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Conference Paper

Comparison in Europe of telco value evolution during 'bubbles': Dotcom 2000 vs. Dotcom 2012

20th Biennial Conference of the International Telecommunications Society (ITS): "The Net and the Internet - Emerging Markets and Policies", Rio de Janeiro, Brazil, 30th-03rd December, 2014

Provided in Cooperation with:

International Telecommunications Society (ITS)

Suggested Citation: Herrera-González, Fernando (2014) : Comparison in Europe of telco value evolution during 'bubbles': Dotcom 2000 vs. Dotcom 2012, 20th Biennial Conference of the International Telecommunications Society (ITS): "The Net and the Internet - Emerging Markets and Policies", Rio de Janeiro, Brazil, 30th-03rd December, 2014, International Telecommunications Society (ITS), Calgary

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A COMPARISON IN EUROPE OF TELCO VALUE EVOLUTION DURING “BUBBLES”: DOTCOM 2000 vs. DOTCOM 2012

October 2014

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Abstract

During the last years, a surge in values related to the New Economy has occurred. This phenomenon is similar to the 2000 Dotcom bubble, even if in those years the value growth was fuelled by other firms and entrepreneurs. What both “bubbles” have in common is that, in both cases, they are based on activities that rely or have need of telecommunication infrastructures.

According to economic theory, the value of downstream goods is driven by the value given by individuals to end goods. Because of this, the value of the telecommunications infrastructure should somehow reflect the value of Dotcom services, as telecommunication networks are needed for the production of Dotcom services.

This paper explores the relative evolution of telecommunications value in Europe with respect to the Dotcom services during the Dotcom 2000 Bubble and the recent re-surge of the Dotcom sector. In both periods, the value of European telecommunication operators should have followed the increase in value of Dotcom services. However, this was not the case.

In order to explain the phenomenon, we consider the evolution of the factors that induce value in the free market (utility, availability) and its interaction with the evolution of telecommunication regulation in Europe.

¹ I wish to thank Gonzalo García-Arribas for his help in gathering and preparing most of the data presented in this paper.

1. Introduction

During the last years, a surge in values related to what used to be called the New Economy (Dotcom² values) has occurred. Apple, Google, Amazon or Facebook may be considered as the main exponents of this trend. In some cases, this value creation has been reflected in the stock markets.

This phenomenon is similar to the 2000 Dotcom bubble, even if in those years the value growth was fuelled by other firms and entrepreneurs. What both “bubbles” have in common is that, in both cases, they are based on firms whose activities rely or have need of telecommunication infrastructures.

According to economic theory, the value of downstream goods (goods of higher order) is driven by the value given by individuals to end or first-order goods, those which may be directly consumed. Thus, more in general, the value of goods of higher order is driven by the value of those goods of lower order for whose productive process the former goods are required.

As telecommunication networks are needed for the production of Dotcom services, telecommunication networks are a good of higher order with respect to Dotcom services. And because of this, the value of the telecommunications infrastructure should somehow reflect the value of Dotcom services.

This paper explores the relative evolution of telecommunications value in Europe with respect to Dotcom services value during selected periods of time. Specifically, two periods will be analysed: the years associated to the Dotcom 2000 Bubble (roughly, 1998-2002) and the recent surge associated to firms like Apple or Facebook (roughly, 2008-2012).

² We will use the term Dotcom as a shortcut to refer to services that rely on telecommunication capacity for its provision. This includes of course all Internet services, but it is not limited to them, as the inclusion of Apple in the set of exponents reveals.

As already explained, value of telecommunication operators should have in principle followed the increase in value of Dotcom services during both periods.

The analysis of available data shows that this does not seem to be the case. Evolution of values during the 2000 *Bubble* seems in line with economic theory, and it can be seen that telecommunication stock prices for European companies evolved in a similar way to the value of Dotcom services. However, the same has not happened in the more recent “bubble” (which will be called the *Surge* in this paper). While firms such as Apple or Google have achieved a large growth in value, European telco operators are lagging behind and did not increase their value, as should have been the case according to the theory and to what happened in the *Bubble*.

This paper tries to provide an explanation for the identified different evolution. In order to do so, the theories of value and price, as stated by Eugene von Böhm-Bawerk (Böhm-Bawerk, 1891), complemented with the theory of price control (Mises, 1977), will be used

The rest of the paper is structured as follows. In section 2 the theory of value will be summarised, together with the relationship between value and price. This last reflection is important if we are to accept stock prices as proxies to value, as it is proposed in this article. Interaction between value, price and regulation is also described in this section,

In section 3 actual data about the evolution of stock prices is presented for both historical periods considered, i.e. the 2000 Dotcom *Bubble* and the 2010 Dotcom *Surge*. The purpose of this data section is not to be extremely exhaustive or rigorous, but just to identify trends. Justification will be provided for each of the decisions made when choosing the data, but it is accepted that other sets of data may lead to different conclusions. In any case, it is very likely that there is consensus in accepting the main trends identified, so this section is more focused on illustrating the trends than in conclusively proving their existence.

Section 4 proposes a theoretical explanation for the differential trends observed in each period. This explanation starts from the theory of value, and analyses the evolution of each of its components in the free market (utility, availability). After that, evolution of

regulation in telecommunications is incorporated to the analysis and related to the value evolution.

Section 5 contrasts the theoretical hypothesis attained in section 4 by taking a look at what happened with USA operators specifically during the second period under scrutiny.

Section 6 concludes summarising the findings of the paper and closes it.

2. The theory of value and the theory of price

In this section, the basic economic theory supporting the rest of the paper is presented. First, the formation of value is described according to the marginal theory of value. As will be shown, value is originally formed for goods with final use; it is this final value which induces value to other commodities required to produce the final good. Value is also the main determinant of prices; the relationship between value and price is explained in subsection 3. In subsection 4, the influence of regulation on value through exchange prices is explained.

2.1 The theory of value

The current theory of value may be traced to the end of the XIX century. It was formulated at the same time by three economists: Carl Menger, an Austrian; William Jevons, an Englishman, and Léon Walras, a Frenchman. This theory supposed the breaking point with the Classical School of Economics; and it is generally considered the origin of both the Austrian School and the Neoclassical School of Economics.

According to the current theory (the marginal theory of value), **value** may be defined as the “*importance which goods or complexes of goods acquire, as the recognised condition of a utility which makes for the wellbeing of a subject, and would not be obtained without them*” (Böhm-Bawerk, 1891, p. 135).

It is clear from this definition that value does not depend on the physical or any other concrete features of the good, but only on its serviceability, its capacity to satisfy the needs of the individual. For example, with regard to value, “ice-in-winter” is a good completely different from “ice-in-summer”, even if physically they could be regarded as the same good. From the economic point of view, the homogeneity of goods is thus not related to its physical features but on its capacity to satisfy the ends of the individual.

Normally, the same good may be used to satisfy various concrete wants. Moreover, several goods of one and the same kind are frequently available, thus the decision between one or another to satisfy the need is arbitrary. From this, it may be inferred that the value we bestow on a concrete good *“is measured by the importance of that concrete want, or partial want, which is least urgent among the wants that are met from the available stock of similar goods”* (Böhm-Bawerk, 1891, p. 148). In sum, the value of a good is determined by the amount of its **marginal utility**.

The more individual goods there are available in any class, the smaller is the marginal utility which determines the value. If there are available so many individual goods of one class that, once all needs satisfied, there still remains a number of goods without further useful employment, the marginal utility is equal to zero.

Usefulness and scarcity are the ultimate determinants of the value of goods. As this relation is completely different from one individual to another, one and the same good may have different values for each individual. Moreover, none of these subjective values may be apprehended by an external observer. Finally, it is not possible to compare the rankings of values of two individuals, as these values are not cardinal.

Summing up, the value of a good depends on its usefulness and on the available stock. However, in the current society, interchange of goods with other individuals is possible. In this context, another possible value appears for each good, together with that of direct use: the exchange value, which coincides with the amount of the use value of the goods got in exchange (Böhm-Bawerk, 1891, p. 166).

Thus, the value of a good is determined by the larger of these two values: use value and exchange value. Producers of a specific good have a use value of zero for the produced

commodity; for these individuals, the value of the produced good equals its exchange value.

