 and Council Directive 95/62/EC of 13 December 1995 on the application of open network provision (ONP) to voice telephony, 30. 12. 1995.

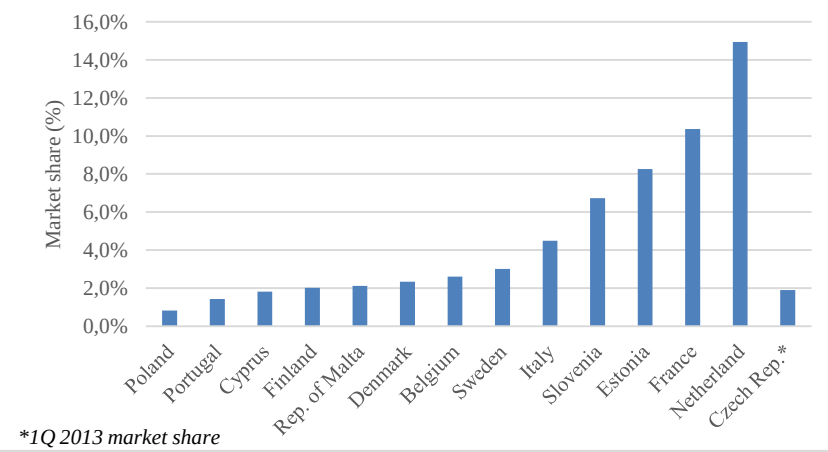
their market share was on the same level which had not changed until 2009 (market share of incumbent operator and its closest competitor are on than same level but lower than in 2000. It indicates large number of new providers who controlled more and more market.

Figure 3 EU average mobile operators' market share



Alternative providers in some EU countries have become a welcome option to the MNO also thanks to specialization in specific services (in particular services related to mobile calls). Their merger with each market was different and depended on their willingness to provide access network to other providers or level of competition within MNOs as illustrated in figure 4 on market share of alternative service providers.[2] The most advanced form of MVNO can be found in the Netherlands (with an aggregate market share of 15%), from Eastern markets and then in Estonia (8%).

Figure 4 Market share of MVNOs in EU countries in 2012



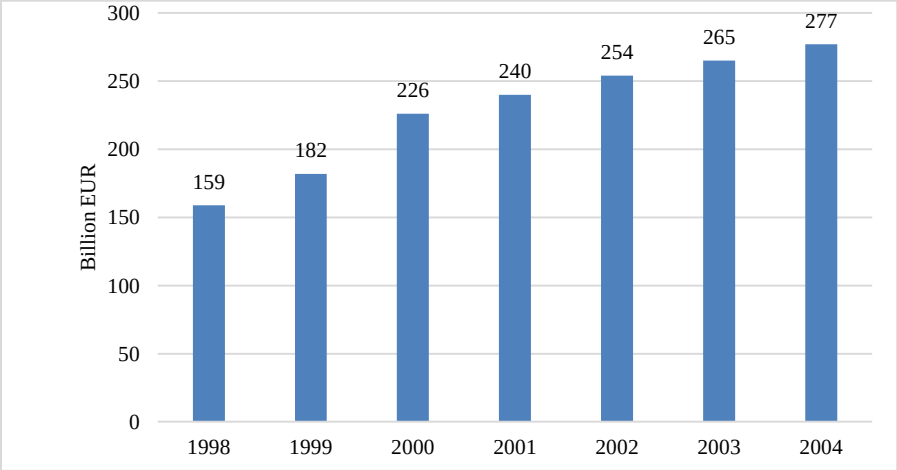
Extension of competition in the voice telephony market can be gauged by the fact that in 2000 an EU average of around 82% of the population could have chosen between more than

[2] As Kiiski at al. (2004) have pointed out, from MNO's viewpoint, making an agreement with an alternative mobile provider might be a significant strategic issue. Selling part of the network capacity to one or several service providers can bring new subscribers and traffic into incumbent network at a zero cost of acquisition. Such policy can be an effective tool for one MNO how to gain market share from another MNO.

five operators for long-distance calls and 95% have a choice between at least two (Commission of the European Communities, 2010, pp. 9).

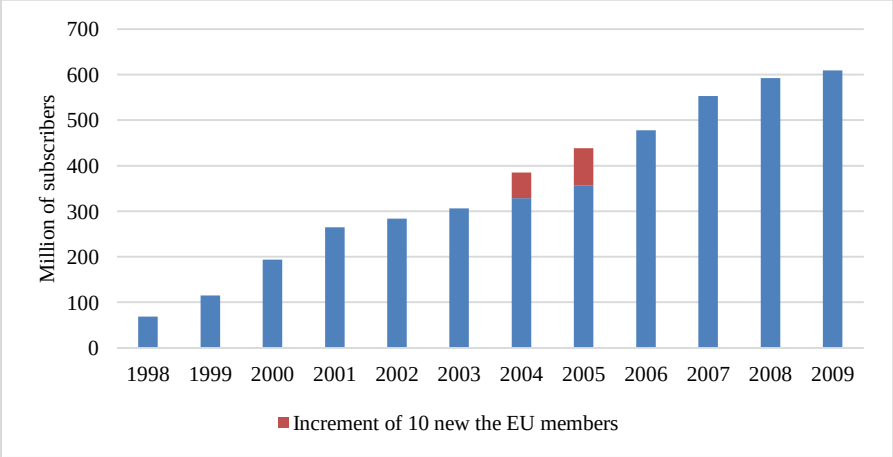
A growing number of companies providing mobile services were reflected in increment of the market value of the telecommunication sector. As illustrated in figure 5, the telecommunications sector has become a destination for many investment (domestic and foreign), which increased the market value of the sector. Accompanying expenditure in the local economy and transfer of technology, skills and business methods, improved facilities and infrastructure attract investment which was a positive signal to potential investors.

