

Supercollider

European mobile consolidation is win-win
for operators and citizens alike

Capex is the most powerful factor driving down unit prices

Consolidation would sustain heavier infrastructure investment

Network sharing is a complement (not an alternative) to consolidation

Summary

In September 2008, scientists at CERN turned on the Large Hadron Collider (LHC), a giant EUR7.5bn particle accelerator located near Geneva. At the time, there were fears about this supercollider's safety – doomsayers predicted the formation of black holes and the end of the planet. In fact, what emerged was the discovery of the long-sought after Higgs boson and a pair of Nobel prizes, from what has proven to be one of Europe's most successful collaborations.

Supercolliders work by bringing together particles at high speeds with the aim of creating still more fundamental ones. But it isn't Europe's only (or even most expensive) experiment along these lines. In telecoms, the consolidation currently being proposed could create operators capable of the heavy investment needed if Europeans are to reap the full benefit not only from mobile technology, but also from another innovation to come out of CERN – the World Wide Web.

Supercollider

It is probably little known that the World Wide Web was born not in the US, but actually in Europe – at CERN, devised there by a British scientist, Tim Berners-Lee. Yet the bulk of the value generation that has been associated with this remarkable invention has accrued across the Atlantic, especially in Silicon Valley, where the capital has been available to back such new technologies. Perhaps the moral of the story is that innovation will only take Europe so far: to properly leverage it requires investment.

Comparatively recently, Europe led the world in mobile technology – but no longer, with companies like Nokia first being overtaken by rivals like Apple and Samsung, and then disposing of its handset division to Microsoft. Moreover, Europe has even fallen behind in deploying new infrastructure, in particular 4G/LTE, which will facilitate mobile's transformation into a data-centric platform providing ubiquitous high-speed access to the Web. The risk, as a result, is that European productivity will further languish at a time when the region greatly needs economic growth. In our view, there is an urgent call for investment. Unfortunately, the present parlous condition of mobile markets impedes this. Contracting revenues encourage the withdrawal of capital and its allocation elsewhere. Ultimately, it is European citizens who suffer as a consequence. We believe the solution to this is a healthier industry, growing, able to invest and thus also able to deliver mobile services at the lowest unit prices. **This report sets out why we think a degree of consolidation (specifically, four-to-three in mobile markets) is the right way to achieve this, to the advantage of the sector and its customers alike.**

The state of the debate

There are currently two deals awaiting the judgement of DG COMPETITION, the merger control regulator of the European Commission (EC). The first is in Ireland, where Three hopes to acquire Telefonica's O2 operation, with a decision due in April. The market in question is relatively small (which makes securing the necessary levels of investment a key issue), and already hosts a decently sized mobile virtual network operator (MVNO) – an important factor in the eyes of DG COMPETITION. In May should follow a decision on Telefonica Deutschland's proposed acquisition of E-Plus in Germany. One of the most prominent features of this market is its abundance of MVNOs – and note that these resellers have consistently generated much higher returns than the network operators. Interestingly, in a consultation conducted by the BNetzA (the German national telecoms regulator), none of the existing MVNOs felt it necessary to call for the imposition of wholesale obligations on a cost-oriented basis. We suspect the BNetzA may like some spectrum redistribution, but do not detect a local agenda to return the market to four players. A further consideration in Germany is fixed-mobile convergence, since both Deutsche Telekom and Vodafone have fixed-line capabilities, but the two operators seeking to combine lack this. They could therefore find themselves at a material disadvantage as the market evolves towards quad-play offers (and towards small cell architectures that require dense backhaul arrangements). Overall, we do therefore see positive grounds for the proposed consolidation to be given the go-ahead.

Indeed, as stated at the outset, **it is our belief generally that consolidation would produce a healthier European industry able to invest more to provide European citizens with better value-for-money services.** At present it is lagging globally in this regard. Admittedly, **American mobile bills are higher, but our analysis shows US unit prices are cheaper.** Moreover, it is already clear that Europe is of diminished priority to handset vendors, while the region's fragmented operators lack much bargaining power with which to respond: hence Apple and Samsung look likely to take a disproportionate share of the value chain.

International parallels could become all the more striking if US or other global players make substantial acquisitions in Europe (although operators like America Movil and Hutchison are, of course, already present). Meanwhile, note that AT&T's denial of an interest in Vodafone would not preclude it from making a friendly bid (always its most likely mode of approach, in our view). The activity from international players suggests that consolidation is probable in any case – the only question being whether European operators will be permitted to participate. **If concentration concerns entail remedies that deter would-be European dealmakers, then the field would be left by default to their global peers.**

The Austrian case

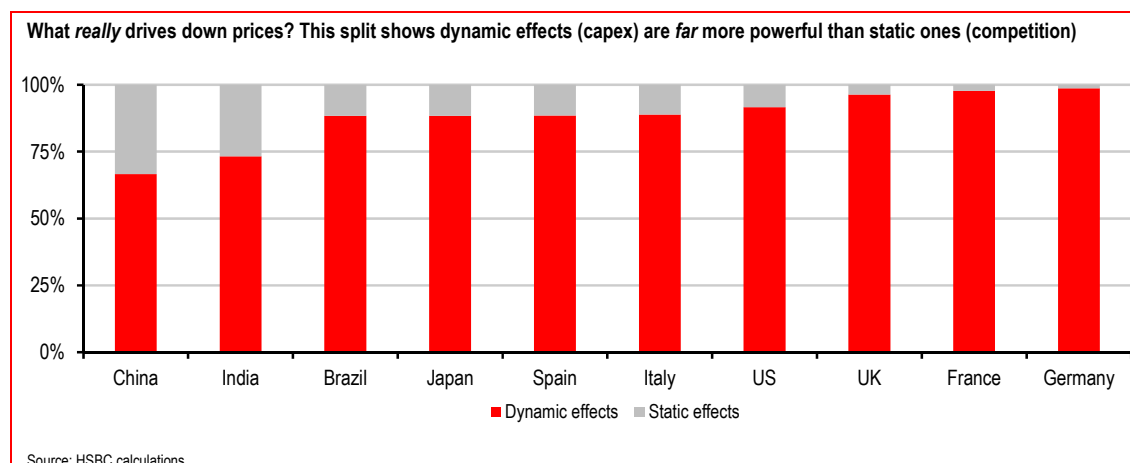
What lessons will aspiring European consolidators draw from past precedents? There has only been one recent in-country mobile acquisition, that of Orange Austria by Three. DG COMPETITION set out its reasoning for approving the deal in detailed case documents. These send a mixed message in our view, but it is plain that **there is more the industry can do to justify the merits of consolidation.**

The first task when assessing the impact of an acquisition is to identify the market in question. The worry here will be that the definitions employed are too narrow. For example, mobile and fixed-line data offerings are hardly perfect substitutes, but we still think WiFi (connected to broadband lines) depresses mobile pricing. We also think it is vital to consider the constraints imposed by over-the-top (OTT) services. The case documents' central component is the assessment of the likely magnitude of any tariff increases

anticipated as a result of a merger. These calculations are based upon a Gross Upward Pricing Pressure Index (GUPPI) technique. Normally, upward pricing pressure analysis assigns a separate term to the efficiency gains that the merger can be expected to liberate. However, here this was omitted, as it was felt that the merging parties had not substantiated their existence. Our concern is therefore that the most significant benefit of consolidation has not been factored into calculations – which capture the incentive to raise prices, but not that to invest. We think that the latter effect far outweighs the former, with the result that unit prices will eventually fall – and consequently regard it as **vital that operators place what are technically termed dynamic efficiency gains centre stage when making their case.**

Ultimately, the Austrian deal was approved, but only on conditions that the financial markets perceived as exceedingly onerous. Our own opinion is that they were harsher than we feel were warranted, given dynamic efficiency gains that we believe could be of enormous benefit to customers. However, we would also observe that the remedies were not quite so negative as many might initially have concluded. We would draw attention to the fact that the pricing structure to which Three has committed as a remedy is variable in nature. Hence MVNOs must pay for the capacity they use, rather than having access to it on a flat-rate basis. This is critical if incremental network investment is to achieve a return (so as to justify further such investment, and thus progressively lower unit prices).

