

Incentives for investment in fast broadband: How much can be expected from the proposed European Code?

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In September 2016, the European Commission presented legislative proposals to replace the European *Regulatory Framework for Electronic Communications* (*RFEC*) with a new *European Electronic Communications Code*. Among the many stated objectives was to stimulate more rapid investment in fast and ultra-fast broadband.

One can argue that the *RFEC* was put in place in 2002, at a time when networks were not yet liberalised or privatised, and when investment needs of existing copper networks were fairly consistent and predictable. As a consequence, the *RFEC* put great emphasis on achieving competition, relatively little on achieving investment. This reflects to some extent a preference for optimisation of static efficiency over dynamic efficiency, which was perhaps in order given that the former is far easier to analyse than the latter.

In this paper, we review the regulatory instruments that provided in the European Code, and consider based on the economic literature, publicly available statistics, and our own analysis the degree to which the Action Lines in the proposed European Code are likely (individually or collectively) to contribute to increased investment in fast broadband in practice.

Our assessment is that the proposed enhancements to broadband policy in the proposed European Code are broadly in the right direction, and collectively are likely to offer network operators a more profitable and predictable business case for investment in high speed broadband. Notwithstanding our observations that the case for FTTP/FTTP can often be significantly overblown, we would still say that this is a welcome or overdue change.

The risks implied by insufficient specification of these provisions in the European Code, and the lack of clarity as regards technological neutrality, are however significant. We would hope that these provisions can be sharpened in the course of the legislative process.

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1. Introduction

In September 2016, the European Commission presented legislative proposals to replace the European *Regulatory Framework for Electronic Communications (RFEC)* with a new *European Code*. Among the many stated objectives was to stimulate more rapid investment in fast and ultra-fast broadband.

One can argue that the RFEC was put in place in 2002, at a time when networks were not yet liberalised or privatised, and when investment needs of existing copper networks were fairly consistent and predictable. As a consequence, the RFEC put great emphasis on achieving competition, relatively little on achieving investment. This reflects to some extent a preference for optimisation of static efficiency over dynamic efficiency, which was perhaps in order given that the former is far easier to analyse than the latter.

In this paper, we will review the regulatory instruments that provided in the European Code, and will consider based on the economic literature, publicly available statistics, and our own analysis the degree to which the Action Lines in the proposed European Code are likely (individually or collectively) to contribute to increased investment in fast broadband in practice.

1.1. Research question addressed

In this paper, we seek to determine

- the degree to which the Action Lines in the proposed European Code are likely (individually or collectively) to contribute to increased investment in fast broadband in practice; and
- the degree to which the goals and likely performance of these elements of the European Code are coherent with likely needs of Europeans who will be using broadband services.

1.2. Methodology

Our methodology is based on desk research, informed by years of discussions of these issues with a range of stakeholders, and review of the European Code itself, and on analysis of publicly available data.

1.3. Structure of this paper

The next chapter of the paper (Chapter 2) discusses the investment gap for high speed broadband, together with the relationship between competition and investment. This is followed in Chapter 3 by a discussion of demand for broadband in conjunction with the technologies that can be used to supply it. In Chapter 4, we summarise relevant provisions in the European Code, and also link back to previous Commission effort to increase profitability of the network operators without serious negative impact on competition. We then provide a critical assessment of the co-investment and wholesale-only provisions of the Code in Chapter 5, and close with brief concluding remarks in Chapter 6.

2. The influence regulation plays on competition and investment

In recent years, the relationships among regulation, the optimal level of competition, and the effect on investment in fast or ultra-fast broadband have often been discussed in the literature. Numerous well-researched papers argue that regulation has a negative effect on investment in broadband.¹ A few others, however, find no relationship.² It may well be that this is an issue where there will never be consensus.

The European Regulatory Framework for Electronic Communications (RFEC)³ was enacted in 2002, largely as a means of introducing competition into a not-yet-fully liberalised electronic communications industry. At the time, fixed copper networks were more-or-less fully deployed in the 15 EU Member States. Investment needs were stable. The RFEC consequently prioritised the introduction of competition more highly than any need to promote efficient investment.

This soon changed. Ten new Member States joined the EU in 2004, and three more subsequently. Many of the new Member States in the east of Europe had less-than-full coverage of the fixed network as a consequence of historic underinvestment during the years prior to the fall of the Iron Curtain. At the same time, the need to provide high speed broadband Internet access to consumers was increasingly recognised as a policy priority. *These changes imply the need for some re-thinking not only of the RFEC, but also of many other policy instruments, in order to increase the priority of efficient infrastructure investment.*

In order to provide high speed broadband to all consumers in the European Union, fibre optic infrastructure needs to be driven progressively closer to where people access the broadband Internet service – and this is so whether we speak of Fibre to the Home, Fibre to the Cabinet (i.e. VDSL), cable broadband, or mobile broadband. In many cases, this deployment entails civil works (e.g. trenching); in all cases, this deployment is expensive.

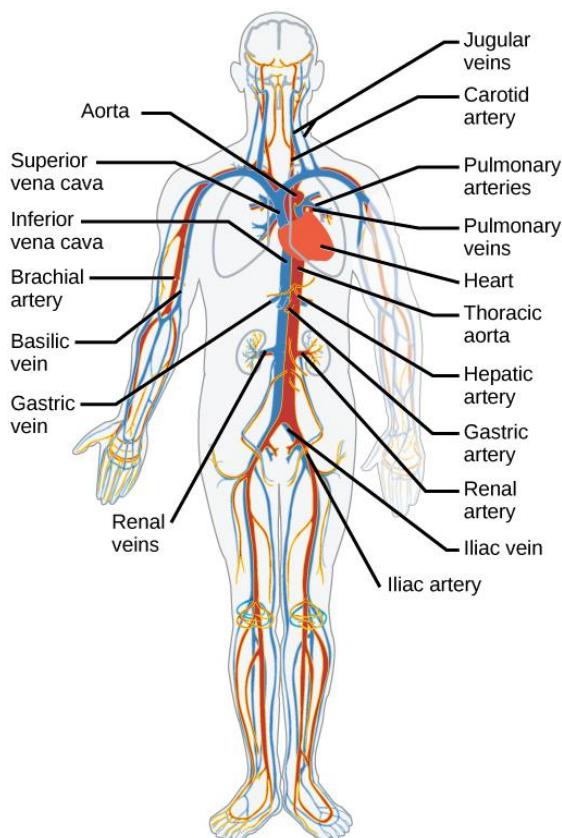
Why so expensive? The importance of this network infrastructure investment can perhaps best be understood by analogy with the circulatory system of the human body. The human body is said to contain about 100,000 kilometres of arteries, veins and capillaries. One tends to think first of the highly visible main arteries and veins (see Figure 1); however, the vast majority of this length is in the capillaries. In upgrading a network, the (copper) sub-loops are likewise somewhat analogous to the capillaries, and consequently represent a large fraction of the total cost of the network.

