Potential welfare gains and losses from an uplift to copper prices:

A Reply to Companies' comments

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On 2 April 2015, the New Zealand Commerce Commission published a consultation on an analytical framework for considering a potential uplift to the UCLL price. The Commerce Commission received several comments from various telecom operators (*Chorus*, *Vodafone New Zealand* and *Spark New Zealand*) on its welfare analysis regarding the impact of an uplift of the UCLL prices.

Most of these comments were related to the main hypotheses used by the Commerce Commission in such analysis that I reviewed in my previous report.[2]

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[2] Carlo Cambini, "Economic aspects of migration to fiber and potential welfare gains and losses from an uplift to copper prices", prepared for the New Zealand Commerce Commission, May 16th, 2015.

In sum, these comments can be grouped in the following four bullet points:

1. In commenting on the cross-elasticity estimate (1.2) and range (0.6-3.0) used by the Commerce Commission in the 2 April 2015 report, most submissions claimed that the value of 1.2 used is too high (*Chorus/Houston Kemp* being the exceptions). In particular, *Network Strategies*, on the behalf of *Vodafone New Zealand* and *Spark New Zealand*, claimed that the one study which anchored the high end of the range should be omitted, as one of the authors subsequently presented in another study lower elasticities (0.845-0.945);
2. A number of the submissions said that they were unaware of any studies of ultra-fast broadband externalities other than Briglauer (2014). They report that the externality value in the Briglauer study is 0.7%, implicitly assuming that this percentage value should be applied to the expenditure. Therefore, several companies criticized the Commerce Commission claiming that it should use that percentage value instead of the 2%/25%/50% of expenditure mentioned in the Commerce Commission 2 April 2015 paper;
3. In its submission on the behalf of *Vodafone New Zealand* and *Spark New Zealand*, the consulting company *WIK* points out some missing elements from the welfare analysis, and in particular the welfare losses from people giving up DSL subscriptions as a result of higher copper prices;
4. Finally, *Houston Kemp* on the behalf of *Chorus*, argues that an increase in copper prices would encourage more investment in the fibre networks, which would in turn increase the availability of fibre and the likelihood of faster migration to fibre.

In this report, I briefly answer to the suggestions provided in these four points.

1. Cross –price elasticity of fiber demand with respect to DSL prices

As I said in my previous report, the welfare analysis presented by Com Com assumes a cross-price elasticity of the demand of fiber with respect to DSL retail price equal to 1.2. This number comes from the estimates done by Shinohara et al. (2011) in which the cross-price elasticity between DSL price and FTTx connections is found to be equal to 1.189.

The submissions by *Vodafone New Zealand* and *Spark New Zealand* – with the support of some consulting companies - claimed that the value of 1.2 used is too high. According to these companies, this value is set by averaging values from a wide range of cross-price elasticities resulting from existing studies (0.6-3.2). In particular, the consulting company *Network Strategies* claimed that the study which anchored the high end of the range should be omitted, as one of the authors subsequently presented in another study lower elasticities (0.845-0.945).

First, it is worth noting that the paper that found the value of cross-price elasticity of demand for fibre in relation to DSL price equal to 3.289 is the paper by Srinuan et al. (2012). That paper has been published in *Telecommunications Policy,* a leading international journal specialized in telecoms economics. Clearly, the fact that a paper is published is not *per se* a guarantee that the paper is relevant and valid, but at least this implies that that paper goes through a serious reviewing process by external experts that checked the robustness of the methodology used and its main results. On the contrary, the analysis by Bohlin (2012)[3], that reports lower values of the cross-price elasticity, comes from a presentation that this Author gave at an International conference only and as far as I know any full paper has been presented with such analysis later on. As an academic researcher, I have to report as much evidence as possible to properly define the relevant range of values in any kind of studies I pursue. At the same time, among all values, the more trustable ones are clearly the ones coming from published papers.

