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Thinking beyond the WACC – the investment hurdle rate and the seesaw effect

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1. Executive summary

The European Commission has set out ambitious goals for investment in very high-capacity networks (VHCNs). Beyond the immediate benefits these platforms confer on users, they are additionally expected to make a much broader economic contribution. This will take place via network effects, through promoting productivity growth, by enhancing social and economic resilience (as demonstrated during COVID-19) and by assisting in the process of de-carbonisation.

The investment challenge

The investment challenge that VHCNs represent is complex and non-incremental since it involves building new infrastructure that will co-exist with legacy networks, which may face competition in terms of overlapping build and for which the additional willingness to pay is uncertain – and may be weak. So the investment environment involves significant market risk.

Investor expectations are also influenced by regulation that tends to cap upside investment returns but cannot provide a hedge against demand and revenue disappointments (including the risk of regulatory opportunism, i.e., denying full cost recovery once the investment has been sunk). Where new network investment is either regulated directly or must compete with regulated networks, regulation therefore introduces an asymmetric risk for investors. Efforts to address this investment challenge are non-trivial and likely to be (at best) only partially successful – reflecting the fact that, where returns are regulated (either now or in the future), this will necessarily cap the associated upside.

Any potential investor will be evaluating the prospective returns on telecoms in Europe versus options to invest in other regions and other sectors. Given the uncertainties involved, past experience will be an important consideration in this process. This represents a headwind for European telecoms investment because the returns generated here have underperformed markets locally and globally.

The benefits of raising the cost of capital for legacy investment

It is against this backdrop that the cost of capital in its wider sense should be evaluated. The question is not simply what the estimated cost of capital is, as a potential input for setting a price control, but what impact can policy and regulation have on risk and required returns for telecoms investment in Europe?

As legacy network investments deliver services that are potential substitutes for those provided over VHCN platforms, the estimated cost of capital utilised in setting legacy price controls is immediately relevant to those evaluating the feasibility of VHCN investments. Under-estimating the weighted average cost of capital (WACC) on legacy infrastructure will actively incentivise customers to remain on legacy offerings and avoid upgrading to faster bandwidths. In turn, this will impede the take up and/or undermine the pricing (and hence economic viability) of VHCN services – directly contrary to the thrust of the EC's objectives.

Additionally, investors also know that new investment will, over time, become legacy investment, so the approach to regulation of legacy investment will be a central consideration in forming a view regarding anticipated returns for new investment.

In setting out the approach for estimating the cost of capital for legacy investment, the 2019 Commission Notice on the WACC specifically identifies promoting investment. However, the approach that has been used in the BEREC reports on WACC parameters do not reflect this.

For example, BEREC's methodology provides only central estimates without standard errors

and does not consider whether it would be optimal to aim up from the central estimate given asymmetry in the social costs of investing too little versus too much.

It is also notable that BEREC, taking its guidance from the EC's notice, utilises an EU-wide equity risk premium estimate in combination with national estimates of the risk-free rate. This results in very low estimates of the WACC for member states with low interest rates and a divergence rather than convergence in WACC estimates across member states that goes far beyond disparities in sovereign risk.

A comparison with the WACC identified by Ofcom when setting price controls for legacy investment by BT provides some indication of the magnitude of the impact of neglecting the above-mentioned considerations.

Ofcom adopted a pro-investment stance and estimated both the cost of debt and equity on a national basis. A nominal pre-tax WACC of 7.0% was judged appropriate for the Openreach infrastructure division that operates legacy copper assets. Had the parameters in the BEREC document been utilised, a value of 5.31% would have instead been determined; 1.7 percentage points lower.

The WACC implied by the BEREC guidance can also be compared with the cost of capital utilised by investment analysts to value telecoms companies. Post-tax WACC estimates for various European operators by HSBC equity research are shown below (the pre-tax WACC is inferred utilising corporate tax rates together with gearing and cost of debt estimates from Ofcom for BT and from the BEREC guidance for other companies; Orange estimates are for France).

HSBC post-tax WACC and inferred pre-tax WACC

	BT	KPN	Orange	Proximus	TI	Telenor
HSBC post-tax WACC	7.7%	6.1%	6.2%	6.3%	7.3%	7.75%
Inferred pre-tax WACC	9.5%	8.1%	8.6%	8.4%	10.1%	9.9%

Source: HSBC, Telecoms: Call to return (on capital), 5 February 2021.

From the table it will be evident that estimates based on the BEREC methodology are significantly below the values that are in active use in valuing telecoms assets, a warning that they are unrealistically low in comparison to reasonable investor expectations.

The EC notice on the cost of capital for legacy assets should be amended to:

1. Allow for the equity risk premium and the risk-free rate to be determined consistently;
2. Require confidence bounds in all WACC estimates; and
3. Provide for BEREC to develop guidance on choosing within this WACC range having first regard to the objective of promoting investment.

This portfolio of measures would ensure that, where an estimate of the cost of capital is utilised in determining a price cap, that it is estimated and utilised in a manner supportive of investment.

The focus for VHCN investment should be on the 'hurdle rate' rather than the WACC

As outlined above, the WACC associated with legacy assets is important in part because of its implications for future investments, such as in VHCNs. To support investment it is important

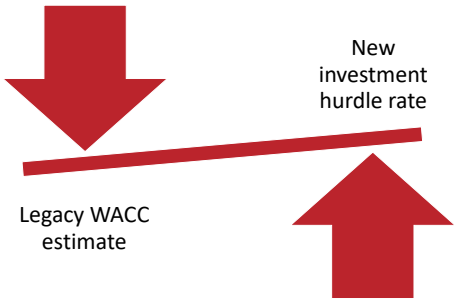
that the WACC for legacy investment is not set too low.

The threshold expected return or 'hurdle rate' for new investment includes a premium over the cost of capital (which may itself differ from that for legacy investment). This hurdle rate premium reflects the inherent asymmetry of returns that is due to the risk of prospective regulation capping the upside but leaving downside exposure (including the risk of regulatory opportunism, i.e., denying full cost recovery once the investment has been sunk), as well as the value of the option to delay investment until the point when better information is available (e.g., concerning levels of demand).

Investors' hurdle rates should not be confused with the actual WACC or a regulatory WACC estimate. The hurdle rate of the investor is determined by the investor's perception of the risks and the opportunity to invest later rather than now. Regulatory risk is a major component of an investor's risk assessment. If the legacy WACC is set too low, or there is any threat of regulatory price controls being applied to VHCN infrastructure, then the risk associated with VHCN platforms will rise – as will, therefore, the required hurdle rate. *Ceteris paribus*, a higher hurdle rate will mean less investment.

Lowering the legacy WACC risks a seesaw effect in terms of the hurdle rate for new investment.

Seesaw effect – lowering the legacy WACC may raise the new investment hurdle rate



Beyond the question of the legacy WACC, Europe has the scope to lower the investment hurdle rate via sound policy and regulation, as well as by making credible commitments to pursue sound policy over the longer term.

There are solid arguments for not applying price caps to VHCN investment, in which case no WACC estimate is required for VHCNs. Meanwhile, any expectation that price caps will be applied in future will tend to raise the hurdle rate for investment, given the risk of uncompensated downside risk.

Regulation also can, and has on occasion, been utilised to partially expropriate the value of investment once it has been committed. Investors know this, and the challenge is to assure them that expropriation will not happen. Otherwise, prospects for commercial investment will be greatly diminished since the hurdle rate will be increased to compensate for expropriation risk.

The above considerations are liable to dwarf other factors influencing the estimation of the WACC for VHCN investments. Their impact will be much more than incremental in magnitude, while any realistic mark-up that is made to the WACC estimate is unlikely to mitigate their potentially negative impact on investor expectations and, thus, required returns.

Hence, it is vital not only to think about the WACC in its own right, but also to address the challenge of giving investors the right incentives to make new investments. In particular, any focus on the WACC for VHCN investment (even if only in terms of what premium might be appropriate) is not a wise place to start, as it signals the presumption that price regulation will ensue in due course. Here, incorporating a degree of 'aiming up' into the process would amount to harm mitigation at best.