2.2 The value of productive factors

So far, the focus has been on goods with a direct usability for individuals. Unfortunately, most of the commodities found in nature are not of such kind, but they need to combine with other commodities in order to become a final good, ready for direct use. According to this criterion, goods of first order may be distinguished from goods of higher order, which require further production before becoming of first order. Of course, goods of second order may require productive processes involving third order goods, and so on. Goods of higher order are usually known as productive factors.

As higher order goods are required to produce the final good, the value of this final good induces value on those inputs upstream. In other words, the goods of higher order have also value, even if they cannot directly satisfy individual needs, because they are necessary to produce the final good, which will in turn satisfy the need.

In sum, all the resources required to produce a good have a value, induced by the value of the final good. The process of valuation recurs in the same way for upstream or higher order resources.

How is the value of final goods split among the different resources? The starting point to understand this is the law of costs, which establishes that the value of the final good equals the sum of the values of the inputs used to produce it. According to Böhm-Bawerk (1891, Book IV chapter 10, Book V chapter 7), “*the total value of the complete group (of goods) adapts itself to the amount of the marginal utility which it is capable of affording as a group*”.

In most cases, productive factors involved in a process may be also used in other processes, and may also be substituted in a concrete process by other similar productive factors. For these non-specific replaceable factors, the value is established at a certain level independently of their concrete complementary employment, and this value they have when we distribute out the total value of the group among its individual members.

The value of specific non replaceable factors is fixed by difference between the value of the produced good and the value of the non-specific factors.

Thus, the value of specific productive factors directly depends on the value of the final good. For example, the value of a telecommunications network depends on the value of telecommunications services to end users. However, the value of the buildings in which the equipment sits, being non-specific productive factors, does not depend on that value, at least not so heavily as the network does.

What about non-specific factors? In this case, the formation of the value is more complex. These factors may be used for several processes, each of which will produce a different good. In turn, each of these goods has a different value according to its marginal utility. Considering this, Böhm-Bawerk (1891, p. 186) proves that “*the value of the productive unit adjusts itself to the marginal utility and value of that product which possesses the least marginal utility among all the products for whose production the unit might, economically, have been employed*”. Thus, the value of non-specific factors is also determined by the value of the possible end goods for which it can be used.

In summary, the value of productive factors is determined by the value of the end goods they contribute to, value which in turn depends on the preferences of the individuals. It is these preferences which guide the preferences of the producers, and together with the available stock for the factor, the value is established by its marginal utility.

The value of a specific factor directly depends on the value of the final good to whose production is directed, whereas the value of non-specific factors depends on its convertibility to other uses.

2.3 The theory of Price: Relationship between Price and Value

As already stated, individuals may obtain resources to satisfy their needs by interchange with other individuals. A voluntary interchange will only happen if both individuals think that they are going to profit from it (not necessarily in monetary terms, it may be in psychic terms, see Rothbard (1962, chapter 3)). In other words, a voluntary

interchange happens when the marginal utility of the received good is higher than that of the given good, for both individuals. In the unhampered market, where no coercion exists, all exchanges are voluntary.

The more units of good are available for an individual, the lower becomes the marginal utility and the higher is the probability that the individual prefers to exchange the good. Producers of a good are in the extreme situation of always preferring to exchange that good.

Price may be defined as the ratio of exchange between two commodities, expressed as the number of units of one of the commodities. Prices are historical phenomena that only appear when an interchange is consummated.

The price of a good depends on the value it has for individuals. The relationship between price and value is described, for example, in Böhm-Bawerk (1891, Book V). He shows that the market price is determined by the subjective valuations of the two marginal pairs: the upper limit for the price is the minimum of the valuation of the last or marginal buyer and the valuation of the first excluded seller; the lower limit is the maximum of the valuation of the marginal seller and the valuation of the first excluded buyer.

In large, organised markets this general theory admits some simplifications, which lead to the conclusion that the price is determined by the valuation of the last or marginal buyer³. In other words, the price is set by the valuation of the buyer that puts the LESS value on the good. Recall, finally, that this value equals the marginal utility for the buyer, which in turn depends on his ranking of preferences and on his available stock.

Before moving on, it is necessary to stress that the existence of interchange *does not imply that the value of a good for an individual equals the paid price*; on the contrary, the value is always higher than the price, because otherwise no exchange would occur.

³ See Herrera-González (2011) for an explanation of this outcome, and also for illustrative examples on how value and price are formed.

Note also that the difference between value and price is not quantifiable, because preferences have ordinal but not absolute value.

2.4 Value and price in the intervened market

The theory of price assumes that all exchanges are voluntary. However, this is not always the case in the real world, where governments may impose transactions or conditions for the same, due to political reasons. So, in presence of government intervention, exchanges may exist in which one of the parties does not value more the received good than the given good.

If this is the case, the link between price and value may be broken. Price regulation is one of the more widespread types of government intervention. If price is regulated, then it is the government which sets the price for the commodity, according to political or other non-economic criteria. Price regulation may take one of several forms: fixed prices, maximum or minimum prices, price caps...

It is clear that if the price is set by coercive methods, the exposed theory of price does not hold. More importantly, this means that the price will not reflect anymore the value of the commodity. The consequences of price regulation have been widely explored by economists both from the Neoclassical and the Austrian School (see, for example, Mises (1977)).

The regulated price is necessarily different from the free-market price. In the first place, if they were to be equal, no need of regulation would appear. But, in the second place, it has been shown that prices depend on subjective magnitudes that are dispersed among a lot of individuals; so, it is impossible for any external observer to collect the entire information required to calculate the free-market price (Huerta de Soto, 2009). In sum, the regulated price will be set above or below the free-market price.

In these conditions, there is a feedback mechanism from price to value, that takes place through the exchange value. Recall that, if interchange is possible, the value of a good is determined by the maximum of the use value and the exchange value. Recall also that producers of a specific good have a use value of zero for the produced commodity. In

conclusion, for producers the value of the produced value equals its price (the exchange value). If the price is regulated, this necessarily alters the value given by producers to the good.

For example, if a maximum price is imposed (below the market level price), the value of the regulated good will decrease, and so will that of all the productive factors involved, with more or less intensity depending on the specificity of the factor.

3. Evolution of telco value and Dotcom value in the periods 1998-2002 and 2008-2012

In this section, empirical evidence will be used to show the evolution of value of Dotcom firms in both periods under analysis. This evolution will then be compared with that experienced by telecommunication operators in Europe during the same periods.

3.1 Methodological notes

It should be clear from the outset that the main objective of this section is not to prove the existence of a price bubble on any of the periods, but to illustrate what most of people thinks that happen: that there was a Dotcom bubble in 1998-2002 and that there have been a recent surge in the value of Dotcom firms during last years. There is also consensus in that European telecommunications operators valuation followed the pattern of growth in the first period, but has not followed it during the second one.

So, the purpose of the data presented in this section is not to be extremely exhaustive or rigorous, but just to identify trends. It is acknowledged that other sets of data may lead to different conclusions, but we are confident that most people will agree in that what will be analysed has actually happened.

3.1.1 Measuring the evolution of value

The focus of this paper is the evolution of value. However, value is a subjective magnitude, and as such it is impossible to measure. In this paper, stock prices (more specifically, indexes composed of stock prices) will be used as a proxy to value.

Two indexes have been chosen for this purpose: the NASDAQ Composite Index⁴ will be used to show the evolution of the Dotcom value, and the DJ Telco EU Index⁵ will do the same for the European Telco value. This will be complemented, when relevant, with evolution in stock price of concrete firms, especially for the *Surge* period (2008-2012).

This has several problems that should be acknowledged, even if none of them is unsurmountable for the purpose at stake.

In the first place, price and value do not coincide. For each transaction in the stock market, the buyer thinks that the value of the stock is higher than the price, and the seller thinks the opposite. Otherwise, no transaction would happen. The investment technique known as *Value Investing* relies completely on the concept of stock price and stock value differing.

However, it is generally accepted that stock prices tend to be a good reflection of the value of the firm, because stock markets are normally considered efficient. In any case, it would be very difficult to find a better alternative for measuring value, even in spite of this theoretical consideration.