Figure 5 EU Telecommunication market value (billion EUR)



Simultaneously with incoming number of new providers the number of subscribers rose due to better mobile coverage of area as a result of the build-up of new access radio network and extension of mobile tariffs based on discount policy. As you can see in figure 6, while in 1998, 69 million of subscribers used telecommunication services while one year after liberalization (1999) number of subscribers almost doubled.

Figure 6 EU mobile subscribers



In terms of termination monopoly (duopoly) position of network operators, state-owned companies and with the aim of offering high quality of mobile services to every citizen in the EU, liberalization policy has proven to be very effective. The only thing left to answer is the

role of liberalization and entry of alternative providers (mainly MVNOs) to retail prices per calls.

4. The impact of liberalization on prices per call in the EU

In Ireland, the telecommunication market was fully liberalized in December, 1 1998. One year after liberalization the number of mobile providers reached number 40. Competition was on a high level, local voice traffic achieved a growth of 18 % during the year, international voice traffic increased by 30 % and prices per tariffs of biggest Irish mobile operator (Eircom) dropped by 9 % (ODTR, 1999). Similarly, customer base grew rapidly over the year.[3]

In Denmark, where mobile operators were innovators of services and customer care, average retail price per call dropped in 2000 in one year from 0,17 Euro per minute to 0,09 Euro per minute and SMS message galore at 0,026 Euro per message (Strand Consult, 2001). Customer base stayed on the same level. Some tariffs were offered free of charge. In both markets, marketing campaign and customer targeting rose, variety and a luxury of services were offered to all customers in the market place.

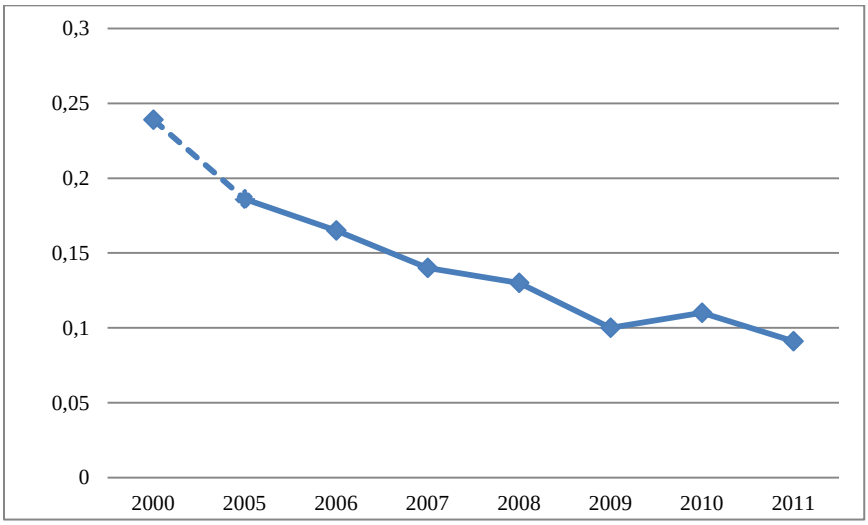
In March 2005 in the United Kingdom, the first MVNO was established. EasyMobile launched their discount concept. Before easyMobile was launched, UK mobile customers were paying approximately 15 pounds per minute and 5 pounds per SMS. After several days, prices per call had fallen to 6 pounds per minute and 2 pounds per SMS (Strand Consult, 2005)

That experienced by the Irish, UK and Danish market were similar to that elsewhere in Europe. As new operators became more established competition became more likely to broaden across all of the different customer bases in the telecommunications market. The emergence of new operators led to establishing a lower price per call. Figure 7 on data of the average price per minute per call shows that the European market has been experiencing a continuous drop in prices per voice telephony.[4]

[3] However higher number of customers can be misleading, because some customers can own different SIM cards for different services.

[4] For comparison was added into the figure average price per minute in 2000, one year before first MVNO launched on the European market.

Figure 7 Development of average price per minute in the EU (EUR/min)



The purpose of this part is to confirm or reject the hypothesis (consumption) of public opinion about the correlation between MVNO (and their number) and price per call. The research is in pursuit of voice telephony, most frequent subject of regulatory measures (remedies). Price per call[5] per country is calculated as the proportion of operators' revenue per voice services to number of terminating minutes. It is a general methodology for the calculation within member counties of the European Union.