However, there are things that can and should be done to lower the hurdle rate premium for VHCN investment:

- Avoid measures that would depress the price of legacy investment, including by driving down the WACC associated with these platforms.
- Allow for pricing flexibility, including wholesale service-price differentiation, to give investors an opportunity to reap the potential upside so as to offset potential downside risk.
- Encourage the negotiation of long-term volume-price commitments with access seekers, which would serve not only to share risk but also to mitigate overall investment risk by aligning incentives of both access seekers and providers to upgrade customers to VHCNs.
- Make credible commitments to an approach that both protects consumers and assures investors of a prospect of a reasonable and appropriate return on investment.

In general, it is reinforcing the credibility of the belief investment will not be subject to expropriation that has the potential to offer the single greatest payoff in terms of increased investor confidence and thus to lower the hurdle rate premium – so securing greater investment. In this context, the importance of the WACC estimations made with regard to legacy investments will be readily apparent.

In terms of pricing flexibility, the 2013 costing and non-discrimination recommendation was a positive step in providing a rationale for squaring pricing flexibility with possible concerns in relation to market power while recognising that regulated legacy networks compete with VHCNs (an equivalent 'virtual' product over fibre could fulfil this role where copper is withdrawn). However, the flexibility offered by the recommendation has not always been fully embraced by national regulators.

The presumption that price regulation of an anchor product or other price constraints should be sufficient, and against any price regulation of VHCNs themselves, should be reinforced. Competition between VHCN networks should also justify forbearance.

Long-term commitments, and mechanisms that make it costly to break them, should be identified. Regulatory commitment may also be more credible where it brings in more than one entity, with cross-cutting goals and objectives. Governments as well as regulators may need to be parties to such commitments.

Further enabling long-term contracts between access seekers and providers on more favourable terms than short-term relationships may increase the credibility of commitments not to expropriate investment, by better aligning the interests of market participants and reducing the risk that one or more parties seek advantage via regulatory arbitrage.

Finally, it is important that the benefits of investment be properly captured in statistics that purport to measure the sector's impact. Adopting metrics that demonstrate the benefits of investment in increasing capacity, thereby lowering unit prices, may also reduce pressure for *ex post* price reductions that expropriate investment. The measurement of service-price outcomes in telecoms should be amended to reflect the quantity and quality of services delivered (at present bills rather than unit prices are typically reported). This would show falling unit prices and so make a link between investment and consumer outcomes in terms of value for money.

In conclusion, a complementary set of measures to ensure that legacy assets are not under-priced because a depressed WACC is applied coupled with measures to lower the hurdle rate premium for new VHCN investment should be adopted.

2. Why investment and investors matter

Investment in communications networks involves positive spill-over effects.[1] There are also wider social and environmental benefits from investment in communications, including increased optionality contributing to societal resilience (as illustrated during the response to COVID-19) and scope to support decarbonisation throughout the economy. Consequently, governments around the world have set goals in terms of future network capability. It makes sense to 'lean-in' to investment in the sector, and to take into account broader benefits from the use of communications infrastructure in assessing policy in relation to environmental goals in particular.

The European Commission has set out goals for the continent as part of its Digital Compass vision for 2030.[2] For example, the second of its objectives is that, by this date, "all EU households should have gigabit connectivity". Meeting targets such as these will involve deployment and user uptake of very high-capacity network (VHCN) infrastructure, and substantial private investment complemented by public funding in non-commercial areas.

Further, to the extent that private investment can be encouraged via a pro-investment policy and regulatory environment, the likelihood of meeting these goals would not only be improved, but the cost in terms of complimentary public funding would also be reduced accordingly.

Leaning-in to investment will lower prices

It is therefore desirable to establish a policy and regulatory environment that is supportive of private investment, and to ensure that investors have a reasonable expectation of earning a return in relation to telecoms investment that exceeds their opportunity cost of capital i.e., their returns from allocating capital elsewhere.

However, the conventional view has tended to be that there is a potential trade-off between, on the one hand, a pro-investment regulatory stance and, on the other, competition and lower prices.

Competition, though, is shifting from the 'me too' variety based on network access and resale to that founded instead either on co-investment, or longer-term contractual relationships between access seekers and providers, or rival network upgrade and/or build. An environment that is more supportive of investment generally would serve to support these developments and need not involve a competition trade-off.

In relation to end-user prices, it is important to recognise that in any industry tied to Moore's Law – as telecoms is – investment will tend to have the effect of reducing prices. The cost of telecoms equipment (routers, base stations, and so on) may grow with complexity, but this infrastructure's capabilities in terms of data bandwidth tend to increase at a much more rapid pace. Few operators have been able to lift bills with inflation, but even assuming they have been able to do so, this will have been far outstripped by the improvement in bandwidth they will have provided. As a result, customers would have paid a little more in their bills for what have been massive improvements in terms of speed and capacity. In other words, the price per GB has collapsed.

So the root problem here is essentially one of measurement. In telecoms, it stems from the

[1] Corrado and Jager, Communication Networks, ICT and Productivity Growth in Europe, 2014. https://www.conference-board.org/pdf_free/workingpapers/epwp1404.pdf

2 Europe's Digital Decade: Commission sets the course towards a digitally empowered Europe by 2030, Brussels, 9 March 2021. https://ec.europa.eu/commission/presscorner/detail/en/IP_21_983

fact that it is individual or household bills, rather than prices, that are reported and compared – without adequately considering the growth in the volumes consumed. By contrast, in other areas of the economy, actual prices are reported based on consumption e.g., the price of electricity is measured on a per kWh basis. In telecoms, investment may modestly raise costs and bills, but – if assessed properly – prices are nevertheless declining, as consumers consume more (of data in particular) and obtain better value for money.

Indeed, following a reassessment in July 2021 of the telecoms sector, the UK's Office for National Statistics made an upward revision of the industry's estimated productivity growth from 5.7% per annum to 25% per annum for the period 1997-2018.[3] This revision drew on work about which the authors noted:[4]

> *"While data services now represent the primary output of the telecommunications services sector, the existing output deflator used in the UK and elsewhere gives higher weight to traditional voice and text (SMS) services. Because the price of these traditional services has demonstrated less change, using a deflator weighted towards these items implies slow growth in the real-terms output and productivity of the sector, which seems at odds with the considerable usage growth and experience of service improvements and motivated the consideration of alternatives."*

Almost all this productivity growth is due to investment raising the volume and quality of output (rather than labour input reductions). Viewed from this perspective, increased investment is likely to contribute to higher productivity growth and lower unit prices.

Promoting investment should therefore support, and is certainly not necessarily in conflict with, competition and lower unit service prices.

[3] Office for National Statistics, Impact of double deflation on UK labour productivity: 1997 to 2018, 28 June 2021. *https://www.ons.gov.uk/releases/ukproductivityanalysismay2021*

[4] Mo Abdirahman, Diane Coyle, Richard Heys and Will Stewart, Telecoms Deflators: A Story of Volume and Revenue Weights, ESCoE Discussion Paper 2020-11. July 2020. *https://escoe-website.s3.amazonaws.com/wp-content/uploads/2020/07/16111642/ESCoE-DP-2020-11.pdf*

3. Who and what drives investment?

One of the defining characteristics of the telecoms sector is its requirement for prodigious quantities of capital. Transitioning fixed-line networks towards fibre to the premise (FTTP) inevitably involves deploying new infrastructure to many millions of locations, while upgrading cellular platforms entails not only considerable spectrum expense, but also work at tens of thousands of base stations sites.

It is often – mistakenly – supposed that these substantial capex projects such as these are the decision of management teams alone. In fact, though, no operator can embark on such ambitious programmes without the active support and engagement of their own investors (that is to say, those who hold the operator's equity and bonds).

Operators must build support for investment projects

It must be borne in mind that one of the most fundamental of management teams' functions is to act as custodians of their shareholders' interests. Ultimately it is shareholders who set the constraints within which management must work, both budgetary and strategic. The checks and balances in place here are various, ranging from investors deserting the stock (putting downwards pressure on the share price) through to the various measures available through mechanisms such as shareholder meetings.