Secondly, we are trying to measure the value of whole sectors: the Dotcom sector and the telecommunications sector in Europe. This gives place to a whole new set of problems: which is the scope of the Dotcom sector? Which firms should be considered there? What about the telco sector? Should it only be considered the value induced by European activities? And, once this scope defined, it may occur that plenty of the involved firms are not publicly quoted, so no information will be available for estimating its value.

Once again, pragmatism suggests the use of composite indexes as reasonable proxies to the magnitudes under scrutiny. It should not be forgotten that the goal is not to estimate the accurate value for a firm or the sector, but to assess its evolution during a concrete

⁴ See <http://www.nasdaq.com/aspx/infoquotes.aspx?symbol=IXIC&selected=IXIC>

⁵ This is the usual abbreviation for the STOXX® Europe 600 Telecommunications. See: http://www.stoxx.com/indices/index_information.html?symbol=SXKP

period. Our interest is not the absolute value, but the relative one. With this in mind, most of the above difficulties become considerably softened and thus the analysis is feasible.

3.1.2 Comparing NASDAQ evolution with European telco evolution

The NASDAQ comprises mainly US based firms. Questions may be raised about the suitability of using an US Index to compare with the EU evolution.

However, Dotcom activities are generally acknowledged to be of global nature. This means that Dotcom firms quoted in the NASDAQ normally deploy their activities across the world, and specifically in the European Union (EU). Because of that, they would induce value not only in US operators, but also in European operators. Therefore, it seems correct to compare both indexes as value proxies: if the Dotcom firms are creating value, they will induce value not only in the country where they are quoted, but also on the other markets where they operate.

Besides, it is generally accepted that most players in the Dotcom *Bubble* were based in the US, so it would be difficult to get a better proxy using only European firms. This concern is still relevant for the Dotcom *Surge*, even if now it could be argued that important Asian players should be taken into account.

Finally, as said before, it should not be forgotten that part of the value of European telecommunication operators comes from outside of Europe, even in some cases from the same USA (for example, T-Mobile and, until recently, Vodafone).

3.1.3 Periods of analysis

The evolution analysis focuses on two events: the Dotcom *Bubble*, which happened at the beginning of the century, and the Dotcom *Surge*, that we are currently living.

The time frame for the first of the events is chosen to be symmetric around March 2000, when the NASDAQ index achieved its absolute maximum. So, data for the Dotcom *Bubble* is provided for four years, from February 1998 to March 2002.

For the Dotcom *Surge* period, no absolute maximum is so clear. Because of that, we lack a central point to delimit the period under analysis. The starting point of the *Surge* has been set in October 2008, because in that month both relevant stock market indexes were on an absolute minimum, from which both indexes have increased, albeit with very different paces. Data is also provided for four years, so in this case it covers from October 2008 to October 2012.

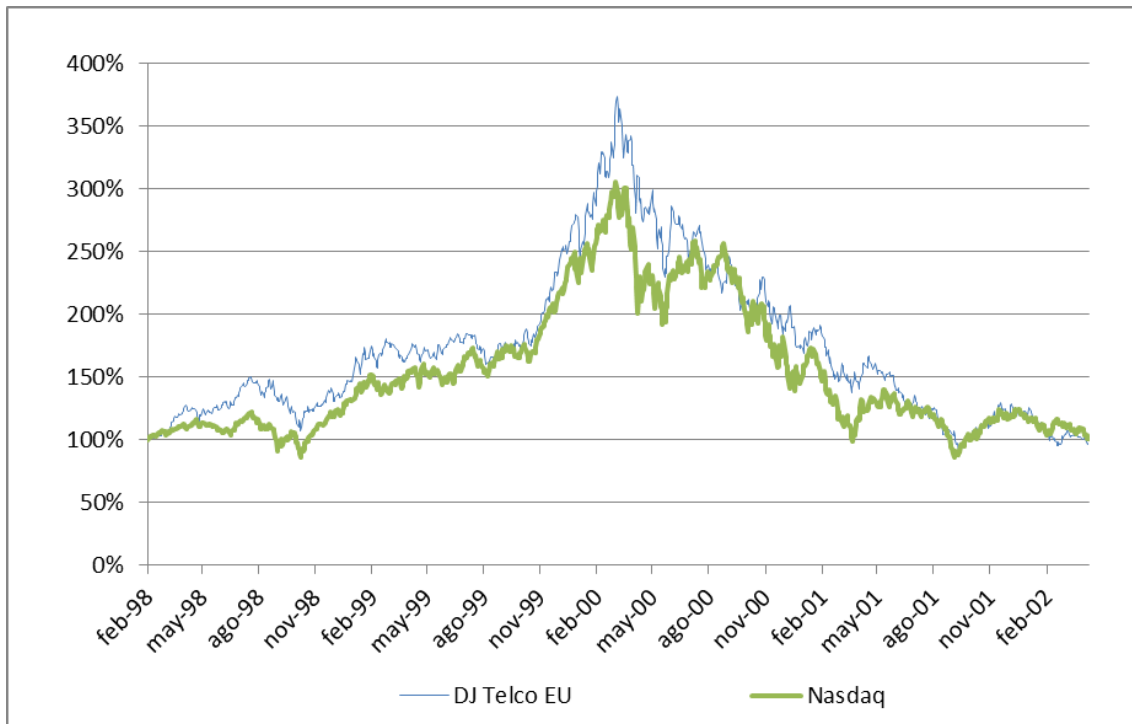
As we are only interested on relative evolution and not on absolute values, and in order to facilitate the comparison, data is always normalized to the starting value for each index or stock price. This applies for both periods under analysis.

3.2 The Dotcom bubble: 1998-2002

The Dotcom *Bubble* is associated with the generalization of the use of Internet. This fact caused plenty of expectations about new business models, many of which did not flourish. Lots of money flowed to these activities, so Dotcom firms achieved values that seemed irrational even at that moment. The acquisition of Time-Warner by America On-Line is seen by many analysts as the most paradigmatic instance of the events at that moment⁶.

The following graphic charts the evolution of the NASDAQ Composite Index against the DJ Telco EU Index during the period from February 1998 to March 2002.

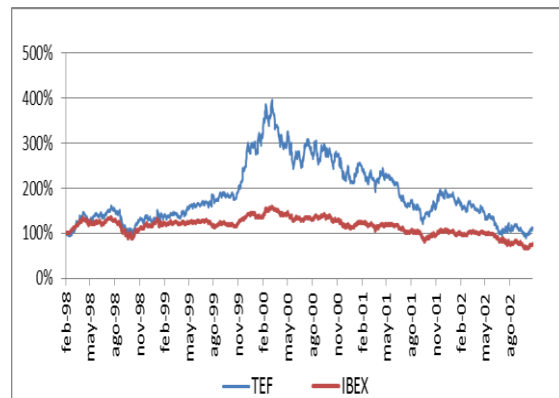
⁶ For a more detailed description of the events during the *Bubble*, see for example Cassidy (2002).

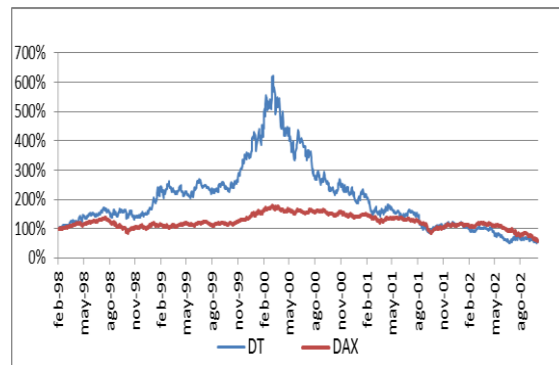
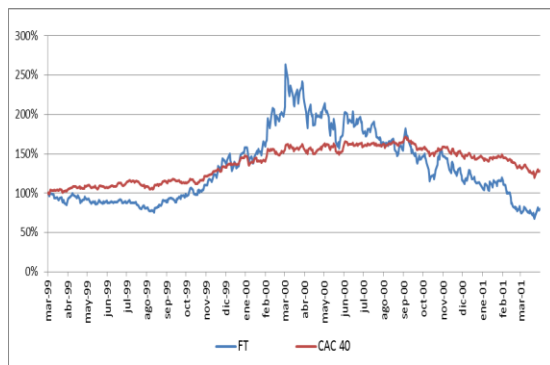


Source: Bloomberg

The graphic is quite clear and leaves little room for doubts. The shapes for both functions are roughly parallel, meaning that telecommunications value followed closely the evolution of Dotcom value.