¹ See for instance Wolfgang Bruglauer, Carlo Cambini and Michał Grajek (2015), "Why is Europe lagging on next generation access networks?", Bruegel; Bruglauer, Gugler & Haxhimusa (2015), "Facility and service-based competition and investment in fixed broadband networks: lessons from a decade of access regulations in the European Union member states", presented at ITS Europe, el Escorial.

² See for instance Dieter Elixmann, Ilsa Godlovitch, Iris Henseler-Unger, Rolf Schwab, Ulrich Stumpf (2015), "Competition & investment: An analysis of the drivers of investment and consumer welfare in mobile telecommunications", study for Ofcom; and Ilsa Godlovitch, Iris Henseler-Unger, and Ulrich Stumpf (2015), "Competition & investment: An analysis of the drivers of superfast broadband".

³ The Regulatory Framework for Electronic Communications (RFEC) is identified in Recital 5 of Directive 2002/21/EC (the Framework Directive) as consisting of the Framework Directive itself and the four Specific Directives. Article 2(I) of the Framework Directive defines the Specific Directives as "Directive 2002/20/EC (Authorisation Directive), Directive 2002/19/EC (Access Directive), Directive 2002/22/EC (Universal Service Directive) and Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)."

Figure 1. The human circulatory system.



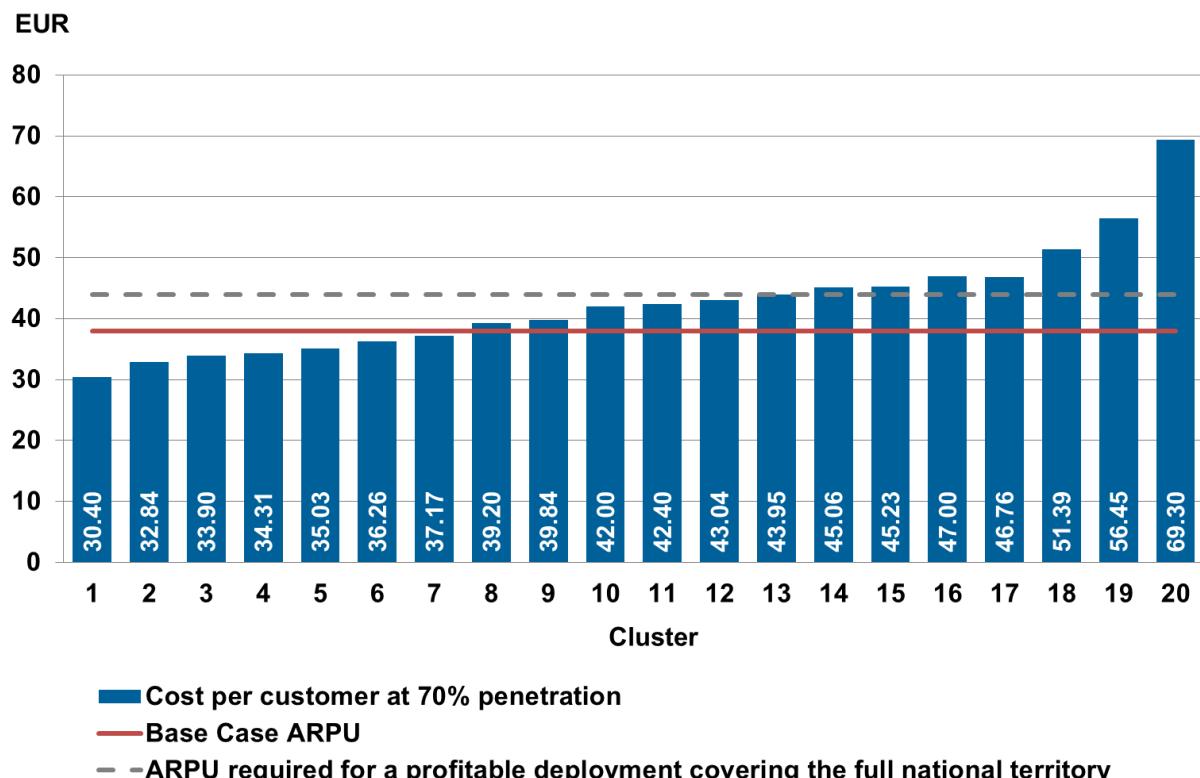
Source: Wikipedia.⁴

Costs tend to be higher in low density rural areas, and lower in high density urban areas, because the average length of each line is less when the density of customers is high. A study that WIK-Consult conducted for the German Ministry of Economics found, for instance, that in breaking Germany up in 20 *geotypes* representing areas of roughly equal population but declining population density, the average cost to serve each customer with top-of-the-line FTTH broadband access ranged from €30,40 to €69,30.⁵ They estimated the average consumer willingness to pay (WTP) for the service to be constant across Germany, and in the range of €38 per month (the red line in the graph).

⁴ Wikimedia Commons contributors, "File:Circulatory System en.svg," Wikimedia Commons, the free media repository, https://commons.wikimedia.org/w/index.php?title=File:Circulatory_System_en.svg&oldid=199809705 (accessed 22 July 2017).

⁵ Cite. This was for point-to-point Ethernet, and assumes 70% penetration. Many would argue that these are overly optimistic assumptions; however, the points made are still directionally correct.

Figure 2. Cost and ARPU per customer per month for FTTH P2P Ethernet (Germany, 70% penetration).