Three also made commitments on spectrum as a remedy, undertaking to handover frequencies to a new fourth player. This was (understandably) the subject of some consternation from investors at the time of the deal's approval. However, Three only committed to give spectrum to any fourth player securing spectrum in the Austrian 4G auction – and since none appeared, the obligation lapsed. The immediate comment to make on this matter is that we believe remedies inviting in new entrants on essentially subsidised terms are only likely to jeopardise the very investment on which we believe sustained unit price declines rely. Nonetheless, the absence of an entrant suggests that notions of the industry enjoying excessive returns may be mistaken. (Indeed, analysis of the margins of Europe's entrants of the 2000-era and after reveals a dismal picture). On the evidence of Austria, we believe the most appropriate number of mobile network operators is three. Post the merger, Austrian operators have lifted certain tariffs, but focused on the low end of the market, where we would argue that price levels were unsustainably low, and have also added to the size of their bundles. We must also emphasise it will take time for investment to occur and feed through into lower unit prices.



Dynamic efficiency gains

We believe it should be clear from the Austrian case that, if operators are to be convincing on the benefits of consolidation, they will need to demonstrate the associated dynamic efficiency gains from investment. In the past, static effects (such as competition) have tended to receive more regulatory focus, but we would emphasise that only network investment can harness the full benefits of technological innovation (making it all the more unfortunate that Europe is falling behind its global peers in terms of capex). In this report we therefore seek to demonstrate that **dynamic efficiency gains (specifically, capex) are primarily responsible for powering unit price declines, and that healthy margins are required to support the capex involved.**

The chart above reveals the degree to which dynamic effects dominate in terms of the factors driving down unit prices – to the extent that the weak nature of competitive effects may come as a surprise. A brief explanation would be that an operator's margin typically accounts for but a minority of its unit price. Greater competitive intensity works by reducing this margin component, and thus the unit price; but it is not a sufficiently large portion of the overall unit price calculation to make a big difference (and margins cannot even be forced down as far as zero, since companies would exit the market). By contrast, there is no cap on the volumes that enhanced investment can drive, and therefore this is far more significant in terms of its impact on unit prices (see pages 52-54 for a full account).

We use a theoretical model to derive the profitability required to sustain the optimal level (in the sense of minimising unit costs/prices) of network investment, and identify this as an EBITDA margin of towards 40% (though note that the model does not take any account of spectrum costs). This work accords well with our examination of the empirical evidence, which suggests that network investment increases with margin up to a certain threshold – of around USD110 pa per user, equivalent to a percentage EBITDA margin in the high thirties. The significant correlation between margin and capex up to this breakpoint suggests that, at these levels, incremental margin is invested in network because it is efficient to do so. Beyond this threshold, investment rises at a slower pace, as operators' enthusiasm for incremental capex diminishes once they are spending at optimally efficient levels. However, most European countries are well beneath the breakpoint. **We therefore conclude that higher margins would lead to higher investment, enabling European operators to optimise their capex to deliver capacity at the lowest unit cost.** The fact that this is underpinned by empirical observation should provide reassurance to those who question whether, post consolidation, operators would actually use improved margins to fund greater investment.

The above line of reasoning is different from an economy of scale-based justification for consolidation, in which market concentration leads to lower unit costs and greater profitability – but where this enhanced profitability is not itself necessary to generate the lower unit costs. Network sharing is often favoured as an alternative to consolidation because it confers economies of scale but without necessarily improving margins (since the cost savings are usually passed on to customers). We certainly approve of network sharing on this basis (it lowers prices), but must highlight it will not drive dynamic efficiency gains, since it will not sustainably boost margins and thereby power capex. **Because it captures an entirely separate effect, network sharing is a complement – not an alternative – to consolidation.** Furthermore, our analysis comparing Europe's network sharing arrangements to tariff levels identifies only a weak correlation. We therefore do not see evidence that network sharing can substitute for the positive effects on investment and unit pricing that we believe would be brought about by industry consolidation.

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The state of the debate

- ▶ Process of convergence just as important as the role of MVNOs
- ▶ Trans-Atlantic comparisons worrying: US unit prices are lower
- ▶ Deals likely – but will buyers be global or can they be European?

Consolidation: the story so far

The question of consolidation is again very much on the agenda in the telecoms sector. Two proposals are currently on the table, and will be covered in this section, while a third deal was given conditional approval at the end of 2012. This transaction, in which Three acquired Orange Austria, provides the most recent precedent for an in-country mobile merger, and is consequently discussed in depth in the following section. However, this recent ‘batch’ of deal-making is by no means the total sum of M&A that has occurred within the European mobile telecoms space. The accompanying table summarises the in-country transactions attempted over the past decade.

The picture that emerges is mixed. On the one hand, most deals have been approved, albeit they have tended to be relatively smaller in scope than those currently proposed. On the other, while the European Commission’s merger control regulator, DG COMPETITION, has not formally rejected acquisitions, it has been reported that Vodafone’s (VOD LN, 240p, OW, TP 270p) proposed consolidation of the Greek market was withdrawn because of regulatory opposition (*Bloomberg*, 6 February 2012). Additionally, although Austria was approved, many have argued that lighter touch remedies would have been appropriate.

However, one thing that DG COMPETITION’s track record does indicate, to our mind, is a preparedness to discuss the benefits that consolidation might bring, alongside (of course) the attendant difficulties it could pose. We would add that, while we think the work of a merger control body is inherently fascinating, we can only imagine that it must seem a thankless task at times. When deals are blocked, the reactions of the parties involved can be vociferous while when deals are approved, consumer groups can be critical and suspicious. Additionally, there is the ever-present downside that a judgement could be questioned in the courts.

Consistency of process

The only way to deal with these challenges is surely to examine each deal on its own merits while maintaining a consistent and rigorous analytical process – and we believe that this is in evidence at DG COMPETITION. Naturally, when substantial deals are proposed, they attract much media attention – and it is perhaps inevitable that the focus tends to gravitate towards what are perceived to be the ‘politics’ involved. Hence there can be a tendency to talk in terms of ‘entrenched’ positions, as well as to discuss any potential variation in the output of the process – the final decision – as indicating inconsistency.

We sometimes have the sense that, if DG COMPETITION were to (for the sake of example) approve the consolidation proposed in Ireland without requiring MVNO or spectrum remedies, it might be portrayed as having backtracked on its decision in Austria – where these types of remedies were required. However, we think this type of commentary does all parties involved and the associated process a disservice. Certainly, in the course of our own discussions in Brussels, we have been struck by the purpose evident amongst all the relevant bodies to actually reach the right decision – even if the perspectives involved on any given topic do vary considerably.

With respect to the final decision on an acquisition (and the remedies required), we would argue that consistency is to be judged not in terms of the relatively binary outcomes (approved/rejected), but rather on the rigor of the underlying decision methodology: in other words, consistency of process, not output. Transactions are evaluated on a case-by-case basis, with different circumstances in different deals warranting different conclusions – without there necessarily being any inconsistency.