The following charts show the evolution of the NASDAQ in comparison with the USA whole market (measured by the S&P 500), and the same for some of the main european operators in comparison with the evolution of the local stock market index: Telefónica vs. IBEX-35 (Spain), France Télécom vs. CAC-40 (France) and Deutsche Telekom vs. DAX (Germany).





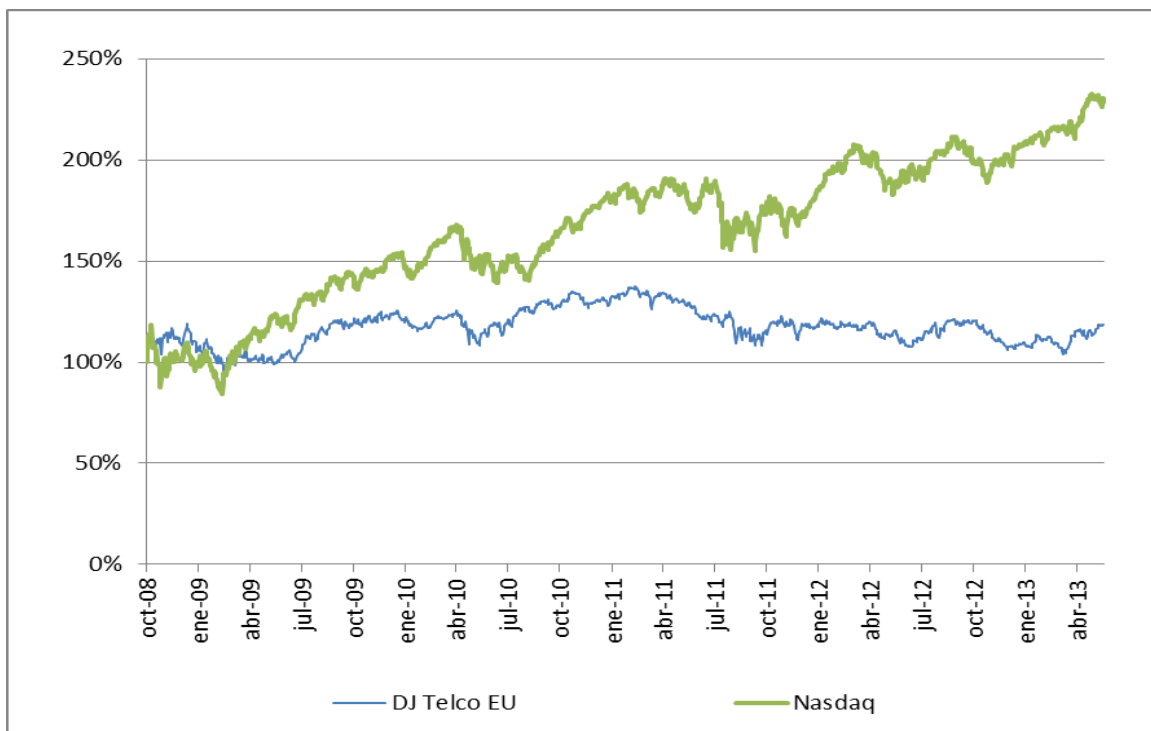
Source: Bloomberg

These charts show that the Dotcom value evolution and those of the telecommunication operators were independent from the local market evolution in each of the cases. The increase of value and later reduction of it both for Dotcom and for telco operator were phenomena that did not happen in other economic activities during the Dotcom *Bubble*.

3.3 The Dotcom Surge: 2008-2012

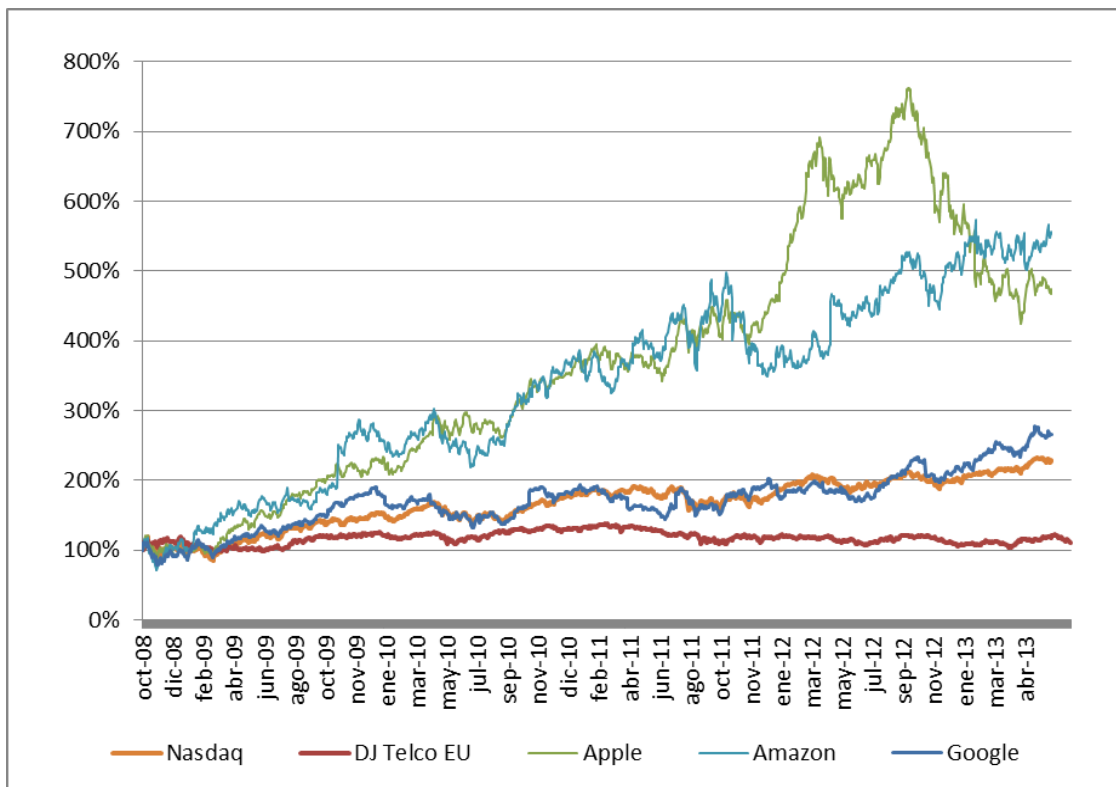
The Dotcom *bubble* seem to have encompassed most Internet firms. During those years, everything that “smelled” of Internet increased the value. There were no clear business model and every enterprise seemed headed to success. In comparison, the Dotcom *Surge* is more focussed and may be traced to a few firms that have found sustainable business models based on Internet or more generally on data transmission. It is the case of Apple, Amazon, Google or Facebook, to name the most prominent instances.

However, as a first step, the evolution of the NASDAQ Composite Index against the DJ Telco EU Index is shown again, this time from October 2008 to October 2012.