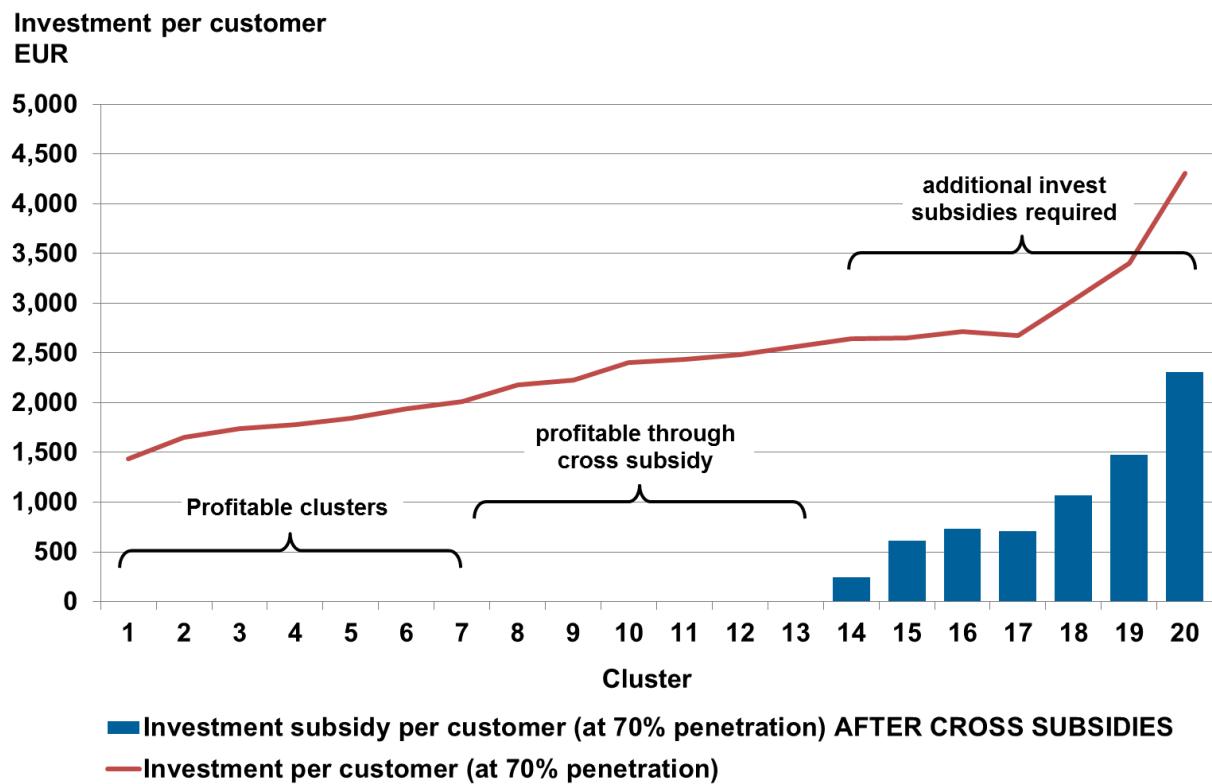


Source: WIK (2012).⁶

The challenge for a network operator is that, in the lowest density geotypes, the amortised cost of providing the service can be considerably higher than what consumers are willing to pay (e.g. €69,30 of cost versus €38 of revenue). The same study concluded on this basis that a profit-seeking network operator would choose to deploy in only seven of the twenty equi-populous geotypes (those that appear on the left in Figure 3); in another seven (the least populous, which appear on the right), the investment could never be profitable without public subsidy. Interesting, they also found that, if the network operator were willing to subsidise unprofitable geotypes from profitable, six more geotypes (those in the middle of the figure) could be built out without running an overall loss. A profit-oriented network operator would not choose to do this, but a benevolent government-run network operator might.

⁶ Ibid.

Figure 3. Investment subsidy per customer required for FTTH P2P Ethernet (Germany).



Source: WIK (2012).⁷

Having established why the deployment is financially challenging, we return to the question of competition versus investment. Again, there have also been those who argue that competition should be fostered, that it contributes to investment, and that nothing else matters very much. We question this view.

On the one hand, as Arrow (1962) illustrates,⁸ firms that operate in a competitive market have more incentives to innovate to escape from competition and enjoy higher market shares. On the other hand, firms that enjoy monopoly rents may have higher incentives to innovate to protect their market position and discourage entry by potential competitors (based on the notion of *creative destruction* introduced by Schumpeter).⁹ A key difference in the two approaches is whether the monopolist is assumed to be shielded from future competition by a potential entrant (Arrow's approach) or not (Schumpeter's approach).

Our sense is that seminal work done by Aghion et al. (2005)¹⁰ provides a more useful thought model. Aghion et al. (2005) found empirically (in a very different context) that investment was optimised when competition was neither too little nor too great. Intuitively, this is logical. If there is no

⁷ Ibid.

⁸ Kenneth J. Arrow (1962). "Economic Welfare and the Allocation of Resources to Invention", New York: Princeton University Press.

⁹ Joseph Schumpeter (1942), *Capitalism, Socialism and Democracy*.

¹⁰ Philippe Aghion, Nick Bloom, Richard Blundell, Rachel Griffith and Peter Howitt (2005), "Competition and Innovation: An Inverted-U Relationship", *The Quarterly Journal of Economics*, Vol. 120, No. 2 (May, 2005), pp. 701-728, Oxford University Press, at <http://www.jstor.org/stable/25098750>.

competition, there is no incentive to invest or innovate. If competition is too great, there are no profits to be made from investment, and thus again no incentive to invest. Aghion et al. (2005) thus argues in effect that *the level of profitability is crucial*, which seems logical. Competition is crucial to the extent that it impacts the expected level of profitability of investments made.

We note in passing that these incentives do not have the same impact on all market players. Petropoulos (2017)¹¹ argues that access to capital also plays a large role, and interacts with the aspects addressed in Aghion et al. (2005). This is consistent with results in European Community Innovation Surveys, where the most frequently cited obstacles to innovation by firms are related to high cost of innovation, lack of financing, and economic risk (see Jaumotte and Pain, 2005a, 2005b).¹² As a practical matter, this helps to explain why incentives to invest are so different for incumbents versus new entrants.

In terms of the dynamic effects of competition on innovation, Aghion et al. (2009)¹³ contends that the Schumpeterian argument prevails. By empirically studying how firm entry affects the incentives of incumbent firms to innovate, this paper finds that the threat of technologically advanced entry spurs innovation incentives in sectors close to the technology frontier (like telecommunications), where successful innovation can enable the incumbent to survive the threat. Profitability and access to capital thus play a crucial role:

- A potential competitor is unlikely to enter the market and compete with the incumbent unless the benefits from market access exceed the entry and operation costs.
- The incumbent will be able to react to the threat of entry by innovating only if it has sufficient access to capital.

We would further argue that the level of profitability should be understood in terms of a confidence interval. If we think of expected returns as a stochastic distribution, *investment decisions then reflect not only the mean of the distribution, but also the standard deviation*. In other words, *the degree of uncertainty of returns matters*.