An important corollary of the above is that new regulatory measures are not required as some kind of pre-condition for competition regulators changing their ‘opinion’ on telecoms consolidation. We would suggest that bodies like DG COMPETITION do not have an ideological stance so much as a process. What is therefore vital, in our view, is that the industry input into that process a more clearly articulated set of arguments as to why consolidation is in the best interest of Europe’s citizens (the only relevant long-term yardstick). We believe that such a case should be centred on dynamic efficiency gains, and detail this line of reasoning in the third and final section of this report.

However, we would acknowledge that there are many factors involved in the multi-layered and complex merger control decision process. Numerous interested parties will (quite reasonably) want to have their say. Meanwhile, aspects of the telecoms regulatory regime are themselves presently subject to a wide-ranging overhaul, as a consequence of the proposed single market reforms. Finally, even what might be described as the global tectonics are becoming increasingly relevant, as international players from outside Europe become more directly involved in the continent’s industry. The current section seeks to bring together these disparate moving parts.

Ireland

The next deal awaiting DG COMPETITION’s verdict is in Ireland, where – as in Austria – it is again Three that is attempting to consolidate the market, this time by purchasing Telefonica’s O2 operation. Ireland does share certain similarities with Austria, but there are also major differences.

Both markets are relatively small by western European standards, but Ireland’s population of 5 million is nonetheless significantly lower than Austria’s of 8 million. This may encourage the local reception to the deal to be more positive, as potentially securing investment that might not otherwise be forthcoming. After all, Telefonica (TEF SM, EUR12.5, N, TP EUR13) has plenty else on its plate at present (domestically, in Brazil and in Italy), while Three could move its focus elsewhere within its portfolio of European properties.

Proposed and approved mobile deals in Europe

Year	Market	Acquirer	Target	Revenue market share Operator	Subscriber market share Operator	MVNOs	Synergies	Remedies	
2013	Germany	TEF O2	E-plus	T-Mobile Vodafone E-Plus TEF O2	35.5% 32.3% 16.2% 15.9%	T-Mobile Vodafone E-Plus TEF O2	33.0% 28.4% 21.5% 17.1%	c70 According to TEF O2, the combination would have total estimated synergies of EUR5.0-5.5bn. Based on 8% capitalization rate, this would imply an annual synergy of EUR440m or 5.5% of combined revenues.	Subject to regulatory approval
2013	Ireland	Hutchison	TEF O2	Vodafone TEF O2 Eircom Hi3G Tesco Mobile	45.2% 26.3% 17.3% 10.0% 1.2%	Vodafone TEF O2 Eircom Hi3G Tesco Mobile	39.4% 28.1% 19.7% 9.4% 3.4%	4 No synergy targets provided by Hutchison. CEO comments "combined 37.5% market share gives us the scale and financial strength to compete even more aggressively" (Three press release, 24 June 2013).	Subject to regulatory approval
2012	Austria	Hutchison	Orange	Mobilkom T Mobile Orange Hutchison	39.2% 30.1% 19.3% 11.4%	Mobilkom T Mobile Orange Hutchison	39.8% 30.4% 17.7% 12.1%	Nil According to Hutchison, the acquisition would create a mobile carrier with 2.8m customers and more than 20% market share in Austria. Hutchison Austria expected to generate cost and capital spending synergies of EUR500m NPV from the combination. Assuming a capitalization rate of c8%, the annual synergies would be cEUR40m, which would correspond to c3.8% of combined revenues for 2011.	Remedies include commitment to enter into an upfront MVNO agreement, to make wholesale access available up to 16 virtual operators without a full own network for the coming 10 years and to divest spectrum and additional rights. Hutchison committed not to complete the acquisition of Orange before it entered into a wholesale access agreement with one virtual operator approved by the Commission.
2011	Greece	Vodafone	Wind Hellas	Cosmote Vodafone STET Hellas Q-Telecom	34.6% 42.5% 14.1% 8.9%	Cosmote Vodafone STET Hellas Q-Telecom	35.6% 33.9% 16.5% 14.0%	c7 No comments were provided on synergies at the time of announcement.	While it was announced that Vodafone and Wind were seeking to merge, the talks didn't lead to a formal proposal, reportedly because regulatory approval was unlikely to be forthcoming (<i>Reuters</i> , 6 February 2012).
2010	UK	T-Mob/Orange	T-Mob/Orange	Vodafone O2 Orange T-Mobile Hi3G	24.9% 29.4% 22.1% 15.2% 8.4%	Vodafone O2 Orange T-Mobile Hi3G	24.0% 26.8% 20.5% 21.5% 7.2%	c30 EUR4bn (GBP3.5 bn) NPV estimated by T-Mobile & Orange. Annual Opex based synergies of over GBP445m (c5.8% of combined 2008 revenue). Capex based synergies of GBP620m on cumulative basis over 2010-2014, and cGBP100m per year (c.1.3% of combined 2008 revenue) from 2015 onwards. Total recurring synergies of c7% of combined revenues.	Approved with conditions of amendment of network sharing agreement with Hutchison 3G UK (3UK) and divestiture of a quarter of the combined spectrum of merging parties (i.e. 15MHz of 60 MHz) in 1800 MHz band.
2010	Switzerland	Orange	Sunrise	Swisscom Sunrise Orange	61.1% 18.2% 20.7%	Swisscom Sunrise Orange	62.1% 20.6% 17.3%	c10 CHF3.2bn (EUR2.1bn) NPV of synergies estimated by Orange & TDC. Annual opex and capex synergies of CHF200m and CHF65m respectively, together corresponding to c8% of combined revenues.	Competition Commission rejected the deal. The Commission said that if the merger had gone ahead, "there would have been only two market players and they would have had every interest in keeping high prices. With three operators on the Swiss mobile market, a "certain dynamism" was maintained and there was "room for innovation."

Note: Market shares given at time deal proposed
Source: The European Commission, HSBC estimates

Proposed and approved mobile deals in Europe (continued)