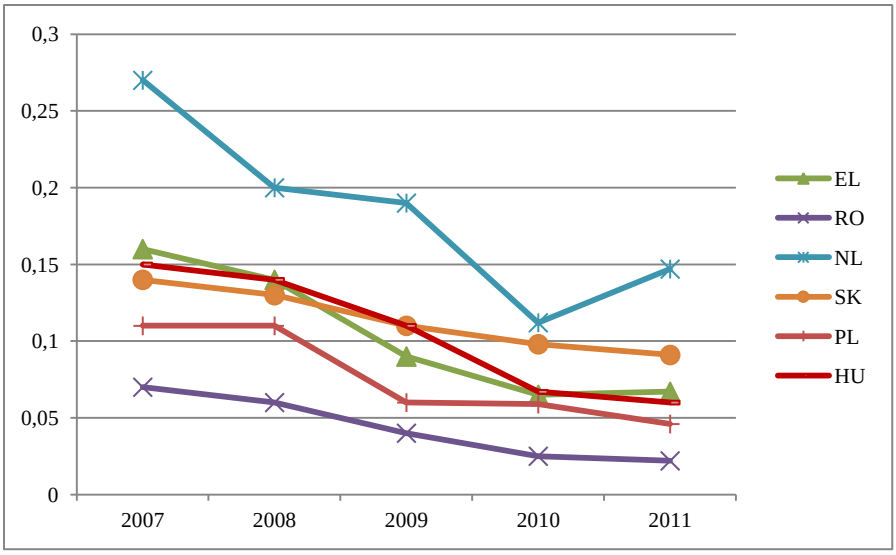
Figure 7 indicates positive impact of liberalization policy, so we can come up with the assumption that prices decreased with the advent of MVNOs. There are two hypotheses that the price comparison should be assessed separately. Both hypotheses are based on the same ground – liberalization – but the interpretation of the decreasing price may be perceived differently. Comparison of price evolution will take place in two steps: with liberalization process comes decreasing of prices (Section 4.1) and comparison of correlation between number of MVNOs and prices per call in single EU country (Section 4.2).[6]

4.1 The impact of liberalization on call prices

Figure 7 itself does not offer any explanation of causes of drop in prices. The importance about dropping APPM is purely informative. In addition, it is the aggregate level of prices per calls from all Unions countries. For this reason, it is necessary to specify the evolution of prices during time period - first, attention is focused on selected EU countries and the development of their average retail prices (Figure 8).

Figure 8 Evolution of APPM in selected EU countries (EUR/min)

[5] Literal expression is Average Price per Minute (APPM).
[6] In other words, higher number of mobile operators may affect price per voice minute easily than single MVNO on the market.



For most countries, there is visible decrease in prices per call during the period 2007 – 2011, albeit with different intensities. The problem of price evolution in Figure 8 is that it is an approximate representation of the selected EU countries. In addition, Figure 8 includes countries which in the reference period did not have MVNOs, or more precisely they were not fully liberalized (Czech Republic, Greece, and Romania). Figure 8 merges together countries of Western Europe (extended scope of MVNOs) with the countries of Eastern Europe (shorter scope of MVNOs). For this reason, countries were split into three groups - countries without MVNOs (MVNO-0), Western European countries (WE-MVNO) and Eastern European countries (EE-MVNO).[7]

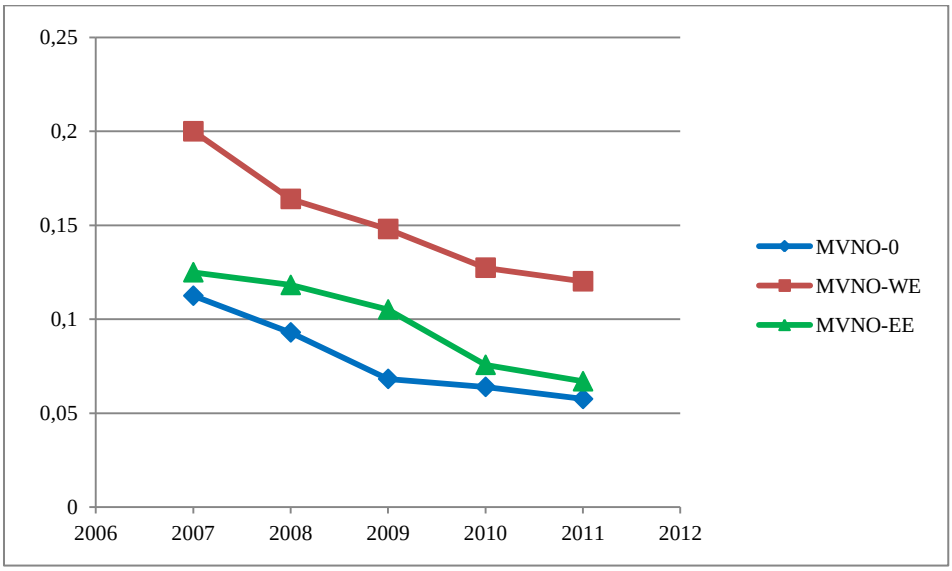
Given that this is a time series and the prices are converted into EUR currency and given the volatility of exchange rates during that period of time (mainly during financial crisis in 2008) the average price per minute per calls for each country were converted into a common currency (EUR) exchange rates from 2007.

The output in Figure 9 brings specific contours of price comparison - average prices per minute per call within countries without MVNOs are lower, respectively on the same level as in the countries of Eastern Europe with the MVNOs. Noteworthy, however, is the fact that there is more rapid decline in prices in the countries of Eastern Europe in recent years, which may be given by the presence of MVNO.[8] Phase 1 can thus be viewed in a positive correlation that liberal policy of MNOs to new operators could result in a faster drop of prices compared to countries without participation of alternative mobile operators, where mobile prices in the years 2009 - 2011 stagnated (were rather constant).

[7] Group of MVNO-0 countries includes Bulgaria, Czech Republic, Romania and Greece, among the MVNO-WE countries there are Netherlands, Belgium, Spain, Germany, United Kingdom and the MVNO-EE group includes Slovakia, Poland, Estonia, Hungary.