¹¹ Petropoulos (2017). "The Relationship Between Competition and Innovation: How Important are Firms' Financial constraints?", Mimeo.

¹² Jaumotte, Florence; Pain, Nigel; 2005a, "From Ideas to Development: The Determinants of R&D and Patenting," OECD Economics Department Working Papers, No. 457, OECD Publishing. Jaumotte, Florence; Pain, Nigel; 2005b, "From Innovation Development to Implementation: Evidence from the Community Innovation Survey," OECD Economics Department Working Paper No. 458, OECD Publishing.

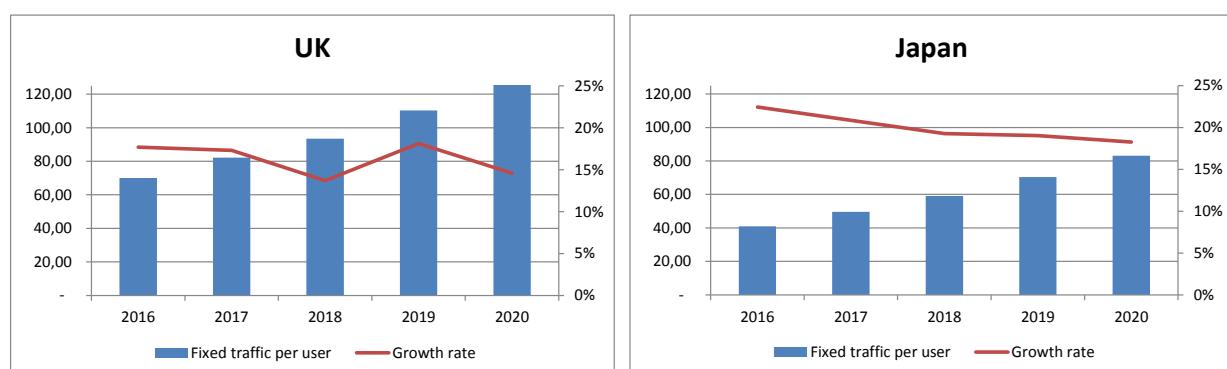
¹³ Philippe Aghion, Richard Blundell, Rachel Griffith, Peter Howitt and Susanne Prantl (2009), "The effects of Entry on Incumbent Innovation and Productivity", The Review of Economics and Statistics, Vol. 91, No. 1, pp. 20-32.

3. Demand for fast broadband services

There is room to question whether the broadband goals of the European Union are fully thought through. The concerns that we would raise are:

- Although many studies have shown societal benefits due to the deployment of broadband Internet access, *none has made a convincing demonstration of the incremental value of high speed broadband*. Relative to the needs that are likely over the next ten years, the value of ultra-fast broadband is enormously over-rated in the public debate.
- The discussion in Europe tends to be obsessively focussed on Fibre-to-the-Premises (FTTP) and Fibre-to-the-Home (FTTH), and pays far too little attention to other media including cable broadband and Fibre-to-the-Cabinet / VDSL.
 - In North America, cable broadband is the preferred medium; fibre build-out has largely ground to a halt.
 - The “second life of copper” was grossly underestimated by most experts. With vectoring and with G.Fast, very high speeds can be reached in countries where copper sub-loop lengths are suitable short (such as Italy and Germany).¹⁴
 - The assumption in most demand studies that all video traffic will travel over IP-based media is suspect. Much video traffic is linear (and likely to remain so for some time), and is multiplexed in the frequency domain.
- On a *Net Present Value (NPV)* basis, needless or premature investment in FTTH would represent substantial waste. To the extent subsidised by government, it would represent a squandering of taxpayer funds that could be better applied to meeting real needs.
- It is often assumed that traffic is growing exponentially, and that it will expand to fill network capacity no matter how great. The evidence suggests otherwise. For example, Japan has some of the fastest FTTP broadband networks in the world, but average traffic per fixed subscriber is less than in the UK (an FTTC/VDSL country), and appears likely to remain so (see Figure 4).

Figure 4. Projected fixed broadband data consumption (GB/month) and year-over-year increase in the UK and Japan.



Source: Cisco VNI data, Bruegel calculations¹⁵

¹⁴ J. Scott Marcus, Francesco Caio and Gérard Pogorel (2014), "Achieving the Objectives of the Digital Agenda for Europe (DAE) in Italy: Prospects and Challenges", a study on behalf of Prime Minister Enrico Letta, available at: <http://www.governo.it/backoffice/allegati/74621-9208.pdf>.

In other words, we would like to inject a note of caution. Our focus in this paper is on supply side factors rather than on demand side factors. We are not “anti-broadband” – on the contrary, we support measures to mitigate impediments to investment in high capacity broadband networks.

Sound policy, in our judgment, would however (1) reflect an approach that realistically reflects likely demand characteristics, (2) that is balanced between supply side measures and demand side measures, and (3) that takes proper account of the capabilities of the various available technologies and their relative applicability to different Member States.

¹⁵ Cisco VNI traffic data were derived from Cisco's online database, while their projected number of users was kindly provided by Cisco staff.

4. Instruments in the European Code

There are three key instruments in the Code that seek to raise the level of profitability of network operators, but in a way that does not seriously undermine competition:

- The review period for determining *significant market power (SMP)* and imposing remedies (and thus regulated wholesale prices) would be extended to five years.¹⁶
- Regulatory relief would be granted to firms that share infrastructure with multiple competitors (for instance, by co-investment in fibre-based networks offering broadband service to competitors).¹⁷
- Regulatory relief would be granted to firms that offer only wholesale service over fibre-based networks.¹⁸

The second and third instruments have some similarities. In both cases, wholesale services are provided to multiple retail competitors in a way that is more or less *incentive compatible*, and that thus might in theory enable competition with little or no regulatory intervention. There is, however, a crucial difference – in the third case, the wholesale provider does not compete with its customers, and therefore has no incentive to raise prices (a so-called *price squeeze*) so as to increase the profitability of its retail services.

4.1.A longer review period

The first has an unobvious effect. Since the review period is longer, any cost reductions by the network operator result in greater profit toward the end of the review period provide greater profit, thus providing a higher return overall. This phenomenon is clearly expressed in Laffont and Tirole (2000),¹⁹ and is linked to the *strength of incentive schemes*. Specifically, if a firm invests in order to achieve a €1 reduction in unit cost, is this likely to result in an increase return of at least €1 to the firm?²⁰ If not, the firm has no incentive to make the investment.