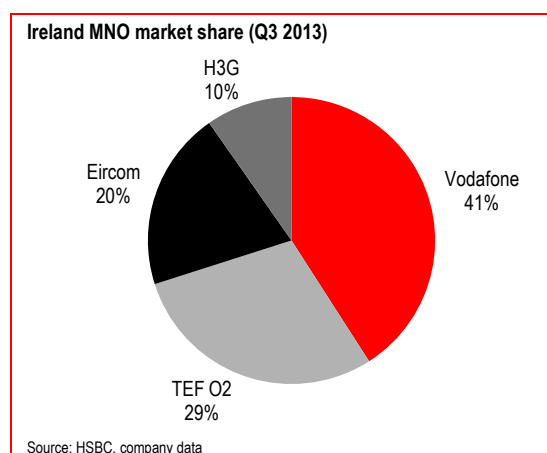
Year	Market	Acquirer	Target	Revenue market share Operator	Mkt Share	Subscriber market share Operator	Mkt Share	MVNOs	Synergies	Remedies
2006	Austria	T Mobile	Tele.Ring	Mobilkom T-Mobile Tele.Ring Orange Hutchison	42.6% 24.5% 8.6% 20.8% 3.5%	Mobilkom T-Mobile Tele.Ring Orange Hutchison	40.4% 24.9% 12.4% 18.5% 3.9%	3	The combined entity would have a customer base of just over 3m and c36% market share. T Mobile said it estimated that the Tele.ring deal would bring synergies of EUR 300m NPV from the combination. Assuming a capitalization rate of c8%, the annual synergies would be cEUR24m, which corresponded to c2% of combined revenues for 2005.	The commitments cover the transfer of both Tele.Ring's UMTS frequencies and its mobile communications sites. In order to meet a large part of these commitments "up front", T-Mobile signed a binding framework agreement ("term sheet") with H3G on 28 February 2006 concerning the sale of sites and UMTS frequencies. The framework agreement is an integral part of the commitments and should culminate in a full contract after control of Tele.Ring has been acquired.
2006	Netherlands	T-Mobile	Orange	KPN Vodafone T-Mobile Orange Others	40-50% 20-30% 10-20% 0-10% 0-10%	KPN Vodafone T-Mobile Orange Others	48.5% 22.3% 14.1% 11.4% 3.8%	50	DT's CEO said he expected the deal to create synergies of EUR1bn. Around half of the savings would be achieved in six years after the deal. At an assumed capitalization rate of 8%, the implied annual synergy would have been around EUR80m or 4.5% of combined revenues.	No remedies suggested as this transaction did not impede effective competition.
2005	Finland	Elisa	Saunalahti	NA	NA	Sonera/Teliasoner a Elisa TeliaFinland DNA Saunalahti	46.1% 27.8% 13.7% 8.4% 4.0%	c16	Communicated synergies of c4.6% (EUR 70m per annum) of combined revenues for 2004.	The approval of the deal was subject to conditions that Elisa divest Saunalahti's own SaunaVerkko network for broadband services on certain traditional operating areas and sell it to a third party approved by the FCA. The operating areas were the capital city area, Tampere, Jyväskylä and Riihimäki. Later in the three cities, the customers of the SaunaVerkko had to be sold as well. Some other conditions were also imposed on Elisa with the purpose of securing, for the transitional period, the business opportunities of the entities to be divested from the group
2005	Netherlands	KPN	Telfort	KPN Vodafone T-Mobile Orange Telfort Others	37.3% NA NA NA 9.0% NA	KPN Vodafone T-Mobile Orange Telfort Others	28.7% 24.4% 14.1% 11.4% 14.7% 6.7%	c50	Synergies not disclosed.	No remedies proposed by the regulators
2004	Denmark	Teliasonera	Orange	TDC Mobil Sonofon Orange TeliaMobile Three	42.8% 33.3% 13.6% 10.1% 0.2%	TDC Mobil Sonofon Orange TeliaMobile Three	49.3% 28.5% 11.5% 10.5% 0.3%	Low	Cost synergies of around SEK490m per annum from 2006, SEK20m of which was to be capital expenditure savings and SEK470 m related to closing down one of the overlapping GSM networks, making the new enlarged company much more competitive. The annual estimated synergies were SEK 490m, which corresponded to c10% of combined revenues for 2006.	No remedies proposed/disclosed by regulators.

Source: The European Commission, HSBC estimates

Nonetheless, we would anticipate the same process from DG COMPETITION, including tough questioning of the merging parties.

Although we are advocates of the merits of consolidation, we have never been of the view that the process would be a smooth one, and were not in the least surprised when the Irish case moved into a phase two investigation. The final decision should be issued around 24 April 2014.

But even while the process is likely to follow a similar template to that seen in Austria, the individual conclusions can be different. Austria is distinguished by the almost complete absence of MVNOs. In Ireland, by contrast, there is a decently sized MVNO (Tesco Mobile), and the market's close proximity to the UK (where more flourish) might well attract others, in the unlikely event that retail prices were to get out of hand. Three's lack of 800MHz spectrum should be another factor in favour of a combination with O2. On the other hand, the merged entity would have almost 40% market share, rather than sub-30%.



While we believe that the Irish authorities are likely to be interested in developments that would support greater network investment, it would not be unusual if they were also keen on having more MVNOs in the marketplace. This would make a remedy based around providing capacity for MVNOs a distinct possibility – albeit not one that

we think would be calculated to drive the greatest investment (and thereby ultimately deliver the lowest unit prices).

Perhaps given its experience in Austria, Three is right to have immediately emphasised that consolidation would support greater investment, and would thus also lead to a more sustainable, fundamental form of competition. In an interview with *Bloomberg* (24 June 2013), Three Ireland's CEO Robert Finnegan explained that the company would follow the merger by "investing significantly to build a super network in Ireland".

Germany

After Ireland, the next instance of proposed mobile consolidation is Germany, where E-Plus and Telefonica Deutschland (O2D GR, EUR6.2, OW, TP EUR7) are proposing to merge, with a regulatory verdict on this due by 14 May 2014. Competition in this particular market would certainly appear to be in rude health according to one of the yardsticks to which DG COMPETITION attaches special importance: MVNOs.

Vibrant MVNO landscape

More than 70 MVNOs and resellers serve, in aggregate, 23% of Germany's total mobile customers. In Austria, remedies involving MVNOs were perhaps to be expected, in view of their previous absence from that market. However, in Germany, with so many already present, it is far from clear that remedies of this type would be proportionate.

Three of the major MVNOs are network-independent, listed companies. The biggest, freenet (FNTN GR, EUR22.6, OW, TP EUR22.5), alone has a 12% market share. United Internet (UTDI GR, EUR32.4, OW, TP EUR32) entered the German mobile market three years ago and has gained almost 2% market share since then. Only in December, it signed a second MVNO contract with E-Plus, which will complement the company's existing contract

with Vodafone – most likely facilitating further market share gains. It is important to note that German resellers have consistently generated significantly higher returns on capital than network operators, and both have substantially outperformed their network operator peers (Freenet is up 539% and UTDI up 491% in the last 5 years).

These figures would suggest that the wholesale pricing available in Germany provides adequate opportunities to would-be resellers. Use of the prices set with respect to the Austrian MVNO remedy would open that opportunity still wider (albeit to the detriment of investment). However, we would highlight the fact that telecoms markets continue to be defined on a national basis: importing a series of price points from a foreign market would therefore be most inconsistent.

BNetzA consultation

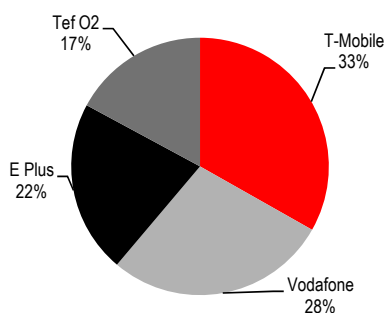
In connection with the EC's review of the proposed E-Plus/Telefonica Deutschland merger, the German telecoms regulator, the BNetzA, has launched its own consultation, with a particular focus on spectrum allocations. The BNetzA is grappling with the fact that a combined E-Plus/ Telefonica Deutschland would have much more spectrum above 1GHz than would either T-Mobile (DT, DTE GR, EUR12.7, OW, TP EUR15.5) or Vodafone. There is the additional issue that larger contiguous blocks of spectrum have the advantage of being more efficient. We believe that the BNetzA's

intention is to outline the potential options, rather than highlight any one as representing the correct answer. In particular, we do not detect in the consultation an agenda to return the market to four players, should consolidation to three MNOs be permitted.

The industry has submitted its initial views in the consultation, which the BNetzA published at the end of December. We note that none of the operators appear to oppose the deal in principle. DT and Vodafone argue for a reallocation of spectrum, but are against ring-fencing spectrum for new entrants. Freenet suggests that the merged entity should be forced to open its network (including its LTE infrastructure) to resellers on commercial terms, but argues that no MVNO obligation should be imposed. United Internet did not itself submit a view, but (as mentioned above) has signed a new MVNO contract with E-Plus.

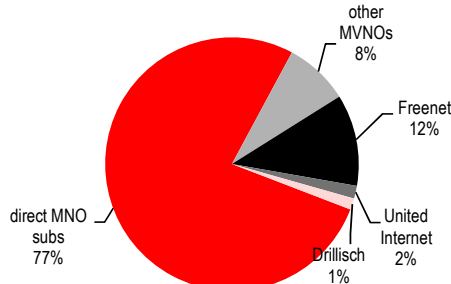
It is surely worth emphasising that none of the existing MVNOs/resellers have thought it necessary to call for the imposition of wholesale obligations on an *ex ante* cost-oriented basis. Meanwhile, only two would-be new entrants (Airdata and LiquidBroadband) argued for the ring-fencing of spectrum in their favour. The BNetzA should by now have received responses to its second batch of questions, although these have not yet been made public.