[8] It should be noted that in the countries of Eastern Europe the liberalization process was under way at a slow-going rate. It is also advisable to keep in mind that liberalization does not automatically mean free access for MVNO to the radio network of MNO. MNO here may pose a number of obstacles for fully utilized radio network, administrative barriers etc.

Figure 9 Evolution of APPM with regard of establishment of MVNOs (EUR/min)



4.2 Correlation between MVNOs and average price per minute

Further, studies will focus on the study of impact of MVNOs in the process of drop in price. The studies will determine whether with higher number of MVNOs lower price will be established. For this purpose we use the data of the number of MVNOs in the EU in 2011 and the average price per minute per call (in euro cents). The output of two variables is shown in Figure 10.

Figure 10 Comparison of MVNOs and APPM in 2011

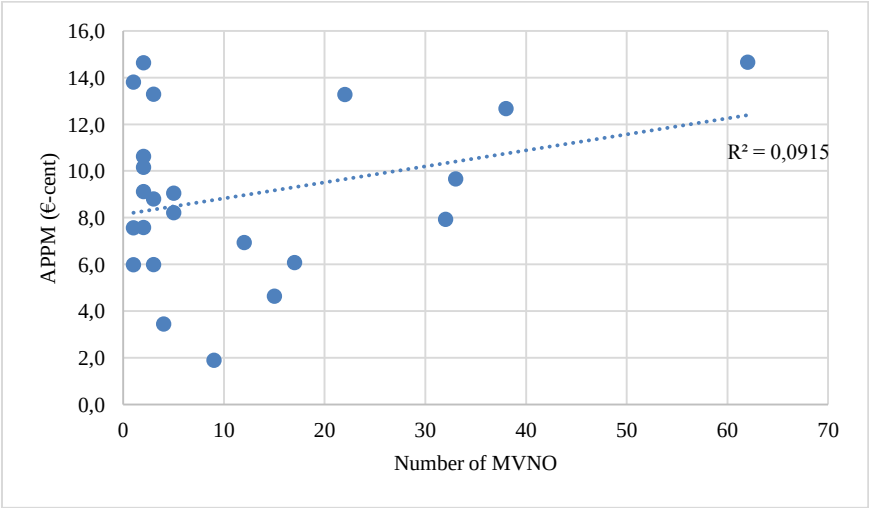


Figure 10 provides information about zero causality between average prices per minute and number of MVNOs. Data can be interpreted as follow: there is no direct link between setting up a lower prices as number of mobile providers increase. On the contrary, while counties with a lower number of MVNOs prices per minute differ from 2 to 14 cents, for countries with a higher number of MVNO higher prices are readily seen (range from 8 to 15 cents). Based on these data, we cannot confirm the hypothesis that with the growth of MVNOs, prices per call has been dropping. Noteworthy is particularly the case of the Netherlands, which has the largest representation of MVNOs on the market in all EU countries and

simultaneously the highest voice call fees (14.7 cents).[9] In addition, market share of MVNOs reaches the largest value (see Figure 4).

Based on updated study of liberalization process, we can declare that average price per minute per call has been declining; causality of influence (higher number) of MVNOs on voice price has not been confirmed. Nevertheless, it is appropriate to proceed to the final data adjustment – Figure 10 compares countries with different living standards, price level and cost of providing services.[10] Thus another analysis is needed and countries are divided into two groups: countries of Western Europe and Eastern Europe (Figure 11, Figure 12).

Figure 11 Comparison of MVNOs and APPM in Western European countries in 2011

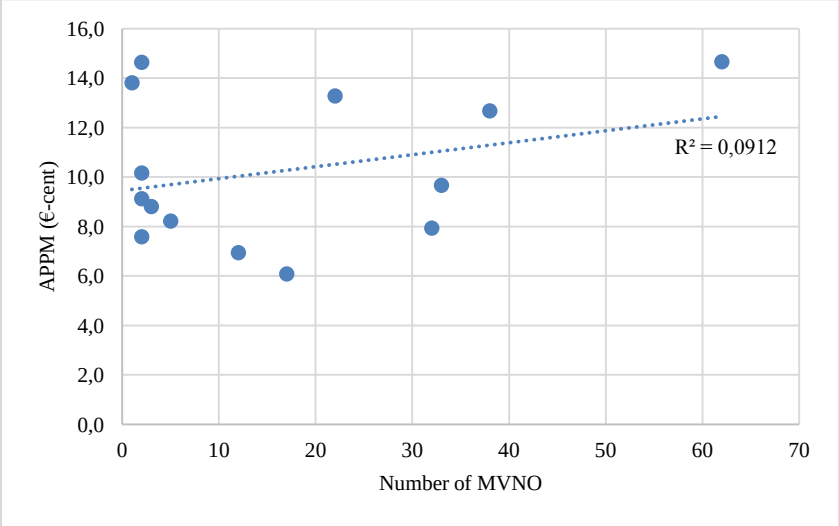
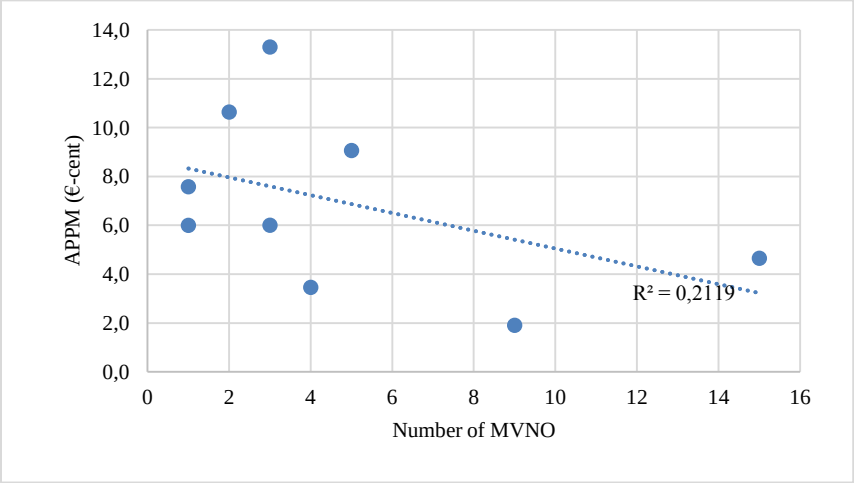