In a system where the prices that a regulated firm is allowed to charge are tied to its demonstrable costs, the answer is likely to be that the investment appears profitable initially, but is not profitable in the long run. The firm is effectively penalised by higher performance requirements.

In a simple, ideal world, review periods would be fully predictable, and would be long enough to provide sufficient opportunity for a network to benefit from reasonable and efficient investments. A real world risk for the network operator, however, is that the actual length of the review period may prove to be shorter than its formal length. If the firm makes substantial profits, the regulator is tempted to renegotiate early. This moral hazard problem on the part of the regulator tends to undermine the effectiveness of incentive regulation.

¹⁶ Article 65.

¹⁷ Article 74 together with Annex IV.

¹⁸ Article 77.

¹⁹ Jean-Jaques Laffont and Jean Tirole (2000), *Competition in Telecommunications*, MIT Press.

²⁰ We normally think of a reduction in cost that enhances profitability, but it might alternatively represent in part a reduction in expected decline in revenues due to competition. Either way, the investment must be felt to generate a positive net return.

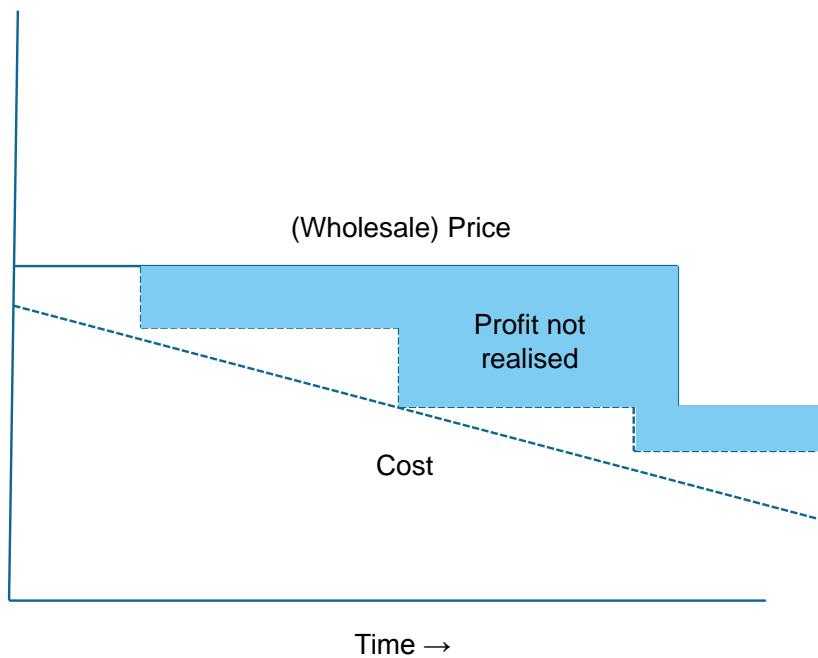
The converse of this problem is that, if the regulated firm has less profitability than expected, it may ask the government to rescue it.

In both cases, we see that regulatory commitment is crucial to the effectiveness of an incentive regulation scheme.

Assuming that the moral hazard problem can be addressed, the Commission's proposal to extend the review period from three years to five will tend to increase the profitability of regulated network operators (i.e. network operators (typically incumbent providers) subject to wholesale price controls as a consequence of having been found to possess SMP). The wholesale price that the SMP operator is permitted to charge to access seekers (i.e. companies that compete with it) is initially set to cost (or to cost plus the Weighted Average Cost of Capital (WACC), which can be viewed as also being part of the cost). This is the situation at the leftmost edge of Figure 5.

Over time, the SMP network operator drives down its costs through investment in newer and more efficient technologies and processes. The cost falls, but the regulated wholesale price does not fall until the next review period. A longer review period thus tends to provide the opportunity to achieve greater profits; conversely, if the regulator perceives that the company is making too much money and shortens the review period, the regulated price comes closer to the cost curve, and reduces the profits that might otherwise have been realised (the light blue area in Figure 5).

Figure 5. The review period of wholesale pricing, and its impact on profits.



Source: Marcus, Bocarova and Petropoulos (2017).

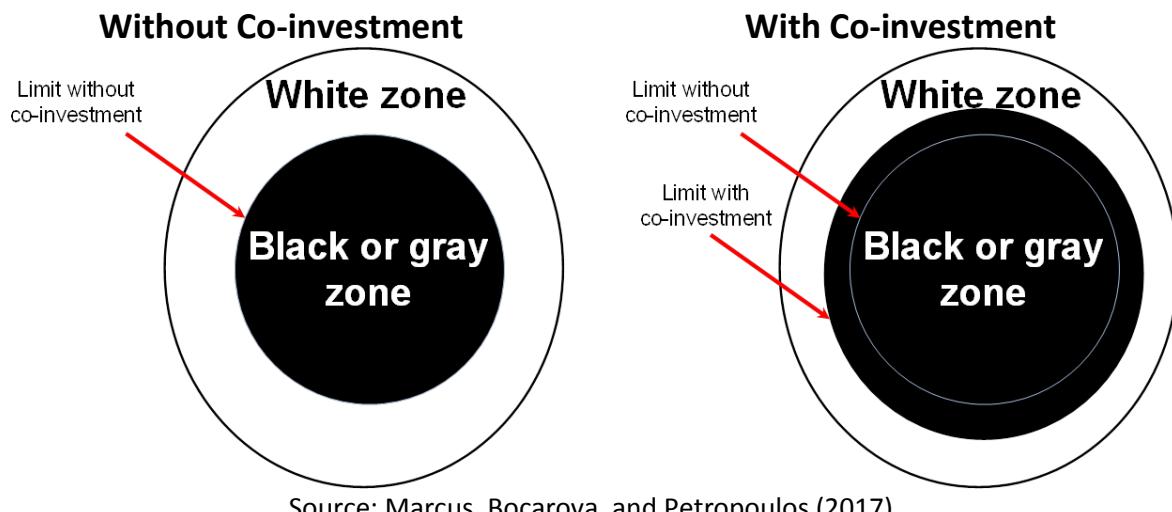
4.2. Regulatory relief for SMP network operators that permit suitable co-investment

Article 74 of the proposed European Code seeks in a different way to provide relief from wholesale price constraints. The Commission has explained its rationale as follows:

In areas where infrastructure-based competition may not be realistic, co-investment by rival operators allows pooling of costs, reduction of risks, overcoming of scale barriers by smaller operators and sustainable retail competition over time which is less dependent on regulation. Significant market power operators who are open to such co-investment in very high capacity networks should therefore be allowed to differentiate themselves from non-investing competitors; this can give all players an incentive to engage the necessary capital. Business models based on selling wholesale network access to retail operators can reduce competition risks, attract "patient" capital which supports longer-term investment in very high-capacity networks and thus push out the dividing line between commercial and non-commercial deployment areas.²¹

This paragraph speaks of the need to "push out the dividing line between commercial and non-commercial deployment areas". The commercial and non-commercial areas are analogous to areas that are referred to in European broadband State Aid guidelines²² as being black (likely to achieve deployment, even in the absence of State Aid) versus white (unlikely to achieve deployment without the application of State Aid). The Guidelines also speak of grey zones, but for our purposes it is not necessary to distinguish between black and grey.) The goal is to expand the area where investment is to be expected, as shown in Figure 6.