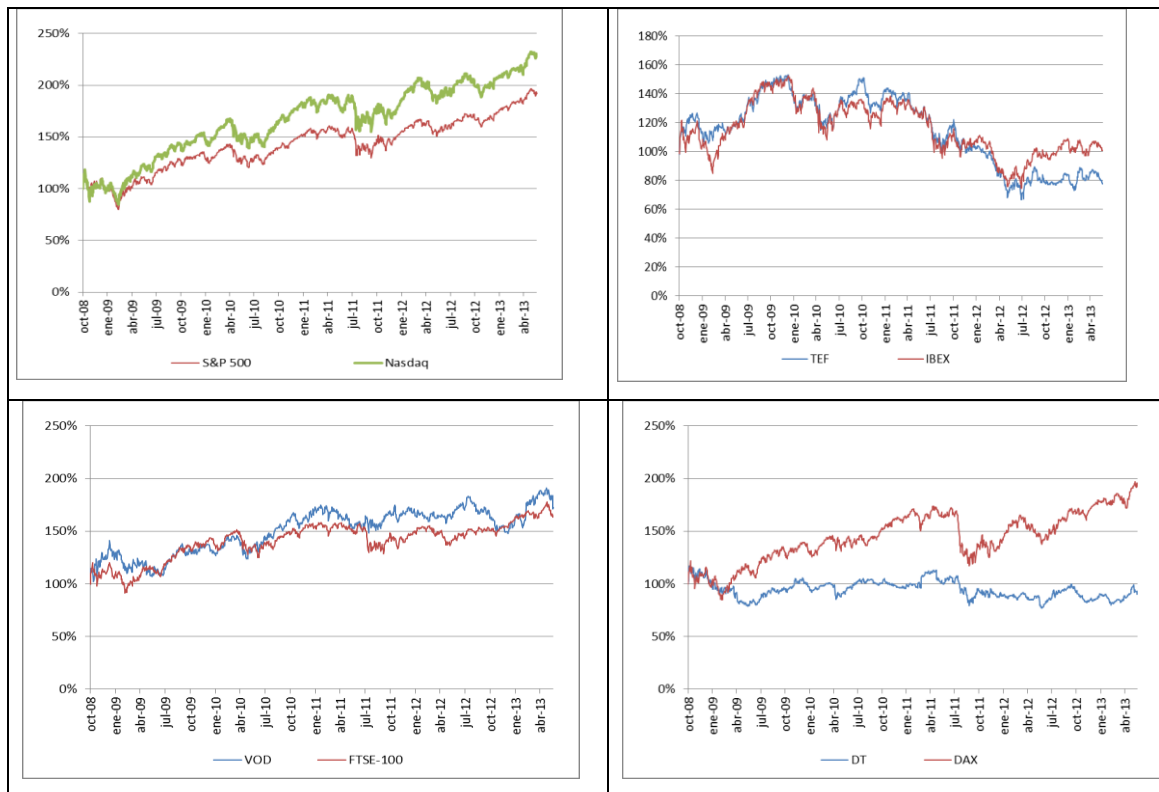
Source: Bloomberg

The contrast is even more striking if the focus is set on succesful Dotcom companies such as Apple, Amazon or Google, as the next graphic depicts.



Source: Bloomberg

Finally, the following charts show the same comparisons made in the previous subsection against local composite indexes. In this case, the evolution of Vodafone vs. FTSE-100 (UK) is shown, instead of the one for France Télécom.



Source: Bloomberg

Once again, these charts show that the depicted phenomenon was different from what was happening in general. From the comparison NASDAQ-S&P, it can be deduced that Dotcom firms has created more value than conventional activities during the analysed period. The contrast would be even more acute if we compared S&P evolution with that of Apple or Amazon. On the contrary, European telecommunications operators (with the exception of Vodafone) were not even able to create value at the same pace as conventional activities.

3.4 Summary

From the data presented, the following may be concluded:

- 1) During the period 1998-2002, there was a bubble in the creation of Dotcom value, as measured by the NASDAQ composite index. The maximum was achieved in March 2000. After that moment, this value completely dissipated, so that around February 2002, the situation was approximately the same as four years before.
- 2) Since October 2008, Dotcom firms have steadily created value, so that as of October 2012 this value has multiplied by 2. Selected firms such as Apple or Amazon have multiplied its value by around 5 during the same period.
- 3) European telco value followed closely Dotcom value during the period 1998-2002, achieving a maximum of value around the same moment. This value was also dissipated in parallel to the Dotcom value.
- 4) However, European telco value has not followed the increase achieved by Dotcom firms since October 2008. On the contrary, value has even been destroyed, and the telco sector seems to have had a worse behavior than the rest of economic sectors.

The following section will provide an explanation in theoretical terms to the observed phenomena.

4. Theoretical explanation

From the comparison of the evolution of Dotcom vs. telco value for both periods, one fact stands out: During the *Bubble*, telco value followed closely Dotcom value; however, this has not happened during the *Surge*. Why was that?

To answer this question, the first thing is to establish if there is any kind of causality between both values (i.e, Dotcom and telco values). Otherwise, the exercise would be pointless. If the evolutions of both values are independent, then what happened during the *Bubble* is just mere chance and does not merit any explanation, and neither do what has happened during the *Surge*. However, economic theory suggests that causality exists, as shown in the subsection 2.2.

In the next subsection the evolution of value during the *Bubble* is explained. After that, we will examine what happened during the *Surge* and try to explain the different outcome.

4.1 Explanation of the Dotcom vs. telco value evolution during the Bubble (1998-2002)

As already explained, the value of productive factors is determined by the value of the end goods they contribute to. Telecommunications networks are necessary for the provision of Dotcom services. In conclusion, value of telecommunications would tend to follow the value of Dotcom services.

It has also been shown that the more specific the resource, the more its value will depend on the value of the final good. Telecommunication networks have historically had different uses, as voice telephony or TV broadcasting. However, nowadays it is generally accepted that all contents may be transported by means of data transmission. And, as a consequence, all telecommunication services may be seen as a Dotcom services, included those referred above. For example, Skype is a Dotcom service to provide voice.

Because of that, we can consider the telecommunication network as quite specific with regard to Dotcom services: there are not many other relevant uses for the telco network nowadays. This fact could also very likely be anticipated during the years of the *Bubble*. In consequence, we would expect the value of telco services to closely follow the value of Dotcom services.

Note that, conversely, Dotcom services heavily rely on telco services for their provision. In fact, as of today, they have no alternative resource to that provided by telecommunication operators. However, this fact has no theoretical influence on the relationship between the values of Dotcom and telco services.

In light of the previous analysis, it is clear that what happened during the years of the *Bubble* is what should have been expected in a free market, according to economic theory.

The parallel evolution of Dotcom and telco value during the *Bubble* was due to the fact that telecommunication services constitute a very specific resource for the provision of Dotcom services.

In more practical terms, what happened was that investors were expecting telecommunication operator to increase considerably their revenues as a consequence of the explosion in Dotcom services. Logically, if Dotcom services were successful and able to get profits, telecommunication operators, on whose services the former ones rely, would get part of the cake. The moment investors started doubting about the capacity to generate revenues of Dotcom agents, they translated their fears to the telco sector, and once again both valuations followed the same path, in this case, downwards.

4.2 *Explanation of the Dotcom vs. telco value evolution during the Surge (2008-2012)*

However, this is not what happened during the second period under analysis. How is this possible? Telecommunications services are still a very specific resource for the *Dotcom* services⁷. Because of this, *prima facie*, the same evolution should be expected.

Of course, this would not be the case if there were excess of capacity in the European telecommunication industry. Recall that value depends both on utility and on availability, which in the case of telecommunications may be approximated by capacity. Even if the *Dotcom Surge* is increasing the utility of the telecommunications network, its value would not increase if there were spare capacity to accommodate the new and expected uses.

4.2.1 An assessment of the possible excess of telecommunication capacity in Europe

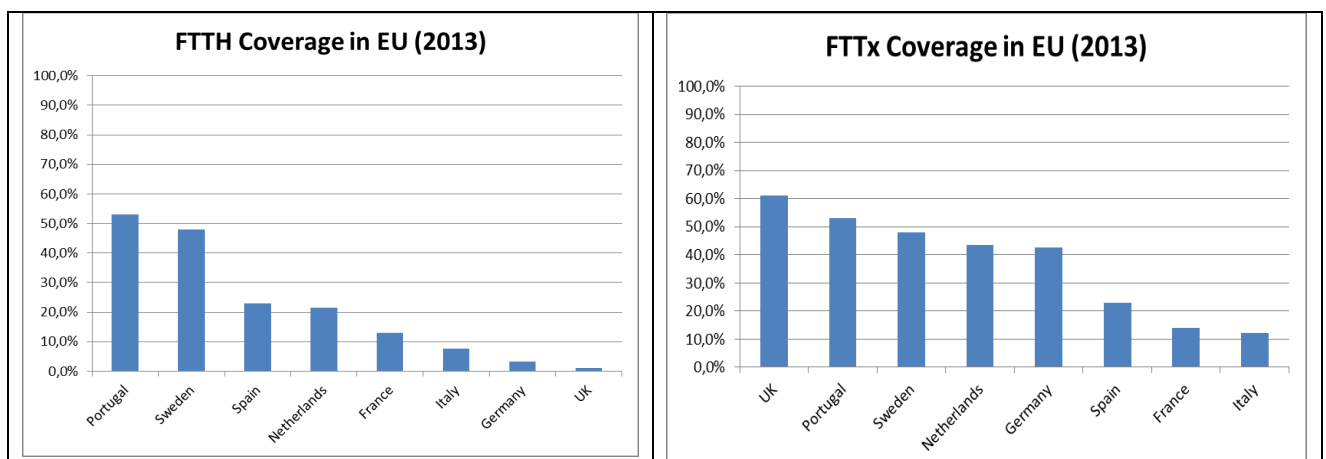
In consequence, a first explanation for the phenomenon observed in the *Surge* could be the excessive capacity in European telecommunication networks. It is not the purpose of this paper to accurately measure such an abstract concept as that of “telecommunications capacity”. In any case, some hints allowing to ascertain the degree of capacity excess in Europe are required.