German MNO market shares (Q3 2013)



Source: Companies

German MNO + MVNO/reseller market shares (Q3 2013)



Source: Companies

Symmetric approach to spectrum

We think that the BNetzA will regard a degree of spectrum redistribution as necessary in the event that the E-Plus/Telefonica Deutschland merger receives approval, but it might like to see this take place without ring fencing – the preference being for an auction design that is symmetric (ie does not favour an entrant) and transparent (see our report, [European Telecoms: Regulation now](#), 15 November 2013). Newcomers to the market would be welcome, but in the BNetzA's view, entrants should be required to pay the same price as those operators that have already committed capital. (Although the BNetzA would doubtless be the first to emphasise that remedies are the decision of the competition regulators).

Establishing a virtuous circle

Now is therefore a pivotal moment in the evolution of the German mobile industry: we view consolidation as offering the key with which to unlock greater investment and lower unit prices. On the accompanying page of charts we show the mobile subsector's recent trajectory alongside two potential scenarios for its future.

The first of these, in which the *status quo* prevails, projects only sluggish growth in usage alongside unit price reductions that are relatively modest. The second scenario, on the other hand, reflects the type of market that might emerge post consolidation – with modest ARPU growth that, in turn, powers network investment, thus driving rapid unit price declines and swift increases in consumption (using Cisco's mobile data forecasts as our basis). Note that the fastest price declines accompany the scenario with ARPU growth – not ARPU contraction.

Fixed-mobile convergence

Aside from MVNOs and spectrum, there is one further topic especially pertinent in Germany: that of convergence. Vodafone's recent move in taking control of Kabel Deutschland (KD8 GR, EUR97,

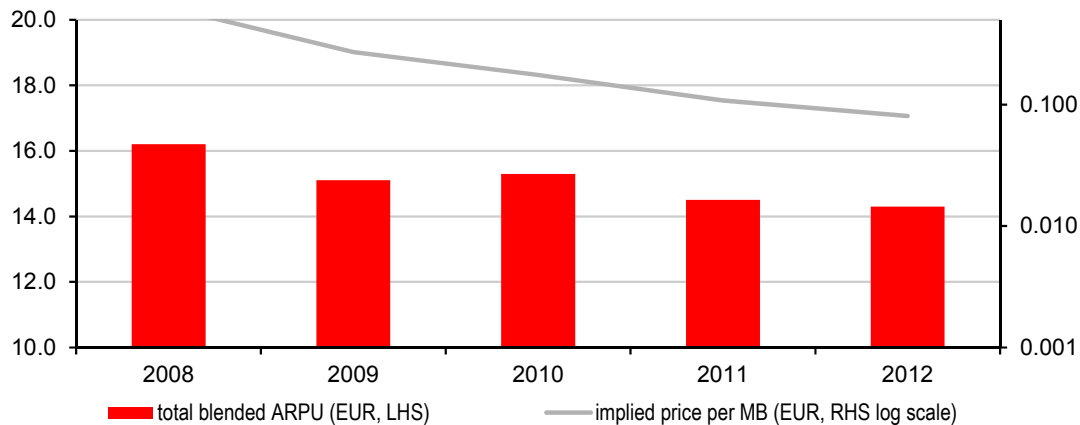
N, TP EUR87) strongly suggests to us that the ability to bring together fixed-line and mobile services will now be gaining in significance as a competitive dynamic. Admittedly, today quad-play has made only a limited impact on the German market, although the advantages of bringing together fixed-line and mobile platforms can go well beyond the services provided to customers (the ability to more cost effectively provide backhaul being as great – or arguably still greater – a consideration). Deutsche Telekom starts off with a natural advantage in this area, having been an integrated player throughout its listed history. Vodafone, on the other hand, has had to acquire its fixed-line exposure through cable.

But this potentially leaves the other two mobile operators, E-Plus and Telefonica Deutschland, in a difficult position. Neither has fixed-line assets in any way comparable to DT's or Vodafone's. This suggests that the third and fourth placed operators could find themselves at a distinct disadvantage, firstly, as the market evolves towards quad-play, and secondly, if – as we suspect – fixed-line capability plays a crucial role in providing cost-effective backhaul for the abundant deployment of small cell network solutions that will be required to answer the mobile data 'capacity crunch' (see our thematic report, *Honey, I shrunk the cells*, April 2012).

We would therefore argue that Telefonica Deutschland, in presenting its case, should try to emphasise the importance of the proposed consolidation in facilitating its LTE and small cell network deployment. We believe that, to compete effectively against Vodafone and DT, the other MNOs will need to exploit what scale advantage they can. Combined, E-Plus and Telefonica Deutschland should be able to mount a much more credible LTE roll out than would be the case in the absence of a deal: in effect, is Germany best served by two fully-fledged LTE deployments, or three?

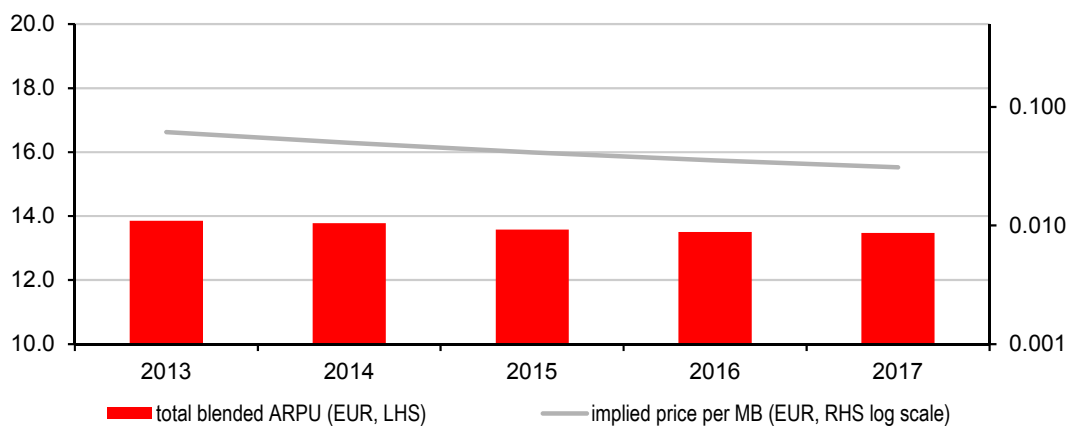
Virtuous circle: modest ARPU growth drives faster price declines

Historical trends: ARPU decline and volume growth drive slowing unit price deflation



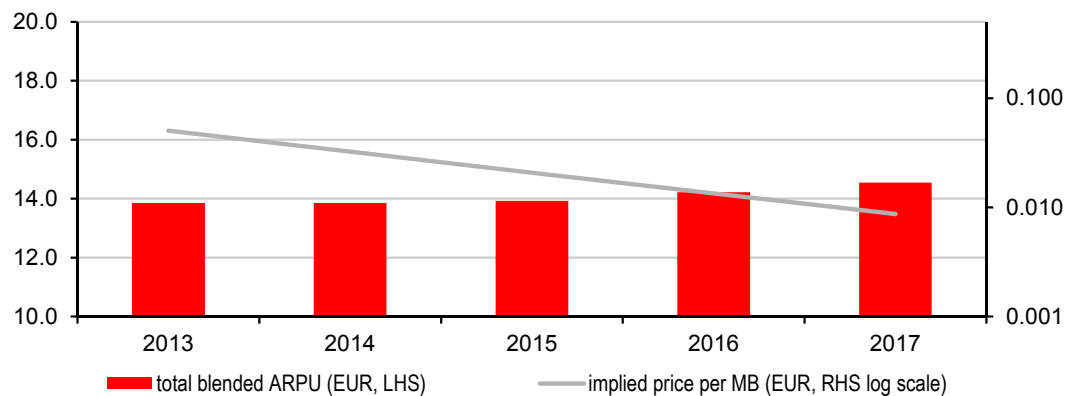
Source: HSBC

Status quo: declining ARPU curtails investment and thus slows unit price decline



Source: HSBC

Win-win scenario: modestly growing ARPU encourages investment inducing rapid unit price decline



Source: HSBC

Convergence is not anti-competitive

Quad-play tariffs are generally (and quite rightly, in our opinion) seen by regulators as a pro-consumer phenomenon, due to the enhanced service set and discounting potential that they provide. Nevertheless, some industry observers have suggested convergence is somehow anti-competitive.