As a consequence, the executives running a telecoms operator must exercise particular care to ensure that those providing the company with its vital capital remain supportive of its key decisions. In the telecoms industry, few decisions are of greater significance than network investment. Simply in the ordinary course of duty, operators are accustomed spending towards 15% of sales on capex, a figure that can rise sharply higher if concentrated items like spectrum are included or during the course of an especially heavy phase of network deployment (such as of FTTP).

In telecoms, investor expectations and increased scrutiny of anticipated investment returns have been shaped by poor historic returns. As an HSBC analyst's report notes:[5]

> *"In aggregate, returns in the sector… have been falling and are poor… Given the enormous cost of FTTP networks in particular and the fact that the project economics can vary so wildly within one country, not to mention the fact that in many countries fibre-to-the-cabinet investments are only just complete, investors increasingly want better clarity on anticipated return profiles."*

Further, HSBC observes that:

> *"The emphasis placed on return on invested capital (RoIC) for the telecoms sector has ballooned over the past 12 months."*

After decades of disappointing returns, equity investors have become innately suspicious of the operator's investment projects. Given that telecoms platforms are foundational for much of the modern economy, the reality of investor wariness of capex and the circumstances that have brought this situation about ought to be of intense interest to policy makers and regulators alike.

It is therefore important to understand the motives and reasoning of the investor base – what are the factors that have prompted their caution on network investment? As mentioned above, the first reality to recognise is that the European telecoms sector has delivered dismal

[5] HSBC, *European Telecoms: Call to return (on capital)*, 5 February 2021.

rates of return over the last two decades, falling significantly short of the companies' cost of capital. Even in isolation from other considerations, a logical policy for investors is to restrict fresh capital allocation to industries like telecoms that have underperformed – not only so as to be able to allocate it to those sectors where prospects are better, but also to reduce the capital deployed in telecoms such that it is commensurate with the (poor) returns that the industry is able to generate.

Capital that is not, as a result, directed towards the European telecoms sector can be repositioned elsewhere. It need not altogether leave the telecoms industry, as it can be rechannelled towards other regions of the globe where returns are more appealing. Alternatively, it can be rerouted to other industries with a better track record of generating attractive returns – although the most obvious destination (technology) will often mean that the capital leaves the EU for the US.

The goal of the investor base in taking such decisions is simply to generate the best returns. Most holdings in shares and bonds are the responsibility of institutional investors, which act on behalf of the individual citizens who save with them (most typically for their pensions). Clearly, institutional investors bear a weighty responsibility, and must make capital allocation decisions (to one sector or region) not out of geopolitical considerations, but rather to fulfil their professional, fiduciary and – indeed – ethical duty to secure on behalf of their clients (i.e., individual citizens) the best returns available. Moreover, in a highly competitive area such as financial investment, an institutional investor providing sub-standard returns would soon see its business migrate to rivals.

As a body, institutional investors are highly professional and well-resourced, and have at their disposal a universe of potential investments that spans every industry across the entire planet. They are in no sense bound to commit their clients' savings to European telecoms. If the latter cannot yield adequate returns, institutional investors have an abundance of options elsewhere – including geographically.

In the absence of better returns, the European telecoms industry has often needed to rely on its dividend yield as a means to bolstering investor support. It should be noted that the dividends thus paid are typically going to those either saving for or actively drawing (and relying upon) their pensions. In other words, these payments do perform a vitally important function – even if not directly contributing to upgrading telecoms infrastructure.

The investment landscape

Recent years have seen the European telecoms sector committing to heavy investment in the form of fibre deployment and upgrades to 5G. During this period, the sector's equity performance has lagged that of the stock market indices measuring the broader economy. Furthermore, it is possible to cite numerous individual examples that amply demonstrate investors' caution with regards to incremental investment projects.

The experience of Vodafone provides a most recent example. The company's raised capex guidance caused an immediate and material adverse reaction.[6] The investor perspective will have been informed by the fact that Vodafone had undertaken a sustained period of intensified capex, referred to as 'Project Spring', in the middle years of the last decade. At the time it was promised that the additional expenditure would generate improved returns, but even then investors expressed the fear that these would not eventuate – and, indeed, that further rounds of elevated capex would be required. While

[6] FT, Vodafone plans multimillion-euro investment for network expansion, May 2021. https://www.ft.com/content/ce91932b-5496-4c76-b659-622b1dfff775

many factors are inevitably involved, it is worth noting that Vodafone's share price today has approximately halved post Project Spring – hardly an encouragement to those contemplating deep infrastructure investment.[7]

This type of experience will be at the forefront of the minds of management teams when contemplating enhanced investments. The likelihood is that they will face a negative response from shareholders for the duration of the programme. Then, subsequently, they are liable to be subject to intensified scrutiny to determine whether they have been able to generate a satisfactory return on the additional investment. This is quite properly so: to repeat an earlier point, institutional investors have a fiduciary duty to their clients – citizens saving for their pensions – to ensure that their capital is well allocated and will need to redirect it away from those sectors incapable of delivering the necessary returns.

Current circumstances, therefore, hardly encourage management teams to embark on capital-intensive projects. (Note that, by contrast, in those circumstances where investors *do* anticipate attractive returns, their incentive is to encourage *elevated* levels of investment – as the greater the sum invested, the greater the return available). It should therefore be salutary that operators often feel the need to fall back on indirect conduits for network investment, such as conducting upgrades via a jointly owned vehicle that keeps the associated capex off the company's cash flow statement. If investors had a positive view of this expenditure, they would actively reward its consolidation. The fact that so many European operators, starting with KPN, have used this mechanism underlines the investor base's aversion to fresh capital deployment in the industry.

Thinking ahead on the interest rate environment

A striking feature of some recent telecoms investment is that it has been undertaken in conjunction with infrastructure funds. However, it needs to be borne in mind that such investors are often relatively new to the telecoms space and have benefitted from the zero-interest rate environment. Yet current levels of interest rate are historically entirely unprecedented[8]; to presume that they perpetuate is in effect to presume that Europe is incapable of recovering from the Covid-19 induced economic malaise. It remains to be seen how these newer investors would respond to higher rates.

Two features of telecoms investment are particularly pertinent here. The first is that the capex programmes involved are often not only extremely expensive, but also protracted. A project of fibre upgrades could easily take between 5 and 10 years, for example. The second is that these upgrades are hardly isolated occurrences. Telecoms is not a utility in part because it is joined at the hip to Moore's Law, and so to a regular and rapid technology upgrade cycle. Utilities such as water or gas are not subject to the same pace of change and thus repeated need to replace and upgrade infrastructure that was itself deployed in the relatively recent past. Consequently, even after a period of sustained elevated capex, investors will know that – soon enough – further rounds of expenditure will be a necessity.

So, while the current interest rate environment may lend some assistance to infrastructure programmes, the ability to sustain investment interest over the duration of an entire project – and then into subsequent upgrade rounds – must not rely on the continuation of today's (historically extremely unusual) monetary environment.

[7] HSBC, *Vodafone Group: Adding RoIC to Spring assessment framework*, 23 March 2016.
[8] FT, Today's ultra-low interest rates are anything but 'natural', 20 August 2020. *https://www.ft.com/content/c4e10d2c-109a-40f5-a175-628d1db9c793*

Another consideration to bear in mind is that an economic recovery is likely to bring with it higher interest rates. This raises the prospect that any price reductions imposed today will need to be subsequently reversed. While the reversal would (all things being equal) improve investment incentives by comparison with the situation prevailing immediately beforehand, implementing regulatory-driven price rises can be politically contentious.

Here, therefore, is a further reason to 'aim up' in estimating the WACC for legacy platforms. The tougher price controls that would follow from any underestimation of the associated WACC would be difficult to reverse, and so would be liable to permanently impair investment incentives.

How investors form their own expectations

The above discussion should underline the importance for operators – given their highly capital-intensive activities – that they retain ready access to substantial quantities of funding. As should also be apparent, the custodians of that capital perform an important function in directing it towards those activities generating the most attractive returns. In orchestrating this, they undertake one of the most vital activities in any economy, namely the efficient allocation of capital. Returns in effect act as a signal of those areas of economic activity where there is greatest need for investment, and European telecoms must take its place amongst a long list of options available globally.