⁷ Even if it is hard to classify Apple as a Dotcom provider, it is clear that its business and its recent surge of value is based on the use of telecommunications services.

Note that telecommunications capacity refers not only the capacity of the core network (as most analysts tend to think), but also and more importantly to the availability of access network. It is generally acknowledged that access network constitutes the main bottleneck in telecommunications, so a hypothetical excess of telecommunications capacity should be visible in an excess of access networks, both in number and in speed.

Is there an excess of access networks in Europe? Most people, including the European Commission, think that this is not the case. There are several complaints about lack of deployment of fiber in most EU Countries. Regarding mobile access networks, it is generally accepted that Europe is behind of most developed countries in the deployment of LTE⁸.

The following graphs show FTTH and FTTx coverage in selected EU countries:

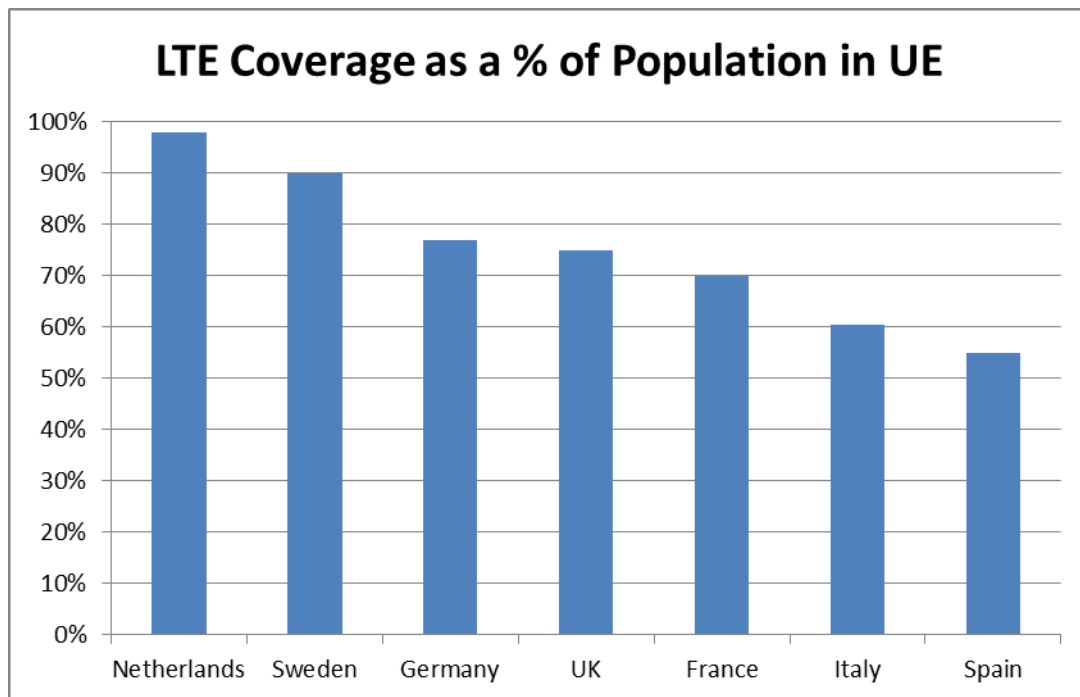


Source: Analysis Mason

Both graphics show that there is still a general lack of FTTH in the most prominent members of the EU. In light of them, it seems clear that there is no excess of capacity in fixed access networks in Europe.

The results are the same if we take a look at the mobile side of the market, for example in terms of LTE deployment as % of population.

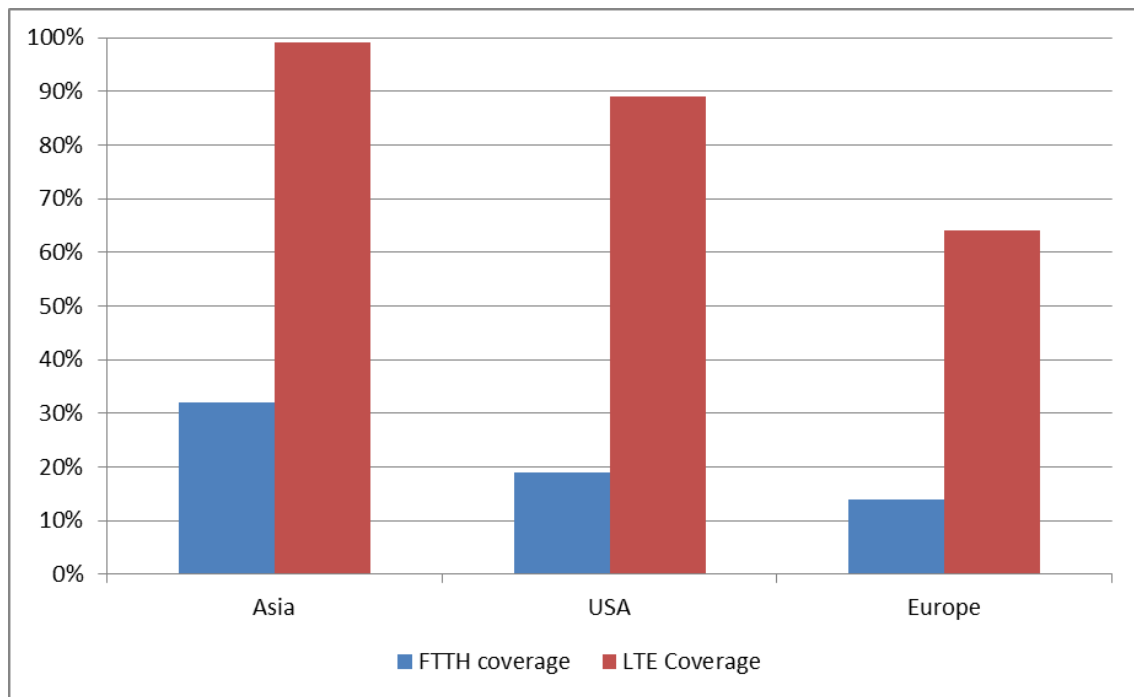
⁸ This complain may be summarized by a sentence from a recent discourse of Neelie Kroes, former Head of the DGCONNECT. *“If you combine Japan, South Korea and the USA it is the same population as Europe. But they have over 8 times more fixed fibre broadband, and almost 15 times more 4G. And the gap is growing. Europe will lose if we don’t also change.”* Kroes N. (2013). We must act now – time for a Connected Continent. Available at http://europa.eu/rapid/press-release_SPEECH-13-693_en.htm



Source: Credit Suisse Research

Of course, results would look a lot worse if the coverage were presented as a % of territory, which is arguably a more accurate measure of telecommunications capacity for mobile services. In any case, it seems that there is no excess of capacity of mobile networks in Europe.

As a last reference, the following chart compares the situation of the EU with that of Asia and USA:



Source: IDATE; Arthur D. Little; Exane BNP Paribas

As excess of capacity may only be measured against individual preferences, it could well be the case that there were actual excess of capacity for telecom in Europe despite of the presented data. However, it seems highly unlikely, and so it seems safe to discard this first possible explanation for the telco value evolution during the *Surge*.