For instance, Rewheel (a consultancy firm that specialises in mobile connectivity and industry expert advisory to policy makers, regulators and competition authorities) has argued that the takeover of E-Plus by Telefonica Deutschland would result in there being three converged fixed and mobile operators in the German market. It believes that this would leave the operators without the incentive to compete in the mobile broadband market, as this would involve cannibalising the operators' fixed-line broadband businesses (*MNO consolidation in Austria, Germany and EU's single telecom market mess*, September 2013).

Rewheel thinks that, given this scenario, there would be a desire on the part of the existing operators to try to delay fixed to mobile substitution by keeping mobile data allowances low and tariffs high, thereby forcing customers to continue their reliance upon fixed-line broadband services. However, we have a rather different point of view on this topic.

To begin with, we would observe that neither E-Plus nor Telefonica Deutschland own material fixed-line assets in Germany. Granted, E-Plus's current parent, KPN (KPN NA, EUR2.77, N(V), EUR2.30), has extensive fixed-line infrastructure – but this is in the Netherlands. Meanwhile, Telefonica Deutschland has sold its fixed-line activities and is relying instead on a wholesaling arrangement with DT. In our view, given the overwhelmingly mobile nature of the operational exposure of both E-Plus and Telefonica

Deutschland, there would be no rationale for their seeking to slow the progress of fixed-mobile substitution.

However, some might say Telefonica Deutschland have shied away from “attacking” the top two operators' mobile position for fear of inviting retaliation in Spain against its pre-eminent position in the fixed-line market there? We think this unlikely. DT is not even present in Spain, so there would be nothing on this basis to prevent Telefonica Deutschland targeting the incumbent. Vodafone, on the other hand, is in the Spanish market, but it can hardly initiate price aggression there – since this function has long been performed by Orange (ORA FP, EUR9.2, OW, TP EUR18) (and, for that matter, Yoigo).

Telefonica's domestic response to Orange's bold market share ambitions (for example, its refusal to step back from heavy handset subsidies) has been to bundle fixed-line/mobile converged products. This tactic has proved expensive but effective in terms of reducing churn (as well as increasing the contract proportion of the customer mix). In view of the fact that price competition in Spanish mobile segment is already ferocious, and that the local incumbent has put in place a sophisticated response, we do not think it credible to suppose that Telefonica Deutschland has been deterred from pursuing fixed-mobile substitution for fear of Vodafone Spain taking advantage of Telefonica's domestic presence in both fixed-line and mobile segments.

Moreover, while Vodafone has recently acquired fixed-line operations in Germany (via Kabel Deutschland), prior to this its operations were confined to Arcor, effectively an unbundled provider of ADSL services. With the mobile side of its activities by far the more profitable, we think Vodafone would have had every incentive to promote fixed-mobile substitution. (In fact, it launched a series of German products with just this aim in mind).

Fixed line and mobile to co-exist

Additionally, though, there might be a deeper misconception underlying the treatment of this whole topic. Discussion of incumbent operators' alleged desire to "delay" fixed-mobile substitution gives the impression that this is an inevitable process, and that mobile networks can be expected to supplant fixed-line platforms. Indeed, Rewheel go on to talk of an "existential threat" to fixed-line businesses. However, not only is it the case that a Telefonica Deutschland/E-plus combination would remain predominantly mobile, but we are also convinced that it is unrealistic to suppose that mobile can supplant fixed-line infrastructure.

The reality is that there is an urgent requirement for a great deal more capacity on both platforms. In fact, increasingly the two are interdependent. Additionally, we would highlight that a case can be made the other way round: the increasingly ubiquitous deployment of technologies like WiFi, which effectively gives wireless access to the fixed-line broadband connectivity to which it is attached, has caused some to suggest that it is actually the mobile operators that face the 'existential threat', as a result of the potential incursions of fixed-line players.

In our view, it is surely long-past time to recognise that the telecoms industry is not some simplistic Manichean struggle between the forces of mobile and fixed-line. The future is integrated, and this is reflected in technologies that are themselves converging. Small cell deployments are the classic case: technically these are mobile base stations, but intended to cover a small area. Clearly, the more base stations in a network, the greater the need for backhaul, and in dense urban environments, this requires extensive fixed-line infrastructure. We believe this is reason enough for operators to choose a converged direction for their strategy.

The above is not to suggest that there is not a place for fixed-mobile substitution (just as there is a place for mobile-fixed substitution...). One obvious space where mobile platforms may provide the most efficient solution is in rural areas with relatively sparse population density – common conditions in regions such as Scandinavia. Here, the cost of fibre deployment is exorbitant compared with the revenue it might reasonably be anticipated to generate. Moreover, base stations in these areas would need to service relatively few customers (by urban standards), and hence should be able to allocate each a sufficient portion of the network's overall resource (which must be shared out between its users) to deliver adequate bandwidth.

However, we do not believe that mobile platforms can supplant fixed-line infrastructure in an urban or even semi-urban environment. As we have extensively argued in the past (see, *inter alia*, *Honey, I shrunk the cells*, April 2012), mobile platforms have nowhere near the required capacity, and in any case depend on the presence of extensive fixed-line fibre for their backhaul.

Note, this line of argument is not intended to suggest that mobile platforms are unable to provide high-bandwidth connectivity in densely populated areas. The point is rather that, if fixed-line platforms were unavailable (save for mobile base station backhaul), and fixed-line broadband usage transferred instead to mobile networks, the latter would not have sufficient capacity to offer an adequate service. This reality has not been lost on the EC itself, which has put the upgrading of fixed-line capacity with fibre at the heart of its Digital Agenda targets.

Proponents of a fully 'wireless' future make great play of the theoretical bandwidths available with LTE technology over broad spectrum allocations, quoting speeds of 2-300Mbps across 30-40MHz of spectrum. These speeds are, indeed, similar to

what fiber to the premise (FTTP) fixed-line platforms can deliver. But the difference is that, in the case of a fibre line, the capacity is dedicated to an individual household (or near-dedicated, as there will doubtless be some contention ratio). By contrast, a base station's capacity must be shared between all those of the network's customers that are within its coverage range. Practical speeds will therefore be much, much lower than the maxima sometimes quoted.

As the number of data consuming devices multiplies, the available spectrum must be shared between more and more users, and consequently the bandwidth available per individual user declines. This is why operators are so interested in obtaining spectrum: because the quickest way to boost capacity in the system is to add more frequencies, so that there is more to be shared around. Hence one really need not resort to elaborate theories of 'hoarding' to account for operators' enthusiasm to obtain further appropriate radio spectrum.