Figure 11 shows rather zero causality between number of MVNOs and average price per minute in Western European countries, while Figure 12 in the countries of Eastern Europe is a week correlation of both variables supporting causality of a higher number of MVNOs and lower price per call. Low correlation coefficient on both parts of Europe can be interpreted as there are other factors – than just number of MVNO – which influence retail prices per call.

[9] Average price per minute is in case of Netherland 7 times higher than in Romania (2.2 euro cents) and Latvia (1.9 cents). Complete list of prices per minute in each country can be found in the appendix.

[10] In general, in Western Europe, technological advances of mobile services take place at a faster pace than in Eastern Europe. Last such case is the test of LTE-Advanced network in London while in the Czech Republic LTE network has started to build up.

Figure 12 Comparison of MVNOs and APPM in Eastern European countries in 2011



5. Other explanation of falling prices per call

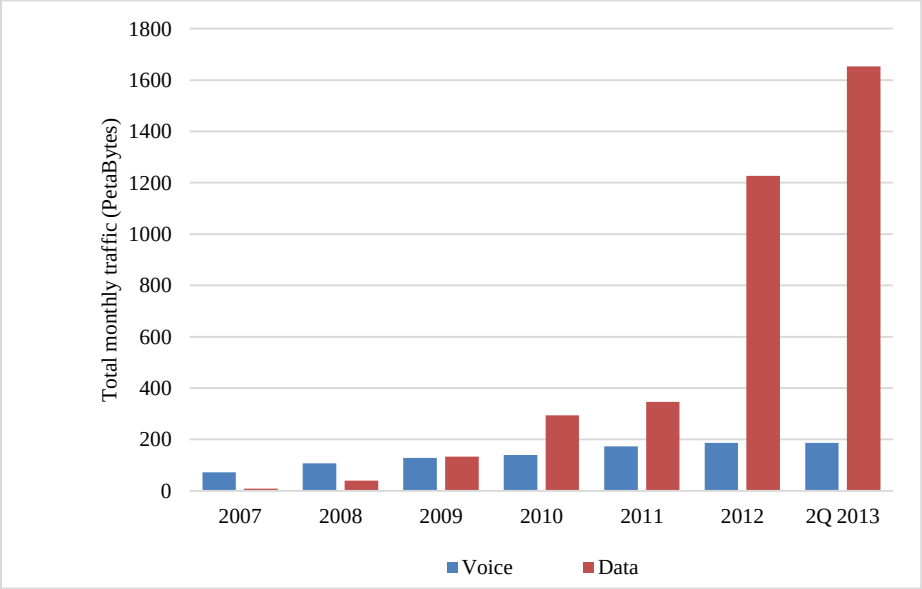
After liberalization period of time, many events have happened which should be considered in the discussion about factors influencing prices per call. In particular, technological progress and the regulation of Wholesale voice call termination on individual mobile networks (so-called mobile termination rate, MTR).

The first important factor behind decrement of price per call is innovation of technology services and substitutes in the form of data applications. Substitutes to voice services within users have started developing in the past ten years. At the beginning, Skype application which was offered to users in 2004 had played a main role. Skype was a substitute to conventional calls via the internet without charges and seemed ideal for long calls and calls from/to abroad.[11]

The year 2007 was crucial in terms of technological innovation, when Apple Company introduced the first iPhone, and especially in 2008, when the first phone running under Google's Android platform came into the market. As you can see in Figure 13, while mobile voice traffic remains on a constant level, data traffic represents key revenues. Their increase basically corresponded to iPhones sales or rather, smartphones. Thanks to the huge spectrum of applications, users might have used a new means of voice communication so-called VoIP. In spite of limited usage within people, main technological revolution was reflected in the diversity of text messaging and sharing of information through social networks, which brought full competition in data services into existence.