4.2.2 An alternative explanation: evolution of telecommunication regulation in Europe

The two basic factors explaining value has been discarded as possible explanation for the *Surge* phenomenon. For one side, utility of telecommunication services has increased as a consequence of Dotcom activities; for other side, no excess of capacity can be presumed to exist in Europe. Accordingly, the value of telecommunication services should have increased in line with the value of Dotcom activities, in the same way it happened during the *Bubble*. At least, this is what should have happened in an un-regulated market.

It has been explained in subsection 2.4 that regulation may affect the value of the regulated goods or services. For example, price regulation fixes the exchange price to a certain amount. As sellers of goods/services only have exchange value for the goods

they dealt with, it is the exchange price the magnitude that sets the maximum value of the good. If the price is set by regulation, then so is the value of the good.

Thus, regulation could explain the value evolution during the *Surge*. If regulation pressure in the EU was higher during the *Surge* than it was during the *Bubble*, it would provide a plausible explanation for the different evolution of telecommunication values in both periods.

Herrera-González & Castejón-Martín (2011) show how regulation for Significant Market Power (SMP) operators has increased since the opening of the telecommunications market to competition in the EU in 1998. They conclude that *“asymmetrical regulation has grown since the liberalisation of the market, with its scope widened in terms of operators, services, and the detail of regulation. A regulation originally intended to balance the market position of the former monopolist in telephone services currently affects new services (e.g., mobile telephony or Internet access) and operators with only a few months experience in the market.”* (see page 672).

By no means is asymmetrical regulation the only kind of regulation in place for telecommunication services. Regulation of consumer rights has also increased its scope since 2000, at least in Europe. Besides, roaming regulation was introduced in 2007. There are still other issues whose possible regulation is under discussion at this moment, such as data privacy, critical infrastructures or net neutrality. Even if this regulation has not been concreted yet, do not forget that value reflects not only facts but also (and arguably with more intensity) expectations.

Therefore, there are little doubts about the increase of regulatory pressure on the telecom sector in Europe since 2000, at least in qualitative terms.

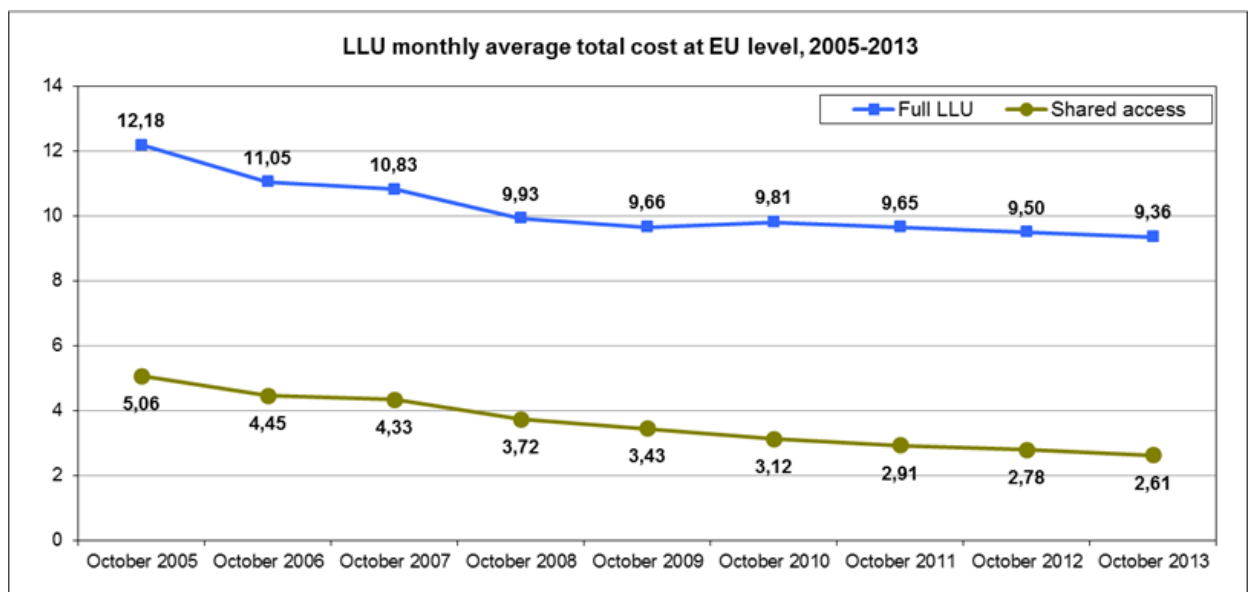
As seen, price regulation is the kind of regulation that may more directly affect the value of a good. In the European telecommunication sector, price controls are pervasive. Without being exhaustive, the following prices are usually regulated across EU Member States:

- Mobile termination rates
- Unbundled local loop prices

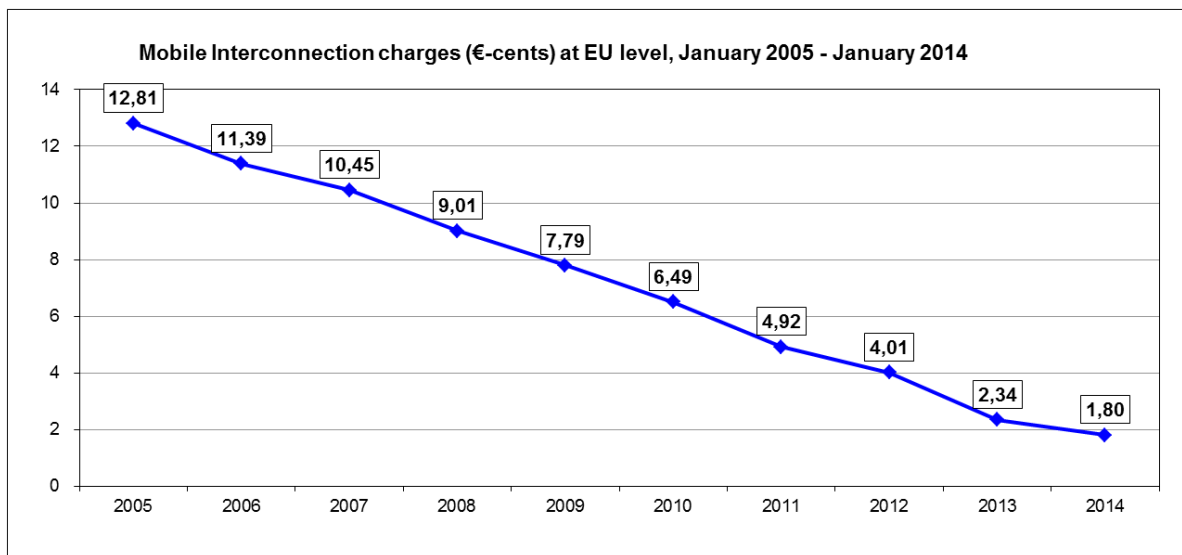
- Fixed interconnection rates
- Bitstream access prices
- Mobile roaming services, both wholesale and retail (Voice, SMS and data)
- Leased lines

Other services, as broadband retail access are regulated in an indirect way, by establishing a soft or hard relation with the wholesale service price. Price control also affects duct provision and plenty of supplementary facilities that cannot be regarded properly as telecommunication services (as co-location).

The evolution of these prices is generally in line with the general trend of increasing the regulatory pressure on the telecommunication sector. The following graphics chart the evolution of the two wholesale services that were arguably more relevant for the market during the periods under analysis: Local Loop Unbundling (LLU) and mobile termination.



Source: European Commission



Source: European Commission

Even if the data shown does not go back to the period of the *Bubble*, the trend is quite clear in both cases. Moreover, during the *Bubble* LLU, even if regulated, was not implemented across most EU countries (the only exception being Germany). Mobile termination rates were already regulated in some countries, but not on cost oriented basis.

4.3 Summary

The evolution experimented during the period of the *Bubble* (1998-2002) is coherent with economic theory in the un-intervened market. During that period, it seems that regulation in Europe was not intense enough to greatly affect the value of telecommunication operators. In consequence, its value behaved as the theory predicted: in answer to the increase in value of Dotcom services, for which the telecommunication networks is a very specific resource, it increased more or less at the same pace. And once the *Bubble* exploded, the telecommunication value also followed the reduction suffered by the Dotcom firms.