Figure 6. The objective of co-investment: pushing out the commercially viable zone.



Co-investment is not new (see Table 1), and the implications are not unfamiliar to European regulators. There have been many instances over the years.

²¹ European Commission (2016): Connectivity for a Competitive Digital Single Market: Towards a European Gigabit Society.

²² European Commission (2016): Proposal for a Directive of the European Parliament and of the Council establishing the European Electronic Communications Code, COM(2016) 590 final.

Table 1. Examples of co-investment in Europe.

	Co-investment initiative	Are all involved parties telecoms operators?	Approach to deployment
France	Orange – SFR Nov. 2011	Yes	Separate deployment with reciprocal wholesale access
	Orange – Free July 2011	Yes	Co-financing only
	Orange – Bouygues Jan. 2012	Yes	Co-financing only
	Bouygues – SFR 2010	Yes	Co-financing only
Germany	Telekom – NetCologne 2012	Yes	Separate deployment with reciprocal wholesale access
	Telekom – Telefónica 2013 Based on the contingent price model.	Yes	Co-financing only
	Telekom – various ANOs Since 2012 Based on the contingent price model.	Yes	Co-financing only
Italy	TIM – Fastweb 2016 In response to new FTTH competition from OpEn Fiber's passive network, over which the Italian state has strong influence. NCA antitrust investigation into the JV agreement under way	Yes	Joint deployment
Spain	Telefonica – Vodafone March 2017	Yes	Co-financing only
	Mas Movil – Orange Oct- 2016	Yes	Separate deployment with reciprocal wholesale access
	Orange – Vodafone March 2013	Yes	Separate deployment with reciprocal wholesale access
	Telefonica – Jazztel August 2012	Yes	Separate deployment with reciprocal wholesale access
Switzerland	Swisscom "Fibre Suisse" (2008)	No	Other
United Kingdom	No significant fixed co-investment initiative to date		

Source: Cullen International (2017).

The co-investment provisions in the proposed European Code appear mainly in Article 74:

[An NRA] shall not impose obligations as regards new network elements that are part of the relevant market on which it intends to impose or maintain obligations ... and that the operator designated as [SMP] on that relevant market has deployed or is planning to deploy, if the following cumulative conditions are met:

- a) the deployment of the new network elements is open to co-investment offers according to a transparent process and on terms which favour sustainable competition in the long term including inter alia fair, reasonable and non-discriminatory terms offered to potential co-investors; flexibility

- in terms of the value and timing of the commitment provided by each co-investor; possibility to increase such commitment in the future; reciprocal rights awarded by the co-investors after the deployment of the co-invested infrastructure;
- b) the deployment of the new network elements contributes significantly to the deployment of very high capacity networks;
- c) access seekers not participating in the co-investment can benefit from the same quality, speed, conditions and end-user reach as was available before the deployment, either through commercial agreements based on fair and reasonable terms or by means of regulated access maintained or adapted by the national regulatory authority; ...

These provisions tend to be relevant to the fixed network, and not to mobile networks, because mobile networks are subject to hardly any price controls linked to SMP today. The incentives of these provisions are irrelevant to Mobile Network Operators (MNOs).

The clear intent is to facilitate investment, especially in areas that would not otherwise receive investment; however, the requirement in (b) that the arrangement “contributes significantly to the deployment of very high capacity networks” does not necessarily preclude arrangements that (also) cover black areas, i.e. areas in which investment could be expected even in the absence of these provisions.

The NRA was arguably already able to take co-investment into account in crafting regulatory remedies, but the provision could be said to create greater regulatory certainty, and also creates an effective commitment on the part of the Commission to accept deregulation under these circumstances. As regards the co-investment itself, proposed co-investment arrangements have routinely been assessed to date by national competition authorities (NCAs). The NCAs already have an established framework for assessing joint ventures and other forms of restrictive agreements, in particular in the mobile sector.

We note also that the three conditions are intended to be *cumulative*. Does this mean that the conditions are to be taken all together, or that each must individually be met? One example of cumulative conditions could be the Altmark conditions, which must be met in order for a State measure in the form of public service compensation to avoid being classified as State Aid. In practice, this means that in its review of the proposed co-investment project, an NRA is not required to examine all of those conditions if it finds that one or more of them is or are not met.²³

4.3. Regulatory relief for providers of wholesale-only broadband services

The third set of provisions relate to network operators that offer broadband access services only at wholesale level. Here once again, NRAs are asked to provide relief from regulated wholesale prices to network operators that do not themselves provide retail offering.

In determining whether a network operator is wholesale-only, the text of Article 77 of the proposed European Code also considers whether the firm is part of a corporate family of firms at least one of which might offer retail services, or whether the network operator has exclusive arrangements with any undertaking that offers retail broadband access services.

As the Commission itself notes in the European Code proposal, the Code “offers a simplified regulatory model for wholesale-only networks with significant market power, limited to fair,

²³ European Commission (2017), “Services of general economic interest (public services)”, at http://ec.europa.eu/competition/state_aid/overview/public_services_en.html.

reasonable and non-discriminatory access rules and subject to dispute resolution as necessary. The provisions require strict conditions for a network to be seen as truly ‘wholesale-only’, and may be particularly appropriate for local very high capacity networks, which might nevertheless be considered to have significant market power in the future.”²⁴

Wholesale-only municipal network operators are commonplace in many parts of world, notably including Sweden. This can be a successful model for network deployment. Where these municipal networks are financed with public funds, they are generally obliged to comply with European State Aid rules, which means that they must be operated as open, non-discriminatory wholesale-only networks.