Suitable remedies

However, we would like to give prominence to another of Rewheel's proposals (made in the same report), that the merging parties might undertake to make no post-merger price hikes. We are confident that the long-term impact of mergers will be lower, not higher unit prices for customers. In our view, the industry should consider making this clear from the very outset by promising that any merger will not result in higher unit prices. This would only reflect the likely medium-term reality, and would address the most deep seated of concerns amongst those suspicious about the implications of consolidation. (As discussed with respect to Austrian consolidation, some unit prices have risen post the merger – but conditions in this particular market were arguably the worst in Europe, and so something of an outlier).

However, we think that other measures – such as requiring E-Plus/Telefonica Deutschland provide cheap roaming to an entrant would be highly counter-productive – as this would undermine the incentive to invest, which provides the most powerful and reliable means of lowering pricing in the long term. Interestingly, in the same report, Rewheel highlights some of the EC's proposed single market reforms, arguing that changes to roaming regulation would provide an opportunity for "Zero-capital MVNO speculators" as well as cable and over-the-top (OTT) players to enter the market, free-riding on the investment of others. It argues that this could prevent mobile operators from accessing the capital they require to invest in improving their networks' coverage and cost efficiency. We agree with Rewheel on this point, but would apply this logic consistently across the whole industry (including the fixed-line component) – all of which requires, in our eyes, substantial investment.

National regulators' views

In prospective deals exhibiting certain characteristics – of which scale is perhaps the most pertinent – the decision on whether or not to give approval generally lies in Brussels, with DG COMPETITION. However, this body consults widely as part of its review process, which means that the views of the local telecoms regulators, the national regulatory authorities (NRAs), are of great interest.

Most NRAs state that they have no cast-iron opinions on the number of players appropriate to a given market. That said, they naturally tend to be cautious about the potential impact on competition that a move from four to three operators per country might have. The starting position is that four networks are better than three from a standpoint of pure competitive intensity.

However, this is not to suggest that the case could not be made for consolidation as bringing net benefits to the customer. Most NRAs seem keen to emphasise the importance that they attach to dynamic efficiency gains (that is to say, to the way in which greater investment leads to lower unit prices). Nor do most harbour an objection to higher ARPU's – provided that these are driven by operators selling improved services that are entitled to command a premium, rather than by putting up the prices of their existing offerings.

Single market proposals

If consolidation in Ireland and/or Germany received approval on reasonable terms, it might inspire similar efforts elsewhere. By this stage, however, the landscape might well have evolved further, as a result of the EC's proposed telecoms single market reforms.

We regard these measures as supporting the case for consolidation, although – to be clear – they do not (indeed, cannot) mandate it. The EC's proposals might instead be characterised as facilitating consolidation (although their full effect will only be felt over time). Incidentally, this would certainly appear to be the view of BEREC (Body of European Regulators for Electronic Communications). In its statement in response to the EC's programme, BEREC argued that “the proposals represent a shift away from the current approach... towards one that favours market consolidation” (BEREC statement on the publication of a European Commission proposal for a Regulation on the European single market, BoR (13) 104).

We think that the intended single market reforms have helped to send a signal to the industry that conditions are changing, and that it is worth experimenting, and (where appropriate) taking certain risks. Two operators in particular (Three and Telefonica) have decided that, as it were, the wind has changed direction, and that it is worth tabling in-country consolidation proposals.

Proposal for spectrum reform

In our assessment – though there does seem to be a good deal of agreement on this point – the most important feature of the single market package is the proposal for spectrum reform. Speaking at the FT/ETNO summit in Brussels on 8 October 2013, Randall Stephenson, chairman and CEO of AT&T (T US, USD33.7, OW, TP USD39), was emphatic on this point. He argued that many of the contentious elements of the single market package about which the industry has misgivings (roaming, wholesale price regulation, and so on) are rounding errors by comparison with the importance of how spectrum is handled by regulators. Mr Stephenson's argument is that nothing will better guarantee that finite radio frequency resource is made efficient use of than owner's economics – in other words, ownership of said spectrum. This, he argued, provides the greatest incentive to ensure the spectrum does not go to waste.

AT&T is clearly taking a close interest in European developments (see our recent report on Vodafone, [Attractive Target at Turning-point](#), 1 October 2013). We doubt that European politicians will be prepared for sales of spectrum in perpetuity – as AT&T would like – but that does not mean that there is not considerable scope to improve upon current arrangements.

Over the past couple of years, there have been vastly different outcomes of spectrum issuance, some positive for the industry (and hence the investment case), but some considerably less so: the extremely expensive auctions in the Netherlands and Austria spring to mind.

In the view of DG CONNECT (the EC's telecoms regulator), regulation that provided for asymmetric spectrum issuance was appropriate at an earlier stage of the market's evolution, but going forward was likely to be counter-productive. This point was relevant not merely to the reservation of spectrum

on behalf of entrants, but also to the imposition of spectrum holding caps. DG CONNECT seems to be of the opinion that such measures should not be used to conduct (in effect) industrial policy, when in reality it is economics that should prevail (see our report, [European Telecoms: Regulation now](#), 15 November 2013). From the perspective of consolidation, this could be extremely important, because it signals to merger control authorities that remedies reassigning spectrum to entrants are no longer so desirable.

Roaming

Another prominent aspect of the proposals concerns roaming – arguably that feature of the European telecoms landscape which most conspicuously advertises the fact that the continent is not yet a single market. It has also been on regulators' radars for years, and (as a consequence) no longer accounts for nearly as high a portion of sector revenues as previously. With roaming set to disappear, it will be much easier to make the case that a single market is genuinely emerging, which in turn should legitimise a greater degree of consolidation in this highly fragmented sector.

The single market package also proposes an alternative to simply sticking with the pre-existing 'Roaming 3' regulatory glide path. Instead operators are free to create roaming alliances, and shift to a 'bill and keep' system within these groupings. Aside from thereby addressing the problem of roaming, DG CONNECT also seems to be looking to send a more fundamental message here, and one with relevance for the industry consolidation debate. It evidently regards roaming alliances as one way to legitimise a scale advantage – and is taking some flak for this stance from certain of the smaller stakeholders.

Nonetheless, DG CONNECT wants to signal that scale economies should be rewarded, and that they are an obtainable and legitimate goal. If

operators do pursue the roaming alliance route, it would seem a perfectly natural development that they might then want to formalise their alliance by means of a merger.

The disappearance of roaming would plainly indicate that telecoms was evolving beyond its traditionally national boundaries. Meanwhile, two other of the single market programme proposals could serve a similar purpose: the introduction of regulatory 'passports' facilitating cross-border activity within the industry and the establishment of common, pan-European standards for products like wholesale NGA/fibre broadband access (eg VULA, a tightly defined bitstream service). Over time, we believe that measures such as these should help to create a market that is more pan-European in nature, in which national concentration issues become less of an impediment.

Relevant market review

A further dimension of the EC package is the on-going relevant market review recommendation. As was discussed earlier with respect to the Austrian case, many of the old demarcations that have previously been drawn in the telecoms market are becoming obsolete, as a result of innovations like WiFi and OTT services. It therefore makes eminent sense to define market segments more broadly, which we believe is likely to be the outcome of the market definition review process.

The broader market segment definitions that we believe are now justified should alleviate certain concentration concerns. In other words, areas that might appear concentrated on a historical definition basis may be seen to present much less of a problem when proper account is taken of new forms of competition – again, from sources such as WiFi and OTT services.

For the time being, most markets clearly do remain largely national in character, and hence it is in-country deals that will remain the most contentious,

while cross-border deals might raise fewer issues – almost axiomatically, since concentration is not increased in any defined (national) market. Nonetheless, over time, changes to the definition and actual functioning of markets do enter DG COMPETITION's deliberations.