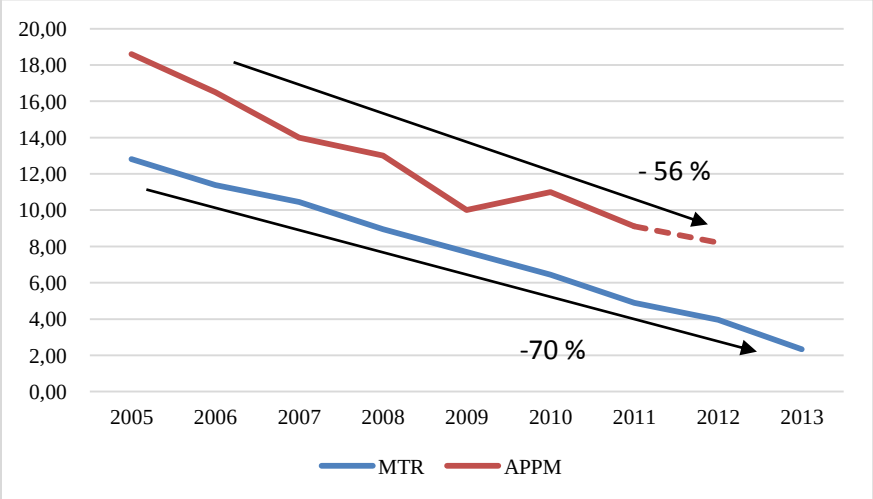
[11] Even though the latest versions started offering calls directly to mobile numbers, importance of mobile voice calls stayed on constant level. For example, in 2012 Skype made up one-third of all international phone tariffs.

Figure 13 Global mobile traffic 2007-2013: voice and data



Explanation of falling prices may offer regulatory measures to national regulatory authorities in regards to decisions made by the European Commission. Particularly in recent years, the Commission has launched a campaign to reduce wholesale fees per calls. Voice services are regulated by the rates which operators charge each other in relation to fee per voice minute.[12] Essentially, this is the only regulated rate per voice services across all Union countries. The aim of the regulation is to influence retail price per minute charged to end customer.[13] The development of regulated mobile termination rate (MTR) and average price per minute (APPM) in the EU is illustrated in Figure 14.

Figure 14 Development of MTR and APPM in €-cents[14]

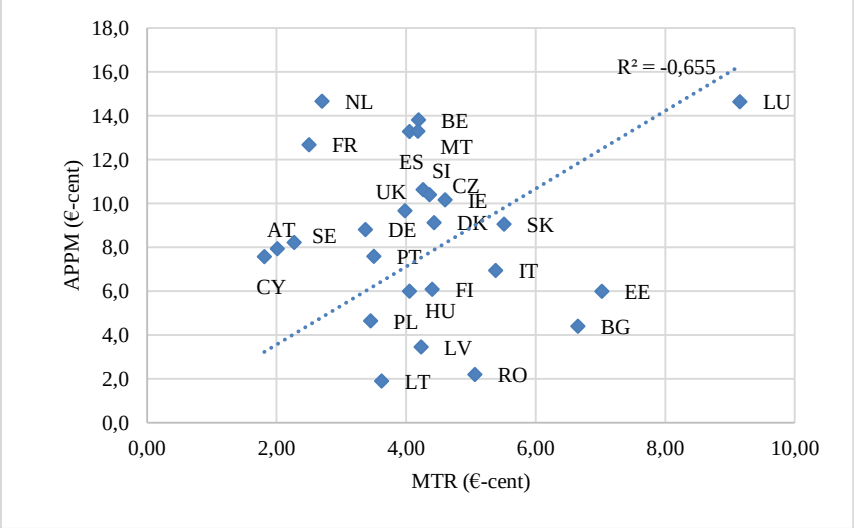


[12] The entire name of this fee is: "voice call termination on individual public mobile telephone networks", or just MTR.
[13] Focus on the MTR is not random. Given that wholesale MTR historically accounted for a significant part of the wholesale costs entering to the retail prices charged to end users, within national regulation authorities there is a general opinion- the retail price per voice minute can be affected by a decline of the maximum termination fees (Czech Telecommunication Office, 2013).
[14] APPM for 2012 represents the estimated value.

You can see positive correlation between decrement in MTR and average price per minute. The correlation is not uniform; there is actually a diversion between percentage drops in price per voice minute from percentage decline of MTR. Despite considerable symmetry of both variables, it is obvious that changes in the MTR do not reflect changes in voice minute at the same level.

Relationship between the MTR and APPM is represented in Figure 15, which compares both indicators of all EU countries for the year 2011. Dependence of the MTR and APPM is ambiguous; the value of the correlation coefficient indicates negative correlation, which means relationship between the MTR and APPM is rather inversely proportional.

Figure 15 Comparison of MTR and APPM in the EU countries in 2011



Divided opinion of the impact of MTR to voice minute can be found in expert studies. Growitsch (2010) pointed to a positive relationship between low MTR and retail price. In contrast, a study by Frontier Economics (2012) found no association between falling prices and regulated MTR. Mhlanga et al. (2013), however, came with the assertion that the regulation of MTR may even act against the development of competition in the market. Their argument builds on the example of regulation of MTR in South Africa, where the dominant operator in response to the MTR set high voice minute rate per calls, originated outside the network of dominant operator to mitigate the "damage" of regulatory measures. Given the fact, dominant operator possessed 60 % of market share and most of the calls were directed to the network of this operator, the customers had no intention to switch to alternative provider. The higher price per voice minute to other networks had a negative impact on small-market players, who were not able to compete more effectively with incumbent operators.

Explanation as to why larger competition in the form of MVNOs does not affect favorable price developments may be very simple and has a precedent in basic microeconomic theory. Specifically, it is model of oligopoly with a dominant firm, which in our case, incumbent mobile operator represents the dominant firm, while the MVNOs are its smaller competitors (followers) *"incapable of its own decision about output or price significantly affect the market"* (Soukupová et al., 2010, pp. 342). MVNOs more often compete against each other

than the incumbent.[15] MVNOs are too small and too dependent on incumbent operator than to be able significantly influence price per call. More often, operators situated in the competitive edge respect voice minute price set by the network operator.