[3] Available at http://www.wik.org/fileadmin/Konferenzbeitraege/2012/Mobile_broadband/Erik_Bohlin_WIK_presentation-v5.pdf

Second, the analysis by Srinuan et al. (2012) is based on a dataset obtained from a nationwide survey of Swedish households carried on by the Swedish Telecom Regulator (PTS) during the period August and September 2009. The total number of respondents was 4000 but the analysis was done on a sample of 2038 respondents after excluding omissions and abnormalities. From the slides of Bohlin (2012) instead it is possible to infer that the analysis is also based on data from a 2009 survey, but with a lower number of respondents (1563). Presumably, the original dataset seems to be the same, but the two analyses differ in terms of number of observations. Finally, in Bohlin (2012) nothing is said about the methodology used for the estimations and therefore it is not possible to infer anything about the robustness and the differences of these results with respect to Srinuan et al.'s ones.

Lastly, there may be an economic explanation on the reasons why the study by Srinuan et al. found a level of cross-price elasticity that appear to be so high (relative to other studies I cited in my previous report). As pointed out in the paper by Kongaut and Bohlin (2015)[4], Sweden continuously developed its broadband strategies even before the 2000s. The Swedish government has released three broadband strategies, in 1999, 2005 and 2011. After the implementation of the 1999 government bill, *an information society for all* (Ministry of Industry, Employment and Communications, 2000), several initiatives to spread ICT knowledge among citizens and firms had been adopted. As a consequence, the number of internet users has increased as well as the use of internet in business and public sectors. The Swedish government then implemented several other initiatives that reinforce this trend and spread ICT knowledge in all country.

The success of demand side policy in Sweden is thus mainly due to the emphasis and continuation of the use of broadband services in everyday life and in all business sectors. This is the reason why, turning to ultra-fast connection, as reported in the *WIK* report (page 25), Sweden is on the top of the rank of EU ultra-fast connection take up with a value of around 53% (with respect to the EU average of around 30%). Hence, from a diffusion point of view (see again the *WIK* report, page 26), NGA take up in Sweden is in a "early majority" phase and people are more likely to be more sensitive to ultra-fast

[4] Kongaut C. and Bohlin E. (2015), "Towards broadband targets on the EU Digital Agenda 2020: Discussion on the demand side of broadband policy", *Info*, 17(3).

connections than in many other EU countries. This higher sensitivity of Swedish users might thus explain the cross-price elasticity value found in the Srinuan et al. (2012) study. Swedish consumers are well aware of the benefits (and costs) from using ultra-fast connections and therefore they might be more inclined to switch from a standard broadband connection to a more "high-speed" one once the price of traditional broadband services increases by a relatively small amount.

All in all, I can state that, considering the available evidence from the existing empirical literature, the value of 1.2 currently used by Com Com is a reasonable one. However, in case the Commission considers the current development of the fiber take-up in Sweden too advanced with respect to the New Zealand experience, then the Commission might consider to lower this value in its estimation. Given the existing evidence, an alternative suitable range is [0.66-1.2], with an average value of around 0.95.

2. Quantifying network externalities

A number of the submissions claimed that they were unaware of any studies of ultra-fast broadband externalities other than Briglauer (2014) who reports an externality value equal to 0.7%. In my understanding, commenters then presented some critics on the Commerce Commission's analysis claiming that Com Com should use that result instead of the 2%/25%/50% of expenditure mentioned in the Commerce Commission 2 April 2015 paper.

I believe that on this point most of the interpretations reported in the submissions are not correct and in some sense the results found by Briglauer (2014) had been partially misunderstood.

The paper by Briglauer (2014), that I also reported and commented in my previous report (pages 10-12), determines the so called 'speed of diffusion' of fiber adoption. The Author determines an index of diffusion of fiber adoption expressed as the percentage of the gap

between the long-run (desired or target) stock of fibre subscribers and the subscribers in the previous period that is closed each period. The results of Briglauer (2014) show that the estimated coefficient for the previous period fibre users lies in the range between 0.56-0.78 with a median value of 0.70. This result implies that, *on the demand side,* for any increase in fiber adoption by 1%, the network effect is around 0.7%, i.e. adoption of fiber increases by 1.7% in total. In other words, an increase by 1% of fiber subscribers attracts other people to adopt the same fiber connections and this effect is around 0.7%. This percentage value represents the incremental growth in demand of fiber adoption and *not* a percentage of consumers' expenditures. In my previous report, I presented some simple calculus on the quantitative effect of network effects on the estimated UFB demand adoption in New Zealand.