How then do investors go about establishing where the finite funds for which they are responsible should be directed? Inevitably many factors are involved, but in essence institutional investors are engaged in a constant process of evaluating the likely future returns of all their available options and comparing these to one another continuously. However, this partial answer only really defers the question, since the issue then becomes, how do investors evaluate each potential opportunity?

This work typically involves assessing a series of quantitative and qualitative factors, but at its heart is likely a financial model that attempts to capture the prospective returns. Building such a model, though, is an extremely challenging matter, given the vast number of assumptions involved. In view of all the uncertainties – as well as the need to justify and evidence investment decisions as part of the internal investment process – the starting point for the selection of any variable is likely to be, what happened last time?

Thus, investors unfamiliar with a given new service will look to the rates of penetration growth seen in comparable services previously. Past levels of margin will be scrutinised to give a better idea of the plausible evolution of the cost profile. However, even understanding key factors such as the likely demand for and associated cost of a new service are still insufficient to supply an adequate view on future returns.

Consider by way of example consumer data services. An investment professional assessing prospects at the onset of this era of the telecoms industry's development might have been forgiven for projecting a lucrative future. Demand has certainly materialised, and operators have also succeeded in progressively driving down the cost of delivering data packets – thereby enabling a plethora of new services, ranging from streamed on-demand video on customers' televisions to social media applications on their smartphones.

In fact, handsome returns have been generated – but these have been heavily concentrated in the hands of technology players with global scale (typically outside of Europe). The European telecoms sector has not been a conspicuous beneficiary. Thus, while demand (in particular) and cost are themselves uncertain, they are still

inadequate to determine the returns profile of an investment.

An additional dimension of uncertainty that is especially relevant when projecting returns in the telecoms sector is that of regulation, which determines many of the key prices within the industry. Here the challenge is assessing what decisions regulators are likely to take not merely now, but – given the lengthy duration of the deployment phase and the even lengthier duration of the assets' working life – those that subsequent generations of regulator might be expected to take in future. These rulings will very materially determine the returns profile of an asset like fibre.

The lessons of the past

As a result of the nature of the unavoidable unknowns present here, investors not unreasonably reach for precedent to act as a guide. The best indication of the likely future treatment of telecoms investment is how it has been treated in the past. While the technologies, their demand profiles and their cost characteristics will vary with time, the fundamental outline of the regulatory choices nevertheless follow a familiar pattern.

Of special interest to investors will be the ways in which regulation has changed once investment has been committed. Clearly, if the regulatory treatment of investment deteriorates during the course of an infrastructure upgrade, then investors have the option to curtail their plans or even bring the programme to a premature conclusion. However, once the capital has been committed, the immediate consequences of heightened regulation are rather different. Most obviously, there is no longer the risk that the investment programme will be downsized – since it is by this point complete.

Investors therefore pay close attention to the treatment of what are often termed 'legacy' investments. It is worth highlighting that such investments were hardly legacy at the point in time at which they were made. However, the acid test for regulation is how they were treated once the associated capital had been committed, and once attention shifted towards future rounds of network investment.

Telecoms investment is a multi-round game. Investors must commit capital not even knowing the identity of the future sets of regulators and policy makers who will have a profound role in governing the associated returns. They must ask themselves, in which markets is there reassurance to be had that the regulatory and policy framework recognises and reflects the multi-round nature of telecoms investment, and is therefore more likely to respect the terms and circumstances under which citizens' savings were originally committed, and network investments made?

Stated commitments on telecoms policy and regulation do provide some reassurance in this situation. However, the degree of comfort that this can provide is inevitably limited by the fact that future decision-makers (with what are liable to be different incentives – especially once capital has been committed) will not be those in the same roles today. In these circumstances, it is the past track record that provides the clearest indication as to which markets are best able to navigate these changing incentives and remain consistent in their regulatory treatment.

In short, investors frame future expectations with reference to past experience. The plainest guide to the future regulatory treatment of investments (that will in due course inevitably become legacy) is the treatment of previous generations of network deployment. In other words, the regulation of legacy assets is of profound importance to investors evaluating future capital commitments.

A case study in setting, upsetting then resetting expectations

One of the great success stories of the past decade has been the way in which the European Commission' *Non-discrimination and costing methodology recommendation* provided the necessary reassurance to telecoms operators, so enabling them to undertake substantial rounds of access infrastructure upgrade employing different flavours of fibre-based technologies. Key components of the *recommendation* included not only pricing flexibility on new investments, but also the provision that the pricing of pre-existing infrastructure (i.e., copper local loops) could benefit from rising with inflation.

Clearly, part of the reason this encouraged investment was very direct – as the increased revenues from modestly higher local loop prices increases scope for investment in fibre-based infrastructure without recourse to additional external financing or cutting dividends. Regarding the latter, dividends have become one of the few remaining reasons for equity investors to retain substantial holdings in the sector (i.e., despite its difficult operating environment). Cuts to dividends are therefore hazardous – in terms of antagonising an investor base the support of which is essential when rolling out large infrastructure projects such as VHCNs.

Furthermore, it is obviously easier for operators to justify investing in a network upgrade when they know that the price of a cheaper legacy platform is not to be made subject to regulatory-mandated price cuts, thereby making those legacy services relatively more attractive to customers. However, also profoundly important was the signalling to investors: that their investments were being treated fairly, even at the stage when they had acquired legacy status.

With this *recommendation* currently under review, it is too early to judge the regulatory follow-through. However, because its transition from basic ADSL services to an intermediate technology, fibre-to-the-cabinet (FTTC), took place slightly earlier (predating the *recommendation* by several years), the UK can provide a relatively early example of how regulation can develop (both positively and negatively) and the effect that this is liable to have the feasibility of substantial new network upgrade projects.

The UK incumbent, BT, began its upgrade to FTTC systems quite early, from 2008, encouraged by the pro-investment stance of the UK telecoms regulator, Ofcom, in permitting the company pricing flexibility.[9] Nonetheless, BT remained subject to a wide range of restraints, for instance the need to offer access to its platforms to third parties as well as its own retail division. Moreover, any attempt by the company to impose excessive charges would plainly be counter-productive in terms of suppressing demand – fatal to any investment project with a substantial fixed cost component.

The resulting build project was impressive, making available high-speed services (up to 80mbit/s) to most of the country's population (by 2019, FTTC services were available to 90% of households[10]). As a result, by half a decade post the start of the deployment, the UK reached levels of data usage per household that were amongst the highest in the world.

However, there then followed a change in regulatory leadership, beginning with a review

[9] Ofcom, Ofcom welcomes BT's plan to upgrade broadband network: Regulation to support investment and competition, July 2008. *https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2008/ofcom-welcomes-bts-plan-to-upgrade-broadband-network-regulation-to-support-investment-and-competition*
Ofcom, Delivering super-fast broadband in the UK, March 2009.
https://www.ofcom.org.uk/__data/assets/pdf_file/0018/59121/statement.pdf

[10] Ofcom, International Broadband Scorecard 2019: interactive data. *https://www.ofcom.org.uk/research-and-data/telecoms-research/broadband-research/eu-broadband-scorecard/2019-interactive-data*

of the entire telecoms market and a shift in stance away from technology neutrality towards advocating specific platforms – in this case, FTTP rather than FTTC.[11] Having said this, the market review's emphasis on passive infrastructure access did at least provide some reassurance to those investing in network that infrastructure-based competition remained Ofcom's preferred mode for the market.

In the regulator's next fixed-line market review, Ofcom announced its intention to impose rapid and substantial price regulation on BT's FTTC network, bringing prices into line with its retrospective analysis of their cost.[12] This outcome was greeted with dismay not only by BT but also its largest infrastructure-focused competitor, Virgin Media.[13] The latter highlighted that Ofcom's decision would damage the economics of both cable and fibre deployment.