At the end of the section, we should point out that the level of retail price has an impact on the type of MVNO. As we pointed out in Section 2, within virtual operators, we distinguish several types of them depending on the degree of in/dependence on the network operator. E.g. full MVNO (which often have their own infrastructure and billing center) may be more liberal in its pricing policy than Brand Reseller. But it is Brand Reseller who is the most common forms of MVNO in the market.

Last explanation of the inability to significantly influence retail price is illustrated in Figure 1 in Section 2. A limited opportunity to influence price per call can be viewed as the fact that MVNOs offer low value added, which could prove its effectiveness. Crucial inputs (mainly network capacity) control MNO and based on that neither MNO nor MVNOs can decrease retail price below costs per network maintenance. MVNOs are not real, infrastructural competition, but rather an imitation of competitors with limited influence.

6. Case study: Situation on Czech telecommunication market

Development of the telecommunication market through MVNOs in the European Union may offer possible development of Czech telecommunication market due to certain similarities, such as the same methodology for setting MTR, similar trend of falling prices per calls or presence of a large number of diverse MVNOs. This Section examines the present situation of the MVNO market and polemists possible evolution of mobile prices and the number of MVNOs.

In regards to recent activity of national regulatory authority (Czech telecommunication office), changes in regulation have made Czech mobile market easily accessible for MVNOs. In 2013, in the Czech mobile market, around 50 MVNOs operated with an aggregate market share of 2%.

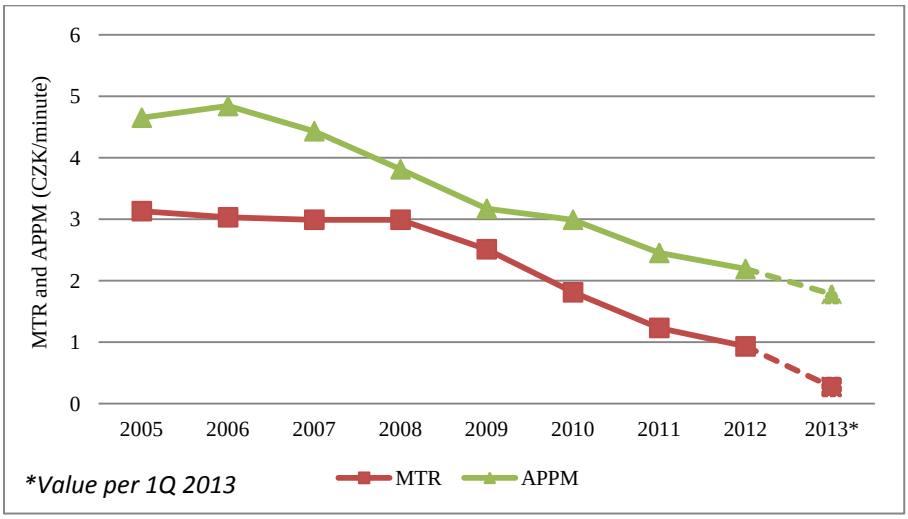
Despite this significant inflow of new mobile providers in 2013, their influence is negligible in terms of the impact on prices per call. Comparison of development of APPM in Figure 16 in the first half of 2013 to year 2012 shows that a significant decline in previous years occurred in the Czech market even despite the mobile revolution in the form of unlimited tariffs or emergence of MVNOs.

The impact of MTR on APPM, however, is different. Considering the fact, that on the EU level price per call parallels the development of MTR in the Czech market; correlation between both parameters is not so obvious, as you can see in Figure 16. Especially in the years 2005 - 2008 the average price per minute showed decreasing trend despite constant MTR.

[15] This argument falls into the context of the current situation of MVNO in the Czech market which focuses their strategies on end users with low monthly expenditure.

A low decrease in APPM is also given by MVNOs´ policy to target specific types of consumers. They are mainly owners of pre-paid tariff with lower monthly expenditures on mobile services for whom MNOs voice tariffs were disadvantageous.[16] Competition between MVNOs rather takes place on the least lucrative customer base.

Figure 16 Development of MTR and APPM in Czech Republic



Regarding future development, it is clear that the current upward trend in the number of MVNOs is unsustainable and soon we can anticipate the correction in the form of a merger or going out of business. After the first year is in the Czech market, the number is the same number in Ireland (approximately 40) after one year of mobile service.[17] In the future, their market share will rise but their growth will not be as dramatic as is the case of the Netherlands. Reasons for growth will be associated with better public subconscious about MVNOs and decrease in the fear of the unknown. In contrast, the growth trend in the number of MVNOs customer base may be limited by conservatism on the part of Czech customers.

7. Conclusion

The aim of the article was to evaluate the influence of MVNOs in the downward trend of prices per voice services. MVNOs started offering its services in the context of the liberalization of telecommunication market to the EU after year 2000, their impact to customer behave can be observed at two different levels - improving the quality of mobile services and their differentiation, and decline of prices per voice services.