In its 2 April 2015 report (points 57-60) the Commerce Commission decided to use this 'speed of diffusion' value into its estimated UFB *demand* with UCLL uplift implying that Com Com does consider the study by Briglauer (2014) for fiber demand expansion analysis.

After having assessed the demand shift due to network externalities, the Com Com analysis then proceeded by estimating the *monetary* value of such network externalities associated with the UFB demand expansion through the use of documents on mobile termination developed by the UK regulator Ofcom. At the time of that decision (2005), Ofcom was the only telecom regulator that - in my knowledge - directly incorporated such network externality effects into the mobile termination prices, even though it had been removed later from the charging mechanism. According to the Com Com's calculus, the network externality surcharge implemented by Ofcom has been quantified in 2% of total retail revenues earned from mobile calls in 2005 in UK. Com Com then decided to add such percentage to the revenues that would have been collected on UFB connections from the expected New Zealand consumers taking into account of the Briglauer's 'speed of diffusion' effect to quantify the per year number of potential fiber users.

The Commerce Commission then claimed that this effect might be underestimated since it does not appear to capture the potential gains from new innovations which might come about as a result of expanding the UFB customer base. The Com Com then proceeded

adding different threshold values of 25% and 50% to make some sensitivity and define a suitable range of values. Relative on this, the 50% threshold probably seems to be high, but it is my understanding that this analysis has been done simply as a sensitivity test without affecting substantially the final outcome of the analysis.

In sum, as said before, the Commerce Commission does consider the Briglauer's evidence and correctly applies its quantitative effect on the estimation of *demand expansion* of fiber connections and not on the estimation of the monetary values derived from them.

Note that none of the submissions received by the Commission appear to have identified any other studies/empirical evidence on the likely magnitude of any network externality effect from fibre.

3. Missing element in the Commerce Commission's welfare analysis

WIK report lists a series of missing points in the Com Com analysis.

First, according to *WIK*, if network effects are present also in copper based network, facilitating migration with an uplift to the UCLL price might generate negative externalities (or better it decreases benefits from lower network externalities) for the subscribers remaining on copper-based services. This potential effect has been also pointed out in the report by Vogelsang (2014; para 28) and by the same Commerce Commission (page 7 of its Uplift report) though not quantified from an economic point of view. Though reasonable, I believe that network effects should be in principle stronger when referring to new and innovative services that are and will be available mainly through high-speed and fast connections and that are not available (or available with a very low quality) using the legacy copper based network. Copper based services are rather traditional and mature, while this is not necessarily the same for the innovative services that could be offered through fiber connections.

Second, *WIK* raises a point on broadband penetration on broadband connections. I share the view that broadband penetration is extremely important for GDP growth and that such

effect should be accounted for in the Com Com's welfare analysis. *WIK* claims that Com Com didn't explicitly consider in their report the welfare losses from people giving up DSL subscriptions as a result of higher copper prices. Indeed, this is true, though incorporating such effect would simply reinforce the view that an uplift should not be applied (which is what the illustrative numbers in Com Com's paper pointed to anyway).

However, if it is true that an uplift of the copper based wholesale price would in principle increase copper-based retail prices and in turn people may decide to give up standard broadband subscriptions, this in turn would encourage consumers to migrate to other broadband technologies such as fiber connections. It is rather unrealistic to think that in 2015, whenever standard broadband prices increase, consumers stop using the Internet and browsing at all; instead, they will probably switch from the low quality broadband connections to the high quality/high speed broadband ones that would become – after the price uplift – relatively less costly than traditional broadband services. In sum, it seems to me that it is more likely that people would switch to the higher quality technologies rather than giving up broadband connection entirely, considering the importance that internet connections has in our everyday life.