The government then became involved, publishing its own strategic review of the UK telecoms market (a document produced by Department of Culture, Media and Sport). The final report placed heavy emphasis on the need to support and nurture telecoms investment.[14]

It was against this backdrop that Ofcom's regulation then shifted back towards taking greater account of the need to support network investment. As previously mentioned, cost-orientated price controls had been imposed on BT's FTTC network for the charge control period; beyond this point, though, the incumbent was now to be given the ability to raise prices with inflation on its 40Mbps FTTC offering – thereby reinjecting some cash back into the market to support infrastructure upgrade expense.[15]

However, the scars of FTTC's intervening treatment remained, with BT understandably looking for robust assurance that future fibre investment would not be subject to adverse regulatory change once it had been rolled out – that, in other words, it would be accorded what is referred to as 'a fair bet'. The company has responded with progressively more ambitious FTTP roll-out plans as Ofcom has provided greater reassurance on this point.[16] For its own investors, this was an indispensable component of any credible fibre investment case, in view of the way in which the regulatory rules had been changed almost as soon as the majority of the incumbent's prior FTTC round of investment had been completed.

Likewise, the fact that the future regulatory landscape has become rather more predictable has also enabled other parties to advance their own network investment plans. For example, Virgin Media has been able to move forwards with its own network upgrade project.[17]

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[11] Ofcom, Making digital communications work for everyone, February 2016. *https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2016/digital-comms-review-feb16*

[12] Ofcom, Wholesale local access market review, 28 March 2018. *https://www.ofcom.org.uk/consultations-and-statements/category-1/wholesale-local-access-market-review* (following the consultation published 31 March 2017)

[13] Virgin Media, Wholesale local access market review, June 2017. *https://www.ofcom.org.uk/__data/assets/pdf_file/0016/105037/Virgin-Media.pdf*

[14] DCMS, Future Telecoms Infrastructure Review, 23 July 2018. *https://www.gov.uk/government/publications/future-telecoms-infrastructure-review*

[15] Ofcom, Promoting competition and investment in fibre networks, 29 March 2019. *https://www.ofcom.org.uk/__data/assets/pdf_file/0018/142533/consultation-promoting-competition-investment-approach-remedies.pdf*
Ofcom, Statement: Promoting investment and competition in fibre networks – Wholesale Fixed Telecoms Market Review 2021-26, 18 March 2021. *https://www.ofcom.org.uk/consultations-and-statements/category-1/2021-26-wholesale-fixed-telecoms-market-review*

[16] FT, Ofcom paves way for UK's rapid upgrade to fibre broadband, 18 March 2021. *https://www.ft.com/content/5c1dce39-ff99-4eed-ad6d-042e6683dded*

[17] Liberty Global, Virgin Media O2 Announces 2028 Full Fibre Upgrade Plan, 29 July 2021. *https://www.libertyglobal.com/virgin-media-o2-announces-2028-full-fibre-upgrade-plan/*

4. Fostering efficient and timely investment

The present section examines some of the most important challenges involved in fostering new investment in VHCNs. These include embedded investor expectations and the extent of the step-change that VHCN deployments represent (due primarily to their expense and the protracted duration of their roll-out).

The formidable nature of these challenges can be compounded if the telecoms sector is mistaken for a utility and mis-regulated accordingly, or if the cash flows upon which operators depend to fund their VHCN builds are eroded – such as through an underestimation of the WACC on legacy assets.

Finally, this section provides a series of recommendations that would help to lower the hurdle rate premium for future network investment, so accelerating and furthering the deployment of VHCN in Europe. Crucial among these is that legacy WACC not be underestimated, because of its negative impact (both direct and in terms of signalling) on investment and on the incentives to invest.

The challenge of changing investor expectations

Investor expectations have been shaped by a prolonged period of under-performance of telecoms stocks in Europe, together with regulation that tends to cap upside returns whilst leaving downside exposure, and that is prone to intensify once substantial capital has been committed.

There is an established literature on the risk of investment expropriation and the need for regulatory commitment;[18] as well as highlighting the parallels between, first, the need for regulatory commitment to seek to address investor expectations and, second, the need for commitment in relation to Monetary Policy to seek to address inflation expectations.[19] In recent years investors in countries with relatively developed regulatory frameworks have nonetheless had to remain alert to the risk of expropriation given examples such as Ofcom's early application of price caps to VDSL (as discussed in Section 3) or New Zealand's price regulation of fibre – both of which have been viewed as confiscatory relative to investor expectations.[20]

To be clear, when thinking about what might lift investment, nothing matters other than investor expectations. However, appropriate policy and regulation can shape those expectations and – given the baseline – there is upside here to raise them, thereby promoting VHCN deployment.

The EC costing and non-discrimination recommendation of 2013 offered the prospect of pricing flexibility and sent a positive signal to investors. Likewise, the UK Government and Ofcom have worked, with a degree of success, to reverse the harm done to investor expectations by prematurely ending pricing freedom for VDSL. It is possible to commit to an improved investment environment.

Doing the right thing requires not only identifying what is required, but also credibly committing to it. The challenge is therefore not just devising policy in the abstract but also sending consistent signals to investors and

[18] Levy and Spiller, The Institutional Foundations of Regulatory Commitment: A Comparative Analysis of Telecommunications Regulation, *Journal of Law, Economics, & Organization*, Vol. 10, No. 2, October 1994.
[19] Levine, Stern and Trillas, Utility price regulation and time inconsistency: comparisons with monetary policy, *Oxford Economic Papers* 57, 2005.
[20] New Street Research, Chorus and New Zealand Broadband Policy – Grasping failure from the brink of success, June 2021. *https://comcom.govt.nz/__data/assets/pdf_file/0031/259366/NewStreet-Research-Chorus-and-New-Zealand-Broadband-Policy-18-June-2021.pdf*

addressing the institutional challenge of committing durably to the preferred approach.

The challenge is not incremental

As noted above, the challenge involves shaping expectations, which in turn requires credibility and making a break with the past. In other words, this challenge is not an incremental one.

Demand for any individual new networks is uncertain and will remain uncertain, in particular given legacy network co-existence and also as network competition and entry unfolds. The challenge of investing at pace and at scale in VHCNs is, likewise, not incremental but instead involves a step change from a progressive upgrade of legacy infrastructure to its replacement (in addition to the difficulty involved in achieving coverage in less commercially attractive areas).

Finally, the challenge is not incremental because it calls for a different focus in terms of policy and regulation in terms of investment, competition and prices. In fact, many of the apparent trade-offs can be squared if prices are measured on a basis that simply takes account of consumption as a proxy for value (e.g., measuring the price of mobile per GB of data) and if the regulatory emphasis shifts to network (rather than access-based) competition. It should additionally be emphasised that the methods and habits of legacy telecoms (or utility) regulation are ill-suited to non-incremental network investment (given uncertain demand) or to the development of competing network infrastructure.

Telecoms is not a utility

Telecoms is sometimes thought of as a utility. Indeed, some advocate a utility style regulatory model, whereby an asset base and price cap consistent with 'normal' returns is set for new investment.

However, telecoms differs fundamentally from utility distribution networks such as those for water or electricity. This is for several reasons relevant to the appropriate form for regulation required:

- Generations of technology operate in parallel, for instance copper and fibre, and consumers may have a choice between these. This introduces risk since the transition between network technologies is uncertain (for the old technology in terms of economic asset life and for the new technology in terms of adoption). It is also a reason why regulation of the new technology may not be required, even absent sufficient competition from rival independent networks, since an existing regulated technology can act as a partial substitute, or anchor product, for the new technology. Where legacy copper service is withdrawn an equivalent 'virtual' product over fibre could continue to fulfil the role of an anchor product, in instances where other competitive price constraints are judged insufficient, thereby supporting ongoing forbearance.
- There are often not only competing networks but also entry from fresh competitors. Such competition introduces additional uncertainty over and above that arising from parallel legacy and VHCN infrastructure regarding demand for a given investor's network. Further, whilst inferior in certain respects, wireless has proved good enough for some consumers even in markets where fibre deployment is advanced, for example, in New Zealand.
- The underlying end user broadband service can be differentiated, such as by speed tiers, in a way which is not possible for water or electricity. Furthermore, over time, the market has become more heterogenous (standardised voice was essentially once the only service).