The same has not happened (so far) during the *Surge* (2008-2012). Considering that no excess of telecommunication capacity exists in Europe, the more plausible explanation for the telecommunication value evolution is the different regulatory situation. Even if the telecommunication value should have followed again the *Surge* in Dotcom services valuation, for which it remains a very specific resource, this did not happen because the

current intensity of regulation puts an effective limit on the value of telecommunication services in Europe.

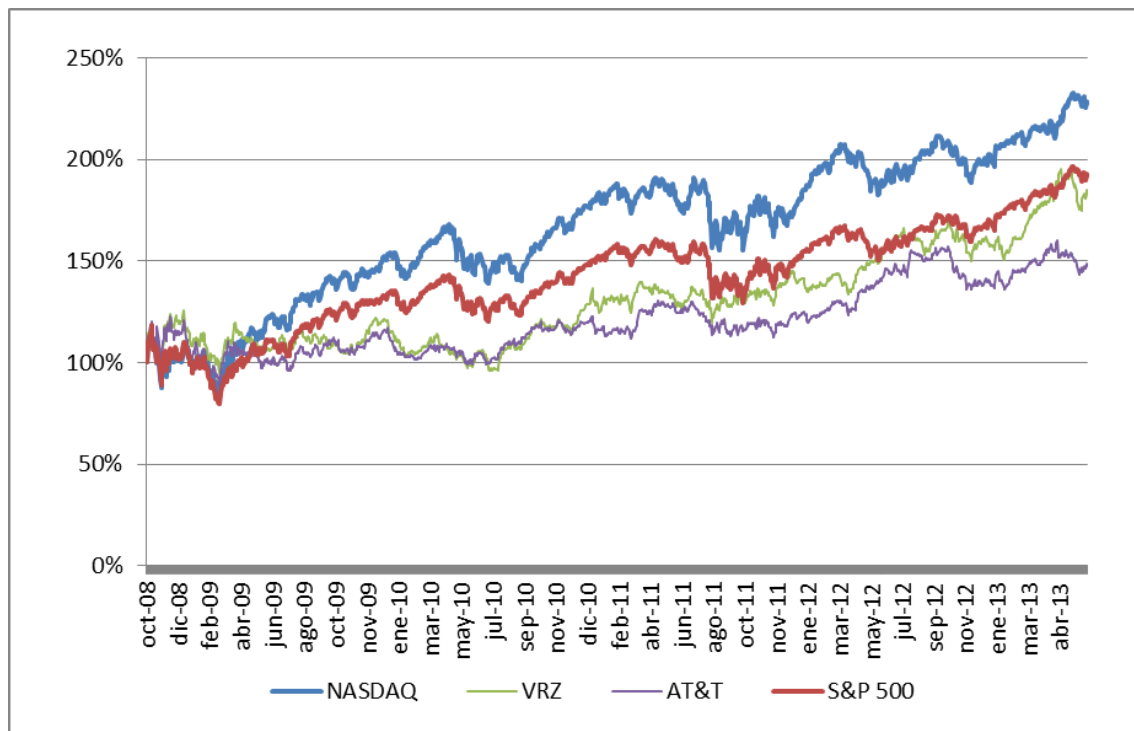
5. Hypothesis contrast: comparison with USA Telecommunication valuation

Having shown in the previous section that the telecommunication value evolution in relationship to Dotcom value during the *Surge* period could be explained by the increase in regulatory pressure, we propose now to briefly check this hypothesis taking a look at what happened with US telecommunications operators during the *Surge* period.

If it is accepted that regulatory pressure on telecommunication in the USA is lower than in the EU, USA telco operator valuation should have followed the Dotcom value during the *Surge*. During that period, the degree of telecommunication regulation in the USA has been lesser than in Europe, specifically because of the lack of LLU obligations⁹. However, as already discussed, prospective regulation may also have an impact on valuation, and it is very likely that US telecommunication valuation had been affected by the Net Neutrality regulation debate that is currently taking place in the USA.

The following graphic charts the evolution of the NASDAQ Composite Index against the S&P 500 and also against the stock quotes of the most relevant US operators, that is, Verizon (VRZ) and AT&T.

⁹ The general view may be summarized in the following paragraph, extracted from Yoo (2014). “*Europe has relied on regulations that treat broadband as a public utility and focus on promoting service-based competition, in which new entrants lease incumbents’ facilities at wholesale cost (also known as unbundling). The U.S. has generally left buildout, maintenance, and modernization of Internet infrastructure to private companies and focused on promoting facilities-based competition, in which new entrants are expected to construct their own networks.*”
See also Crandall (2011), who concludes: “*The U.S. telecommunication sector is, for the most part, deregulated and likely to remain so for the foreseeable future*”.



Source: Bloomberg

The results are not so conclusive as they were for the *Surge* in Europe. Even if it is clear that value for Verizon and AT&T has increased during the period under analysis, it did not follow so closely NASDAQ evolution as the European telco value did in the *Bubble* period. Moreover, general activity (measured by the S&P 500) followed more closely the NASDAQ than telco activities did.

In any case, both Verizon and AT&T increased its value during the *Surge*, something that did not happen with their European counterparts. So, *prima facie*, it seems that the hypothesis stated in the previous section holds for the USA. The threat of prospective regulation, together with a possible slowness of adaption after de-regulation (which happened in 2003 in the USA), could explain the different paces of increase in value. It could also be explained by excess of telecommunications capacity in the USA, but in this case value would tend to stay at its level instead of increasing.

6. Conclusion

During the Dotcom bubble (1998-2002), the value of telecommunications in Europe followed closely the evolution of the value of Dotcom services. When some Dotcom services renewed their increase in value, as Google, Apple or Amazon has done during

the last years, telecommunications did not follow in Europe. In this paper, we have tried to explain the reasons behind this divergent evolution.

The phenomena occurred during the first period analysed seem coherent with economic theory. Value of resources tends to follow the value of the final goods for which they are required. The more specific the resource results for the production of the final good, the closer should be this following. As the telecommunication network is a resource very specific for the provision of Dotcom services, the observed evolution coincides with the expected one in an un-intervened market.

However, the phenomena occurred during the second period are not so easily explained. At first sight, the same that happened during the *Bubble* should have also happened during this *Surge*, because the telecommunication network remains a very specific resource for the provision of Dotcom services.

A first explanation for the divergence would have been the existence of excess of telecommunications capacity in Europe. It has been shown that, while it may be the case, most analysts (including the European Commission) would disagree in the existence of such excess.

That leaves us with only one possible explanation: the complete different regulatory scenario in Europe during each of both periods under scrutiny. There is consensus and it has been shown that telecommunication regulation has considerably increased its pressure since 2000 in the EU. The evolution has been from quasi-free market (in which only fixed termination rates were regulated for SMP operators) to a market in which plenty of details are defined by regulators, affecting all operators and for several services. This has been coupled with a general decrease in regulated prices.

As regulation may influence value of a good by means of the exchange price, it seems clear that the increase of regulation could be the cause of the different relative evolution of telecommunication and *Dotcom* values in both periods considered.

This hypothesis has briefly been checked against the events in the USA during the *Surge*. Accepting that during this period USA regulation on telecommunications was

less intense than in the EU, the value of USA telecommunication operators should have followed the evolution of the *Dotcom* value. It has been shown that it seems to have been the case, even if the value of USA operators has not followed Dotcom value as closely as European operators value did during the *Bubble*. Prospective regulation on net neutrality or on other issues affecting the telco industry (cybersecurity, data protection) may provide an explanation for this.

The purpose of this paper has been descriptive or positive. Judgements are purposely avoided. The objective is not to discuss if the analysed phenomena are good or bad for the social welfare; it is just to provide an explanation for those phenomena. However, it should not be forgotten that the value given to a good has influence on how entrepreneurs act with regard to it: if the value of an activity increases, entrepreneurs will tend to move resources from other activities to the first one; if it decreases, they will do the contrary. This activity of entrepreneurs is also in line with the welfare of society: moving resources wherever they are more valued.

Telecommunication operators need their activity to have the right valuation, so that, if needed, entrepreneurs channel resources to it. And Dotcom firms also need this to happen to telecommunication resources, because of their high dependence on them.

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