Eventually, it may happen that consumers decide to switch to mobile broadband after leaving fixed DSL connections. Even in this case, however, recent evidence by Gryzbowski and Lang (2015)[5] shows that in cities with a large availability of broadband technologies – xDSL, FFTH/Cab and LTE – complementarity between fixed and mobile broadband connections emerges: consumers use Internet access via mobile data to sample online content, but they complete their online activity using fixed Internet access at home. This complementarity means that when consumers are well aware of the potential benefits (and costs) of broadband, users will tend to use *both* mobile *and* fixed broadband connections. If this is true, an uplift of copper based connections may eventually generate an indirect effect on fiber connections too, through a direct increase of high-speed mobile broadband subscriptions.

[5] Gryzbowski L. and J. Liang (2015), "Estimating Demand for Fixed-Mobile Bundles and Switching Costs between Tariffs", *presented at the 2015 Annual Scientific Seminar on "The Economics, Law and Policy of Communications and Media: Policy Challenges in Digital Markets"*, Florence School of Regulation (EUI), Fiesole, Italy.

Finally, it is also correct what *WIK* suggests regarding the absence of economic evaluation of potential switching costs. Com Com didn't explicitly consider these costs too though as before it would simply reinforce the view that an uplift should not be applied. However, the values reported by *WIK* are simply illustrative and they are not based on any real market evidence as well as in any empirical results. It is therefore difficult to say something realistically about the real quantitative effect of such switching costs.

To sum up, I can state that the issues raised in submissions by *Vodafone New Zealand* and *Spark New Zealand* through *WIK* would tend to reinforce the view that no uplift to the TSLRIC can be justified, that all in all is the same conclusion of the Com Com analysis.

4. The impact of an uplift copper based prices on fibre investments

A counter argument raised by *Houston Kemp* on the behalf of *Chorus* is that an increase in copper prices would encourage more investment in the fibre networks, which would in turn increase the availability of fibre and the likelihood of faster migration to fibre (see eg *Houston Kemp* report, pages 15-16).

The analysis of *Houston Kemp* is only partially correct. As I highlighted in a couple of research papers joint with Marc Bourreau and Pinar Dogan[6], if, on the one hand, it is true that increasing the access price to copper incentivizes the entrants to invest in fibre infrastructure and this in turn will enhance the incumbent's incentives to invest, on the other hand another effect is at play: a higher access charge increases the incumbent's opportunity cost of investment due to the so called *wholesale revenue effect*; if the incumbent invests in a fibre infrastructure, it will then lose wholesale profits earned from the copper based legacy network that would become more profitable due to the UCLL price uplift.

[6] See Bourreau, M., Cambini, C., & Doğan, P. (2012). "Access Pricing, Competition, and Incentives to Migrate from "Old" to "New" Technology." *International Journal of Industrial Organization*, 30(6), 713-723; and Bourreau, M., Cambini, C., & Doğan, P. (2014). "Access Regulation and the Transition from Copper to Fibre Networks in Telecoms." *Journal of Regulatory Economics*, 45(3), 233-258.

In other words, an increase in copper prices would make copper access services more profitable, and so it might weaken incentives on *Chorus* to invest in fibre beyond what it is contractually committed to do, as such investment would risk cannibalizing the higher profits available on copper.

In sum, the effect of a copper access price uplift is not monotonic and the final effect would depend on the comparison between the two counterbalancing effects above described.

It is worth pointing out that, in my knowledge, the Commerce Commission is required by the New Zealand legislation to set a geographically averaged UCLL price, which are typically higher than costs in urban areas. Given that the UFB deployment is largely in urban areas (and any further expansion or upgrade to these networks are likely to be focused mainly on urban areas), the regulated UCLL prices in those areas are already above the underlining costs and this should in turn incentivize competing investment.

The adoption of geographically differentiated (i.e. de-averaged) access charge, that is access charge that depend on the different degree of infrastructure competition across urban and rural areas, would further affects firms' incentives, but the adoption of differentiated access prices is not a subject under investigation within the current regulatory decision.[7]

[7] The role played by geographically differentiated access charges on fibre investments is analyzed in Bourreau M., Cambini C. and Hoernig S. (2015), "Geographic Access Markets and Investments", *Information Economics and Policy*, 31, 13-21.