So, in contrast to a utility, risk in telecoms is inherent, since demand and the willingness to pay for new services is uncertain and will remain

uncertain – as a consequence of infrastructure competition (including from legacy assets) and the threat of entry.

Inherent risk complicates the setting of regulatory price controls, since demand for any one individual network is uncertain – as it depends not only on market demand, but also on the share of market demand that is captured by a given network. It also means that whilst regulators may act in a way that allows scope for upside reward (primarily through forbearance) they cannot eliminate downside demand risk.

There is also less justification for comprehensive price controls, since competition from regulated legacy networks and alternative networks constrains pricing power; whilst the balance of costs and benefits of regulation is less favorable since regulation involves greater risk in terms of harm to consumers via foregone new or differentiated services, as well as via reduced entry and infrastructure competition.

By contrast to utilities, the degree of uncertainty present in telecoms, together with the nature of this market's dynamics, may justify forbearance and should be given much greater weight when assessing the balance of costs and benefits of any given intervention. Given that dynamic benefits are difficult to anticipate or quantify, there is a need for judgement here – as well as a case for acting with a bias against intervention.

The institutional challenge of sustaining a bias against intervention to reflect the tradeoff in terms of dynamic benefits foregone should also be recognised when considering the design of regulatory institutions as well as the inclusion of appropriate checks and balances in relation to telecoms regulation.

Reducing cash flows directly undermines investment

It should be relatively uncontentious that underestimating WACC will inevitably have one, very immediate consequence – it is liable to reduce the cash flows available to each operator. If, and only if, signaling factors are ignored (which, for the reasons discussed elsewhere in the present document, would be highly unrealistic), it might be argued from a purely abstract perspective that this should not in itself impact decisions about future investments. However, there are convincing theoretical, empirical and pragmatic reasons to believe that reduced cash flows are likely to reduce investment.

Imperfections in the market, due to information asymmetries and moral hazard, introduce a link between free cash flow and investment.[21] An academic paper from Bolton, Wang and Yang (2014) concludes:[22]

> *"Investment distortions via asset sales are critical parts of risk management for firms that are severely financially constrained. Preserving liquidity is thus of the first-order importance to maximize firm value."*

Empirical evidence also supports a conclusion that reduced free cash flow would be likely to lower levels of investment. For instance, Almeida, Campello and Weisbach (2007)[23] analyse data for manufacturing firms in the US and reach the conclusion:

> *"our results strongly suggest that financing frictions affect investment decisions."*

Of particular significance regarding the telecoms industry was the finding of Worthington (1995) that the impact of cash flow constraints on

[21] Holmstrom and Tirole, *Financial Intermediation, loanable funds, and the real sector*, The Quarterly Journal of Economics, Volume 112(3), August 1997.
[22] Bolton, Wang and Yang, *Corporate Finance and Risky Inalienable Human Capital*, May 2014.
[23] Almeida, Campello and Weisbach, *Financial Constraints, Asset Tangibility, and Corporate Investment*, 2007.

investment was substantially greater in industries with high sunk costs.[24]

Pausing to think about how decisions are practically made within companies also suggests that reduced cash flow would be likely to result in reduced investment.[25]

Addressing the challenge

Investors are interested in expected returns allowing for risk and set against alternative investment options in other sectors or geographic regions. This implies that 'the cost of capital' needs to be considered in the round, considering the impact of policy on the potential upside and downside of investing, including the risk that policy and regulation could have the effect of expropriating invested capital *ex post*.

A range of considerations are relevant to this wider conception of the cost of capital, including:

- Acknowledging that telecoms networks are unlike utilities since they involve parallel running of old and new networks, with demand split between the two; growing competition between network providers; and scope for differentiation of the underlying network service to end users. Errors in characterising telecoms networks as utilities increase the risk that poor policy and regulation will follow.
- Recognising that price controls on legacy networks increase the risk of investment in VHCNs; since legacy networks compete with new networks, and the continued availability of legacy networks at lower prices will deter uptake of VHCN services. Likewise, limitations imposed on migrating from legacy platforms may increase VHCN investment risk.
- Enabling service/price flexibility for VHCN offerings, since allowing different service/price points and permitting their evolution over time give networks better scope to optimise adoption and monetisation, whilst also improving the prospects for widespread take-up of VHCNs. The EC's ongoing work on revising and updating the 2013 *Non-discrimination and costing methodologies Recommendation* (NDCM) may provide useful opportunities in this regard.[26]
- Ensuring that, whilst network access is available, it does not entail an uncompensated transfer of risk from access seeker to access provider. Co-investment and long-term volume related contracts can both help address this concern, whilst also helping with commitment, since access provider and access seeker incentives are more likely to be aligned around network transition and growing the VHCN market. Again, the EC's ongoing work in revising the *Non-discrimination and costing methodologies Recommendation* (NDCM) may yield opportunities here.
- Taking account of the impact of the legacy WACC on new investment. This matters in terms of substitution incentives, but also for investor expectations given that any new investment will become legacy investment over time. Ideally, price controls should not be applied to new investment and hence a WACC estimate should not be required, but investors will receive greater assurance if, above and beyond this, there is an approach to legacy that minimises the risk in any future scenario where legacy rules were to be applied to VHCN investment.

[24] Worthington, Investment, cash flows and sunk costs, The Journal of Industrial Economics, Volume 43(1), March 1995.
[25] Stein, Jeremy C, 1997, *Internal Capital Markets and the Competition for Corporate Resources*, The Journal of Finance, Vol. 52, pp. 111-114.
[26] European Commission, *Access Recommendations: Factual summary report of the targeted consultation on the proposed revision*, 8 December 2020. *https://digital-strategy.ec.europa.eu/en/access-recommendations-factual-summary-report-targeted-consultation-proposed-revision*

- Avoiding the negative knock-on effects on VHCN investment that reducing operators' cash flows from legacy assets is likely to have.
- Developing and then reporting metrics for outcomes and pricing in the telecoms sector that reflect underlying productivity growth and declining unit prices, rather than reporting bills alone.
- Thinking carefully about institutional design and incentives. Regulators may need the help of governments, the member states and the EC itself in making credible long-term commitments to a sound approach – in order to demonstrate that a future regulator will not be tempted to renege. Likewise, access providers need the flexibility to write contracts with access seekers that align their incentives, as otherwise investors will anticipate lobbying by access seekers for advantage once investment has been committed.

Whilst all the above are relevant to the 'cost of capital' conceived in broad terms, the next section considers the narrower question of the estimated weighted average cost of capital for legacy investment following the WACC Notice/BEREC reports, before wider considerations are addressed in the final section.

5. Pitfalls of the EU approach to the WACC

Based on the WACC Notice of the European Commission guidance, BEREC issues annual reports on estimated WACC parameters for legacy investment in telecoms. The Notice and its implementation involve pitfalls that can be expected to discourage investment and distort the allocation of capital between both individual member states as well as the EU and other global regions.

First, an EU-wide equity risk premium is estimated as required by the Commission Notice. Yet, in combination with member state specific risk-free rates, this has resulted in divergence rather than convergence in the estimated cost of capital between member states. This is liable to distort investment in EU telecoms.

Second, whilst in principle the approach is intended to support investment, there is no explicit consideration of what this might imply. Rather, WACC estimation is treated as a narrow technical exercise independent of the investment objective.

Third, whilst BEREC has focused on the WACC for legacy investment, the EC guidance mentions that the approach might be adapted to reflect the risk of VHCN investment. As discussed in the previous section, there are a number of reasons why adjusting the estimated WACC for risk in relation to new investment is hard in practice and would not be expected to lead to efficient investment. The focus should instead be on lowering investor hurdle rates via credible commitment to forbearance where possible.

The current approach is liable to result in divergence not convergence

One of the stated purposes of developing a common approach is to reduce the scope for national regulators to make different parameter assumptions, resulting in varying WACC values that do not necessarily reflect discrepancies in financing conditions across member states.