The logic of the provision is sensible. These wholesale-only network operators do not compete with their wholesale customers. The main incentive for harmful economic vertical foreclosure is thus eliminated (see also Section 4.4).

There could be incentives for the wholesale-only network operator to set prices at levels that are *non-discriminatory but high*. If the objective is to permit the network operator to maintain some pricing power so as to strengthen incentives to build out, this is not necessarily a concern, provided that prices are only modestly inflated (however defined).

The Commission has rightly noted a range of issues relevant to wholesale-only networks, but their assessment does not necessarily provide much clarity. They note that wholesale only “the presence of a wholesale-only operator does not necessarily lead to effectively competitive retail markets, and wholesale-only operators can be designated with significant market power in particular product and geographic markets.”²⁵ The competition risks arising from the behaviour of operators following wholesale-only business models might be lower than for vertically integrated operators, provided the wholesale-only model is genuine and no incentives to discriminate between downstream providers exist. The regulatory response should therefore be commensurately less intrusive. On the other hand, national regulatory authorities must be able to intervene if competition problems have arisen to the detriment of end-users.”²⁶

4.4.A previous effort to make investments in high speed broadband more profitable

These initiatives in the European Code need to be understood in historical perspective. This is not the first time that the Commission tried to shift the balance between competition and investment. The Non-discrimination and Costing Recommendation of 2013²⁷ likewise sought to strike a different balance between efficient investment in Next Generation Access (NGA) and competition.

²⁴ Page 16.

²⁵ This might happen in Sweden, where the NRA is considering defining a separate geographic market for the fibre-based sub-market of market 3a such that each fibre network (including municipal wholesale-only networks) would constitute a separate market. A recent proposal is now up for consultation.

²⁶ European Code, op. cit., Recital 192.

²⁷ European Commission (2013), Commission Recommendation of 11 September 2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment (2013/466/EU).

Specifically, the Recommendation stipulated that the “NRA should decide not to impose or maintain regulated wholesale access prices on active NGA wholesale inputs … where — in the same measure — the NRA imposes on the SMP operator non-discrimination obligations concerning passive and active NGA wholesale inputs” where the obligations conform to equivalence or where the inputs are demonstrably replicable “provided that the actual take-up of upstream passive wholesale inputs or non-physical or virtual wholesale inputs offering equivalent functionalities or the presence of alternative infrastructures create a demonstrable retail price constraint.”²⁸

In other words, active wholesale NGA inputs were to be freed from explicit price controls provided that non-discrimination and/or replicability provided sufficient competitive constraints on prices. For non-discrimination to be held to be effective, there is a strong presumption that *Equivalence of Inputs (EoI)* must be imposed.

Somewhat analogous provisions apply to passive infrastructure.²⁹

To date, only a few of the Member States (the UK, the Netherlands, Sweden, Ireland, Luxembourg, France, and Portugal) have imposed EoI, and in most cases, only on a small subset of the potentially relevant services.³⁰

The Recommendation leaves the door open a crack to relief from wholesale price regulation in general: “Depending on the demonstration of effective equivalence of access and on competitive conditions, in particular effective infrastructure-based competition, there may be additional scenarios where the imposition of regulated wholesale access prices is not warranted under the Regulatory Framework.”³¹

In Sweden, the NRA (PTS) imposed EoI obligations on Telia’s fibre based access products, with effect from 1 December 2016. Cost orientation obligations were consequently lifted from Telia’s fibre based access products.

Other than the Swedish case, instances where the SMP operator has been exempted from cost-oriented wholesale access pricing as a direct consequence of implementation of non-discrimination following principles of EoI appear to be rare (if they exist at all).

²⁸ Ibid., Art. 48.

²⁹ Ibid., Art. 49.

³⁰ Cullen International (2016), “Table 1 - Non-discrimination in market 3a (equivalence of input or output)”.

³¹ Ibid., Art. 58.

5. Co-investment and wholesale-only networks: opportunities and risks

The logic of these provisions, individually and collectively, seems to be sensible. What opportunities and risks do they entail?

5.1. Static versus dynamic gains

All of these measures represent (in one form or another) a hopefully small loss in static efficiency in order to obtain a larger gain in dynamic efficiency.

Societal welfare is often analysed in a static sense by means of *Harberger's Triangle*. If the price that consumers pay for a good or service is somehow inflated (due for instance to market power or to regulatory inefficiency), there are two effects: surplus (the difference between value received and price paid or cost incurred) is transferred from consumers to producers, and *deadweight loss* is incurred because less is consumed than would have been consumed at the efficient price. The welfare transfer is in principle neutral to overall societal welfare (surplus is moved around but not increased), but the reduction in deadweight loss is unambiguously positive.

Much of the focus of the RFEC was to correct for over-pricing by incumbent European network operators, most of which had been government monopolies during the nineties, by means of introducing competition.

Many experts would argue that the elimination was generally appropriate, but has gone a bit too far – squeezing all of the fat out of the system left insufficient incentives for efficient investment.³² Any correction upwards in profitability necessarily entails not only a transfer of surplus back from consumers to producers (i.e. network operators), but also some increase in deadweight loss. In other words, it entails trading off static efficiency in the near term against longer term societal efficiency gains obtained through increased (infrastructure) investment.

This poses substantial challenges both for policy and for politics. The static efficiency losses are fairly easy to quantify. The longer term dynamic efficiency gains are more speculative (and many of the attempts to date to quantify the gains of high speed broadband are dubious in our judgment).

5.2. Public policy goals, regulatory instruments, and uncertain outcomes

In terms of institutional design, a significant risk introduced by the proposed revisions is that they seek to achieve an industrial policy goal – which is a legitimate political aspiration – by regulatory means. The tools are not ideally suited to the job.

As explained succinctly in Tabellini (2002),³³ it is crucial to bear in mind ‘the distinction between “bureaucratic accountability” (i.e. the control of appointed bureaucrats with a narrowly defined mission) and “democratic accountability” (i.e., the control of elected politicians with an open mandate).’ ‘In a representative democracy, the ultimate instrument for holding politicians

³² See, for instance, Nick Garnham (2004), “Contradiction, Confusion and Hubris: A Critical Review of European Information Society Policy”, keynote address to the EuroCPR conference, Barcelona, March, 2004; available at: <http://www.cprsouth.org/wp-content/uploads/2011/11/garnham-debate.pdf>.

³³ Tabellini, G. (2002), The Assignment of Tasks in an Evolving European Union, CEPS Policy Brief No. 10, January 2002.

accountable is an election. Regulatory accountability depends instead on circumscribing the decision authority of the regulator so as to operate largely within the ambit of a defined scope of authority and a defined set of rules.