While there is no doubt about better services for customers and offering entirely new discount tariffs (for evidence, see discount policy of Danish MVNO operator Telmor which was copy not only from other MVNOs), conclusions about their impact on mobile prices are ambiguous. Retail prices per call since 2000 have shown a dropping trend, there may be more causes for this: from the application of new technologies for mobile transmission, which contribute to lower costs on maintenance (and that may be reflected in a lower price) through

[16] At the end of 2012, the APPM at pre-paid tariff was more than 1 CZK higher compared to the prices per voice minute at post-paid (flat) tariffs (3.03 CZK per minute compared with 2.02 CZK per minute); (Czech Telecommunication Office, 2013).
[17] At present, in Ireland, there are only 17 MVNOs remaining.

regulatory measures of national regulatory authorities, to the size of the market participants and willingness to migrate to another mobile operator.

The study showed that in case of price declination, the situation does not differ significantly between Western and Eastern Europe, in both parts there is apparent decline of prices per call with diverse dynamics. The price comparison with number of providers on the market showed that a larger number of virtual operators do not lead inevitably to a lower price per call, on the contrary, due to its slight market share and different business plan, MVNOs often compete with each other for a narrow group of customers.

The case of the Czech Republic (and other EU countries) indicates that the regulatory encouragement for creating an MVNO opportunity was likely to increase competition and thus lower tariff fees of basic services. The Czech Republic became a member of the MVNO family at the end of 2012 and yet, within a year, a significant number of alternative providers emerged. MVNOs themselves are in their business strategy limited by their own costs and wholesale contracts with MNOs.

Consumers may find voice tariff offers from MVNOs interesting, but their influence on retail price is limited. MVNOs strategy concentrates on customers with lower monthly expenditures. Decrease in prices per call in 2013 were influenced by MNOs concerns about another regulation framework and upcoming auction of radio frequencies, which could have brought forth mobile network operator.

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Appendix: Average prices per minute in the EU and number of MVNO

Table 1 APPM and number of MVNO in the EU countries in 2011

Country	APPM (€-cents)	Number of MVNO	Country	APPM (€-cents)	Number of MVNO
AT	7,9	32	LT	1,9	9
BE	13,8	1	LU	14,6	2
CY	7,6	1	LV	3,5	4
DE	8,8	3	MT	13,3	3
DK	9,1	2	NL	14,7	62
EE	6	1	PL	4,6	15
ES	13,3	22	PT	7,6	2
FI	6,1	17	SE	8,2	5
FR	12,7	38	SI	10,6	2
HU	6	3	SK	9,1	5
IE	10,2	2	UK	9,7	33
IT	6,9	12			

Table 2 Development of MTR and APPM in the EU (€-cents)

Year	2005	2006	2007	2008	2009	2010	2011	2012
MTR	12,81	11,39	10,45	8,95	7,69	6,44	4,89	3,95
APPM	18,6	16,5	14	13	10	11	9,1	8,2

Table 3 Development in APPM in selected EU countries (EUR)

Country	2011	2010	2009	2008	2007
BG	0,044	0,052	0,04	0,05	0,06
CZ	0,104	0,119	0,1	0,13	0,16
EL	0,067	0,065	0,09	0,14	0,16
RO	0,022	0,025	0,04	0,06	0,07
NL	0,147	0,112	0,19	0,2	0,27
BEL	0,136	0,156	0,17	0,18	0,2
ES	0,133	0,149	0,16	0,17	0,19
DE	0,088	0,12	0,12	0,14	0,17
UK	0,097	0,1	0,1	0,13	0,17
SK	0,091	0,098	0,11	0,13	0,14
PL	0,046	0,059	0,06	0,11	0,11
EE	0,06	0,069	0,12	0,11	0,1
HU	0,06	0,067	0,11	0,14	0,15

Table 4 Development of MTR a APPM in Czech Republic (**Value per 1Q 2013)*

Rok	2005	2006	2007	2008	2009	2010	2011	2012	2013*
MTR	3,13	3,03	2,99	2,99	2,51	1,81	1,23	0,93	0,27
APPM	4,65	4,84	4,43	3,81	3,17	2,99	2,45	2,19	1,78

Table 5 Development of APPM in selected EU counties (EUR, nominal rate= 2007)

Country	2011	2010	2009	2008	2007
BG	0,044	0,052	0,04	0,05	0,06
CZ	0,092	0,109	0,095	0,117	0,16
EL	0,067	0,065	0,09	0,14	0,16
RO	0,027	0,03	0,048	0,065	0,07
NL	0,147	0,112	0,19	0,2	0,27
BEL	0,136	0,156	0,17	0,18	0,2
ES	0,133	0,149	0,16	0,17	0,19
DE	0,088	0,12	0,12	0,14	0,17
UK	0,097	0,1	0,1	0,13	0,17
SK	0,091	0,098	0,11	0,12	0,14
PL	0,05	0,063	0,069	0,103	0,11
EE	0,06	0,069	0,12	0,11	0,1
HU	0,067	0,073	0,122	0,14	0,15

Table 6 APPM and MTR in the EU countries in 2011

Country	**APPM (€-cents)**	**MTR**	**Country**	**APPM (€-cents)**	**MTR**
AT	7,9	2,01	LT	1,9	3,62
BE	13,8	4,19	LU	14,6	9,15
CY	7,6	1,81	LV	3,5	4,23
DE	8,8	3,37	MT	13,3	4,18
DK	9,1	4,43	NL	14,7	2,7
EE	6	7,02	PL	4,6	3,45
ES	13,3	4,05	PT	7,6	3,5
FI	6,1	4,4	SE	8,2	2,27
FR	12,7	2,5	SI	10,6	4,26
HU	6	4,05	SK	9,1	5,51
IE	10,2	4,6	UK	9,7	3,98
IT	6,9	5,38			