Further, the Commission Notice on the calculation of the cost of capital for legacy infrastructure proposes:[27]

> *"A Union-wide ERP is consistent with empirical evidence suggesting that financial markets in the Union are increasingly integrated…"*

However, given that the ERP reflects the compensation investors require for holding shares that entitle them to the (risky) residual claim on the profits of a company after all its other obligations have been met, one might expect the equity risk premia to vary across member states depending on assorted risk factors. Integration of financial markets is emphatically not therefore a sufficient condition for assuming that the ERP should be based a Union-wide estimate. While the process taken might benefit from uniformity and consistency, the actual circumstances measured will vary.

Indeed, the approach adopted by BEREC, following EC guidance, of combining an EU-wide ERP estimate with national values for the risk-free rate has arguably led to an artificial divergence of WACC estimates that will tend to disincentivise investment in markets with low-risk free rates and distort the allocation of capital across the European Union.

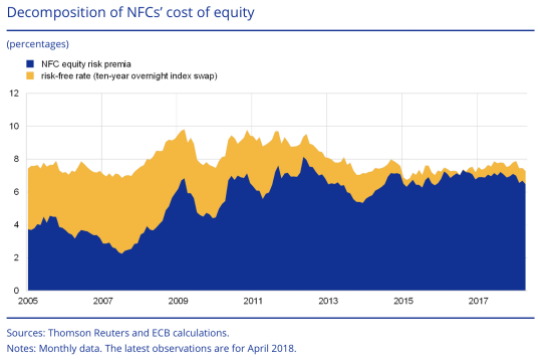
[27] Notice on the calculation of the cost of capital for legacy networks in the context of the Commission's review of national notifications in the EU electronic communications sector, November 2019. *https://digital-strategy.ec.europa.eu/en/library/commission-publishes-notice-calculation-cost-capital-legacy-infrastructure*

A sense check against the discount rates used by analysts to value companies or estimates by regulators not bound by the BEREC methodology would have pointed to the possibility that the approach to debt versus equity was flawed.

European Central Bank (ECB) economists have assessed the cost of capital, taking account of changes in the risk-free rate and the equity risk premium, because of its role as a monetary transmission mechanism. The ECB economists have found that:[28]

> *"since the start of the global financial crisis, increases in the ERP have largely offset the fall in the yield of risk-free assets"*

The following chart illustrates the shift over time in the risk-free rate and estimated equity risk premium in the EU as a whole for non-financial corporations (NFCs). As can be seen, a rising equity risk premium has tended to offset reductions in the risk-free rate.



Given that changes in the risk-free rate and the ERP are to a significant extent offsetting, the fact that BEREC's approach combines a common ERP with risk free rates derived for each individual member state (and that differ significantly) has resulted in WACC estimates that are extremely low for certain member states. The anticipated impact would be to discourage telecoms investment in some member states and to distort the allocation of capital across the EU.

A comparison of BEREC's and Ofcom's WACC methodologies

To illustrate the potential magnitude of the impact of the EC Notice and BEREC methodology, it is instructive to contrast it with the approach adopted in March 2021 by Ofcom, which estimated the WACC in relation to legacy Openreach investment.[29]

Ofcom settled on a nominal pre-tax WACC estimate of 7.0% for Openreach (and 7.8% for BT Group). Had Ofcom utilised the ERP estimated by BEREC of between 4.18% (geometric mean) and 5.31% (arithmetic mean), rather than the Ofcom estimate of 7.9%, the estimated pre-tax WACC would have been 1.5 to 2.2 percentage points lower. Applying the BEREC WACC parameter estimates nationally could therefore be expected to make investment in EU member states generally unattractive – and especially so in those countries with low interest rates.

Additionally, it is illustrative to note the qualitative features of the Ofcom judgement regarding the WACC. First, Ofcom also sought to promote investment and competition, and considered these goals complementary:

> *"the overall approach to regulation in this review reflects our objective to promote investment in gigabit-capable networks by Openreach and other telecoms providers in order to promote network-based competition"* [Paragraph A20.148]

Second, price controls apply to legacy but not to FTTP (fibre-to-the-premise) infrastructure. Ofcom recognises that FTTP investment involves

[28] André Geis, Daniel Kapp and Kristian Loft Kristiansen, Measuring and interpreting the cost of equity in the euro area, *ECB Economic Bulletin*, June 2018. https://www.ecb.europa.eu/pub/economic-bulletin/html/eb201804.en.html

[29] Ofcom, Promoting investment and competition in fibre networks: Wholesale Fixed Telecoms Market Review 2021-26, Appendices 1-26, March 2021. https://www.ofcom.org.uk/__data/assets/pdf_file/0021/216084/wftmr-statement-annexes-1-26.pdf

both upside and downside risk, and that capping returns would remove the scope to earn higher returns if the upside eventuates; thereby lowering expected returns overall and denying investors what Ofcom refers to as a "fair bet".

Third, whilst Ofcom acknowledges the literature on "aiming up" discussed under the sub-section below, it did not make an explicit adjustment for this. Rather Ofcom notes that "*Taken in the round, our estimate is consistent with supporting investment in the sector…*" (A20.147).

A comparison of BEREC's calculations with equity analyst estimates

The WACC implied by the BEREC guidance can be compared with the cost of capital utilised by investment analysts to value telecoms companies. A discount rate is a necessary input to analysts' company valuations and – since analysts do not have an incentive to under or overstate the discount rate they utilise – these provide a useful sanity check on WACC estimates derived for regulatory purposes.

Post-tax WACC estimates for various European telecoms operators by HSBC equity research are shown below (the pre-tax WACC is inferred utilising corporate tax rates, while gearing estimates are from Ofcom for BT and from the BEREC guidance for the other companies; the estimates for Orange are for France).

HSBC post-tax WACC and inferred pre-tax WACC

	BT	KPN	Orange	Proximus	TI	Telenor
HSBC post-tax WACC	7.7%	6.1%	6.2%	6.3%	7.3%	7.75%
Inferred pre-tax WACC	9.5%	8.1%	8.6%	8.4%	10.1%	9.9%

Source: HSBC, Telecoms: Call to return (on capital), 5 February 2021.

Estimates based on the BEREC methodology are significantly below the values above utilised in valuing telecoms assets, a warning that they are unrealistically low in comparison to reasonable investor expectations.

The EU Notice should be revised to stipulate that member state specific ERPs be estimated based on an agreed methodology, and BEREC should then issue a revised set of estimates produced using this methodology. The EU Notice should also permit and encourage sense checks on the overall WACC estimates, for example in comparison with the discount rates applied by equity analysts in valuing companies.

Taking proper account of uncertainty and Europe's policy goals

The WACC estimate used in setting price caps for legacy networks will affect incentives to invest in new network for two reasons. First, the price of legacy networks impacts the pricing of and/or the demand for new networks. Second, the approach taken to the regulation of legacy networks can be expected to influence investor expectations regarding the future treatment of new investment. Judgement is required and this should not be lost sight of by reducing WACC estimation to a purely mechanical exercise.

The BEREC methodology produces point estimates for the WACC but fails to explicitly acknowledge and assess the significant uncertainty involved in estimating the WACC (primarily in relation to the cost of equity). Standard errors should be reported alongside point estimates.

Further, one of the European Commission's objectives in publishing a notice on the calculation of the cost of capital for legacy

infrastructure is to "promote efficient investment and innovation by setting rates reflecting the appropriate level of risk".

Yet the implications of promoting efficient investment are not spelt out and BEREC does not consider this objective in adjudicating on WACC parameters. In practice, the objective of promoting efficient investment has been neglected.

In view of the fact that the WACC estimate is inherently uncertain, there is an important question over whether to "aim up" within the estimated distribution of WACC values, given the asymmetry present in relation to the social costs of over- versus under-investment.

The literature in relation to the asymmetric costs of investment decisions includes Wright *et al* (2003) and Dobbs (2011)[30]. A review for the UK Regulators Network[31] (2018) also considered the question and concluded that aiming up can be justified to promote socially efficient investment.

The report for the UK Regulators Network modelled the optimal degree of aiming up across a range of assumptions and concluded that the optimal degree of aiming up is in fact significant for a range of plausible assumptions. This study found that, given demand elasticities less than 1, the optimal degree of aiming up would be to utilise the 90th percentile of the estimated WACC distribution.