When it comes to broadband policy, two distinct policy threads are often jumbled together.

- A *universal service* thread seeks to achieve affordable availability of basic services to all. Its goals are to achieve network effects, and to avoid the exclusion of disadvantaged individuals. It is typically addressed by the regulatory authority.
- An *industrial policy* thread that seeks to ensure availability of the most advanced feasible capabilities to those who need them and can afford them. This thread seeks to enhance overall strength and competitiveness. It is typically pursued by the ministry.

Mixing these threads is risky. The tools, goals and actors are not necessarily the same. Yet what we see in these elements of the proposed European Code is precisely that: an attempt to achieve industrial policy goals by means of regulatory tools. The key risk is that the decision authority of the NRA is not sufficiently circumscribed – the Code calls on the NRA to make decisions that are inherently political. Too much authority is delegated to the regulatory process.

Consider Article 74 (b) and (c) (see Section 4.2). The former identifies (together with an annex to the Code) the conditions that identify a suitable co-investment; the other makes clear that the provisions relate to *very high capacity networks* (see Section 5.4).

In recent public remarks, a Commission official spoke of “freeing NRAs to develop innovative ways to promote deployment”.³⁴ We would respectfully suggest that this is the job of the ministry, not of the NRA. These provisions of the proposed Code effectively call on the NRA to make poorly delineated, political decisions.

Doing so runs the risk of (1) regulatory over-reach by individual NRAs, and (2) a decline in the harmonisation of regulatory results that the Commission has worked so hard since 2002 to promote. In effect, these provisions risk inadvertently reversing fifteen years of electronic communications policy.

Specifically, the lack of clear and detailed specifications raises for instance the risk that some NRAs decide to maintain obligations in cases where they logically ought to be dropped; conversely, there is the risk that obligations will be lifted by some NRAs and in some cases where doing so is not objectively justified. Both tend to undermine confidence in the overall regulatory process, and to undermine as well the very regulatory predictability that the Code is seeking to enhance.

5.3. Specific potential benefits from co-investment

Many of the potential benefits are visible in the Commission’s own comments, but others must be inferred. Among the benefits are:

- The cost per home served per network operator will tend to be less than would have been the case without co-investment.

³⁴ At the launch of IDATE’s annual yearbook, May 2017.

- The risk per home served per network operator will likewise tend to be less than would have been the case without co-investment.
- The risk to a network operator of being over-built after investing is reduced or eliminated. *This is possibly the largest gain.* This is especially helpful to network operators other than the SMP operator.
- The price to consumers is still limited by competition with other firms that co-invest.
- Profits for all participants at wholesale level are not necessarily limited to cost plus WACC; thus incentives to invest will tend to be higher.
- Freedom from SMP regulation potentially reduces complexity, both for the regulated firms and for the NRA.

5.4.Sufficient attention paid to technological neutrality?

We consider it important that efforts to promote ultra-fast broadband not discriminate in favour of or against any particular technology (see Chapter 3). The marketplace should choose winners and losers, not the Commission.

The authors have been involved in European electronic communications policy for many years, but no case comes to mind where Commission waffling has been as pronounced as on the meaning of “very high capacity networks” in Art. 74(b). Is this limited to FTTP/FTTH, or does it include various forms of FTTcab/VDSL (including vectoring, G.Fast, ...), and cable broadband? In public remarks by Commission officials, the answer appears to depend on (1) the audience and (2) who they spoke with most recently.

The exclusion of VDSL variants such as G.Fast is perhaps unproblematic in countries like France with long sub-loop lengths, but could lead to enormous wasted or premature investment in countries like Italy and Germany that have short sub-loop lengths.

5.5.General challenges with infrastructure sharing

Many forms of co-investment are possible. The relevant provisions of the Code do not seek to restrict this. This is in order.

European regulatory experience with co-investment is already widespread, both for fixed and for mobile networks. In any infrastructure sharing regime, several questions must be considered:

- What is the overall impact on competition?
- Is there a risk that information sharing between the parties will harm one, or weaken competition in general?
- What is the impact on competing undertakings that cannot take part, or do not wish to take part?

To date, these issues have routinely been addressed by the NCAs rather than the NRAs. There is thus some risk of confusion, overlap, or inconsistency to the extent that NRAs are now explicitly obliged to consider as a sector-specific regulatory matter a group of considerations that to date have been addressed as a horizontal competition matter.

The recitals and operative text of the Code consider these three issues, but do not necessarily resolve them. For example, the Code requires in the case of co-investment that competitors must continue to have access to the same remedies that were previously available; whether this is enough to enable Incentives for investment in fast broadband / proposed European Code

them to continue to compete is, however, an open question. Conversely, the Code rightly notes that these provisions generate incentives to enter into co-investment arrangements, since firms that do not fail to obtain the benefits of co-investment.

There is also a substantial literature on the risks implied by information sharing in a co-investment (or risk sharing) scenario.³⁵ A recent, highly credible paper by Krämer and Vogelsang³⁶ argues on the basis of experimental economics that the risk of tacit collusion in a co-investment scenario is surprisingly high; interestingly, the resultant over-pricing will tend however to decline over time. What the policy implications of these findings are is not altogether clear, since the point of the exercise (in our judgment) is to permit the network operator to over-price somewhat.

³⁵ An extensive survey appears in Section 2 of Jan Krämer* and Ingo Vogelsang (2016), "Co-Investments and Tacit Collusion in Regulated Network Industries: Experimental Evidence".

³⁶ Jan Krämer* and Ingo Vogelsang (2016), "Co-Investments and Tacit Collusion in Regulated Network Industries: Experimental Evidence".

6. Conclusions

Sound policy should reflect an approach (1) that realistically reflects likely demand characteristics, (2) that is balanced between supply side measures and demand side measures, and (3) that takes proper account of the capabilities of the various available technologies and their relative applicability to different Member States.

Our assessment is that the proposed enhancements to broadband policy in the proposed European Code are broadly in the right direction, and collectively are likely to offer network operators a more profitable and predictable business case for investment in high speed broadband. Notwithstanding our observations that the case for FTTP/FTTP can often be significantly overblown, we would still say that this is a welcome or overdue change.

The risks implied by insufficient specification of these provisions in the European Code, and the lack of clarity as regards technological neutrality, are however significant. We would hope that these provisions can be sharpened in the course of the legislative process.

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