The estimation of the WACC and implementation of a price cap are distinct but related activities. Alongside guidance on estimating the WACC, BEREC should provide guidance on the question of aiming up when utilising a WACC estimate to set a price control. The risk otherwise is that the latter element is disregarded in an overly simplistic use of the WACC estimate to set a price control that loses sight of the fundamental objective of promoting efficient investment.

Lowering investor hurdle rates would act to promote investment

The European Commission Notice (November 2019) focusses on the WACC for legacy investment and notes that (paragraph 1.4):

> *"The scope of the Notice is limited to the WACC calculation for legacy infrastructure. For the purposes of the Notice, legacy infrastructure means infrastructure of an SMP operator not subject to a Next Generation Access (NGA) premium."*

Further, footnote 21 of the Notice states that:

> *"The Notice does not prejudge whether additional premiums for specific investments are justified, in particular for certain next generation access networks…. The lower risk profile of investment into FTTN/VDSL (compared to fibre to the home) is discussed in Annex I, section 6 of the NGA Recommendation. In such cases, NGA networks fall within the scope of legacy infrastructure."*

Some risk adjustment is of course preferable to no risk adjustment. However, in practice, making a risk adjustment for next generation access networks is highly problematic and provides only a markedly inferior means of promoting efficient investment, for the reasons discussed in the previous section.

[30] Dobbs, Modelling welfare loss asymmetries arising from uncertainty in the regulatory cost of finance, Journal of Regulatory Economics, February 2011. https://www.researchgate.net/publication/227347375_Modeling_welfare_loss_asymmetries_arising_from_uncertainty_in_the_regulatory_cost_of_finance

[31] Wright, Burns, Mason, Pickford and Hewitt, Estimating the cost of capital for implementation of price controls by UK Regulators, 2018. https://www.ukrn.org.uk/wp-content/uploads/2018/06/2018-CoE-Study.pdf

As previously noted, regulation also interacts with risk to introduce an asymmetry, since regulation caps the upside without limiting the downside.

Further, the power of regulators to expropriate value once capital has been committed is a key source of perceived risk for investors. Any attempt to somehow quantify this risk and then use it to inflate a price cap by way of compensation is fraught with difficulty. For example, investors will know that regulators are unlikely to allow for the risk that their power to set future prices inherently introduces. A more effective and transparent approach would be to tackle directly the source of the perceived risk itself, to reduce the hurdle rate for new investment.

Any form of cost-based regulation inevitably weakens the link between, on the one hand, returns and, on the other, the value that customers place on the services that ultimately flow from network investments. It also inevitably blunts and distorts investment incentives.

A further observation is that the EECC's distinction between FTTP (deserving of a risk premium) and FTTN/VDSL (legacy, hence not deserving of a risk premium) does not stand up to scrutiny because:

- First, risk must be assessed from the perspective of investors at the time the investment is made. What might now appear to be a sure bet may have looked very different at the point of time when the decision was originally made to commit the capital in question.
- Second, if FTTP is now viewed as having a reasonable prospect of success, then the clear implication of this is that the economic asset life of FTTN/VDSL will be significantly shorter than was originally envisaged at the time of its deployment.
- Making an investment in any generation of technology is inherently risky when there are other generations of infrastructure present that can act as potential substitutes. This is, of course, even more the case if there is also uncertain demand.

It is therefore preferable to forebear, as well as to bake into the design of regulatory institutions the scope to make credible commitments to forebear in future. This would have the effect of lowering investor hurdle rates, and so facilitate greater investment.

6. Commitment to a framework that supports investment is required

Investment in telecoms is a multi-round game, and therefore its regulation needs to be also. Amongst the most fundamental reasons why the telecoms industry should not be confused with a utility is the fact that it undergoes such rapid technology change. Indeed, telecoms can be thought of as 'joined at the hip' to Moore's Law. Improvements in processing power and other parallel advances progressively lift bandwidths, which in turn lead not only to improvements in existing services but also enable the launch of new services altogether. Ensuring that networks benefit from the latest equipment necessitates investment that is not only substantial but also continuous.

Hence the desirability of a regulatory framework that is adapted to the industry's own investment process: long term and continuous. This, however, raises certain challenges. The first relates to the time horizons involved. Telecoms regulation tends to act over time-frames that are much shorter than are those associated with network returns profiles. This disconnect has been recognised in the EECC, which has extended the period between NRAs' market reviews, from 3 to 5 years. Even a 5-year period, though, is slight by comparison with the returns profile of an access network, which can run to decades (though note, obviously, that certain access networks have never generated or may never generate an adequate return).

Aligning regulatory and investment outlooks

For the purposes of encouraging investment, regulatory periods would ideally match those of investment returns. In practice, though, this presents certain difficulties. While NRAs are independent, they must remain under political scrutiny and exist within a framework that is itself ultimately politically determined. The present participants within this system are not able to bind the hands of their successors.

These difficulties are genuine, but should not be seen as cause to simply abandon efforts to provide for consistency and predictability in regulation. It is easier to justify long-term network investment in a context of a stable, orderly and predictable regulatory environment and therefore every effort should be made to get as close to this as possible.

One action in this regard is, fortunately, relatively straight-forward. In the absence of a crystal ball, investors are liable to look to recent decisions as a steer to the type of treatment that they can anticipate in future for their new investments. The regulatory treatment of legacy assets thereby provides regulators with a powerful signalling tool. Estimating a WACC that fairly and accurately reflects the broad set of concerns discussed in the present document would be an important step in this process. In particular, it would demonstrate adherence to the EC's notice which includes the objective:[32]

> *"(iii) the promotion of efficient investment and innovation in new and enhanced infrastructures, taking account of the risk incurred by the investing undertakings"*

The controversy that has arisen over legacy asset WACC estimates indicates that the current regulatory environment is not yet fully aligned with the need to encourage and support investment. As currently estimated, BEREC's WACC figures give the impression that telecoms is being treated as a single-round game, wherein the treatment of legacy assets is of diminished

[32] EC, Commission Notice on the calculation of the cost of capital for legacy infrastructure in the context of the Commission's review of national notifications in the EU electronic communications sector, 2019.

significance precisely because they are legacy. This ignores the dynamic nature of the system.

It is now therefore important that the EC clarify its stance on the significance it attaches to the treatment of legacy infrastructure – which is, to reiterate, the future status of any investment of which it is now desirous.

By adapting its approach to estimating WACC, BEREC could likewise signal the importance it attaches to a consistent and predictable regulatory environment, one that would encourage fresh investments in VHCN infrastructure. In this regard, factors like 'aiming up' would convey a particularly strong message that the regulation is intended to support network investment.

However, a regime that really sought to nurture and encouragement investment in VHCN ought to go further:

- Although the time period covered by regulatory market reviews has been extended, from every 3 years to every 5, there is still a profound mismatch here between this time horizon and the time it will take investors to recoup their capital. This could perfectly feasibly be three times as long. (For the purposes of clarity, note that stating the payback period is extended should not be confused as implying that achieving payback is somehow guaranteed; the meaning here is rather that, even if payback is reached, it will nonetheless take a protracted period of time). Extending the period covered by market reviews would improve visibility and predictability but need not be applied to each and every telecoms market component, being chiefly appropriate to those reliant on infrastructure that is particularly time consuming to deploy (e.g., VHCN).
- A public commitment to forbear from regulating NGA services, in view of the price constraints present from (i) competing infrastructure, whether legacy or otherwise; (ii) the threat of new market entry; (iii) competing cellular platforms. It needs to be borne in mind that VHCN platforms are inherently expensive to roll out and will require high levels of uptake if they are to generate an adequate return. Excessive pricing would only make it harder to reach the required levels of adoption.
- The case for forbearance is still stronger where operators make long-term public commitments to provide access on designated terms or conclude long-term agreements with access seekers.
- Given the inevitable temptation to change approach once investment has been committed, investment would benefit from an enhanced regulatory system of checks and balances, whereby any proposal to adapt the status and treatment of certain investments (e.g., to reclassify VHCN in future as legacy) would require the approval of NRA, member state government and EC, each with a specific mandate to review any such proposal sceptically with particular regard to the impact any such decision would have on future investment.