With specific respect to the relevant market review that is well underway, DG COMPETITION (the EC's merger authority) does regard these definitions as the natural starting point for its own analysis, although (as we ourselves have emphasised previously) it is of course able to conduct a more granular segmental analysis in those areas where it believes this is warranted. We would therefore see DG CONNECT's work on the definitions as a significant input into the process, but by no means the only variable.

Towards a pan-European market

Taken in total, we think that the single market initiatives seek to broaden the conception of the telecoms market from one of national silos, sub-divided into as many as seven separate segments, towards a more pan-European conception, with quite possibly only half the number of constituent subdivisions.

Meanwhile, the activity around the single market measures has certainly succeeded in drawing attention to the sector's difficulties, as well as to the desirability of taking action in response. We struggle to think of a time in the past when the sector has received such attention from policymakers. Even those who disagree with the detailed content of the single market programme should welcome, in our opinion, the distinctly higher profile that Vice President Neelie Kroes has secured for the industry – and its current plight.

DG COMPETITION's stance

There has been much coverage of the controversies in Brussels to which the single market proposals have undoubtedly given rise. The first point we would customarily make in response is that there must always be disagreement and debate at any time when policies are undergoing a period of change, and this should be taken as a healthy sign that genuine deliberation is taking place. Silence would merely indicate that there was nothing to argue about, and that the *status quo* would simply persist. In addition, however, we would like to make a further couple of points.

The first is that, while the measures were originally authored by DG CONNECT, they have successfully secured the assent of the college (the European Commission's cabinet) – as well as subsequently garnering a positive reference from the last European Council of heads of state. Therefore, whatever the misgivings of DG COMPETITION, the latter has given its approval to the package. Indeed, the two bodies were in regular communication throughout the authoring of the package, and will have discussed in depth proposals such as those for the creation of roaming alliances.

At a Commission forum on the single market proposals held in Brussels on 17 June 2013, Cecilio Madero (a senior official from DG COMPETITION), expressed the view that the package could pave the way for the creation of a single market. Of course, observers on all sides would concede that there remains a long way to go before the market can be considered to be Europe as a whole, rather than its constituent nations. But this journey has at least begun – something that should have a profound impact on consolidation over time.

The second point to make is that what can get lost amid the noise is that those with concerns about the new programme often themselves inhabit very different ideological positions. For instance, it is clear that both DG COMPETITION and BEREC have questions about the measures, but they often come from opposite directions.

Whereas BEREC pleads (not surprisingly) for greater local autonomy and flexibility, DG COMPETITION's view is essentially that greater cohesiveness and centralisation is required. Equally unsurprisingly, the viewpoint of many in Brussels is that the lack of harmonisation in the telecoms sector is a function of the lack of a single regulator overseeing the industry. We suspect that DG CONNECT may have wanted to go further in this direction, but was constrained by what was politically feasible.

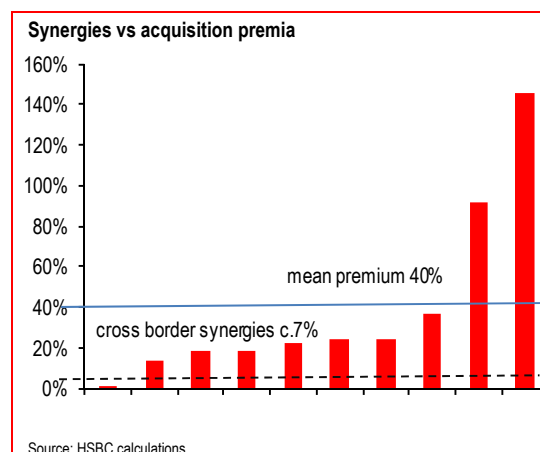
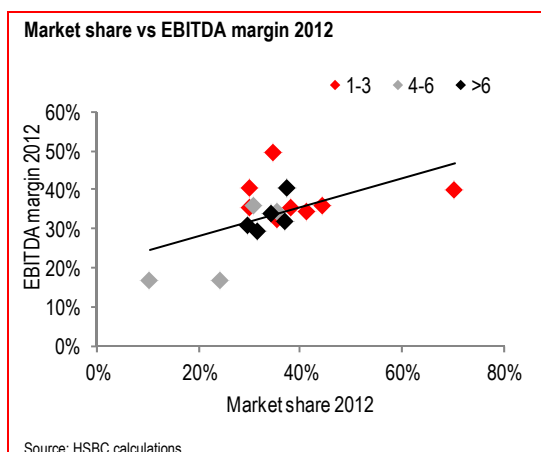
In the meantime, it seems likely that DG COMPETITION will continue to look more sympathetically on cross-border consolidation than on the in-country variety. The problem here, as we discussed in our original *A proposal for progressive consolidation* report (December 2012), is that without an in-country component to placate financial investors, it is difficult to see cross-border consolidation getting the go-ahead from sceptical financial markets.

We ourselves do continue to have faith in the idea that cross-border operators should enjoy superior

margins all other things being equal, but would accept that empirical evidence for this is extremely thin on the ground. For example, there is little obvious correlation between margins and the number of countries in which European telecoms companies operate.

Nor are the relatively modest operational synergies that had been touted in the (few) recent instances of telecoms cross-border activity much by comparison with the extent of the bid premia typically required to complete such transactions (see accompanying charts). In other words, it seems only reasonable that financial investors will remain highly sceptical about cross-border deals, which would in turn make it very difficult for management teams to contemplate such acquisitions.

Therefore, if an integrated European telecoms market is the objective, enabling operators and customers alike to enjoy the benefits of economies of scale, perhaps a pragmatic approach is called for – accepting that consolidation will initially take place at the national level, and that this will naturally evolve into cross-border activity. Theoretically, consolidation at the national level is logistically more practicable, would tidy ownership maps such as to make subsequent cross-border activity less complex, and would also – by reinvigorating the sector – give operators the means to justify controversial cross-border deals to those that provide them with their capital.



Nothing ventured...

One pertinent observation made by Ben Verwaayen at the HSBC-sponsored FT/ETNO Telecoms summit (8 October 2013) was that the industry spends a lot of time complaining. There is surely little denying this, even if we might insist that there are some extenuating circumstances. But the relevant question is whether or not this is the right way to change matters for the better?

We would argue for a constructive approach. Certainly, there is much work to be done before regulation rewards investment in the way that will be necessary if Europe is to reap the rewards of the latest generations of technology now being deployed globally. But this goal would be accomplished most effectively, in our opinion, if operators are pro-active and enthusiastic about what they can accomplish on behalf of European citizens.

Certainly by comparison with the global internet giants, the European telecoms operators risk coming across as backward looking. Granted, said internet players enjoy far lighter-touch regulation on a whole series of areas (including privacy) and questions are now being raised about whether they fund their fair share of taxation, given the revenues generated in Europe. The lack of a level playing field for telecoms operators makes it rather easier for the global internet giants to project positivity – but we think our argument nonetheless stands: the telecoms sector needs to positively engage, and convey the message that it is the solution to some of Europe's problems (underinvestment, the lack of productivity growth) rather than an additional problem.

One of the most interesting moments in the above-mentioned conference was when Stephane Richard, CEO of Orange wondered whether it might be time for the industry to be bolder and, in particular, take the initiative on in-country consolidation. He conceded that, currently, the

industry declined to put forward certain transactions for fear that they would be rejected. But now, even while the operators' legal teams would likely continue to advise caution, it might be perhaps the moment to make some more entrepreneurial proposals.

Stretching the argument further, perhaps this implies the merit of not just tabling in-country deals, but also of attempting a large cross-border transaction. As we have argued above, DG COMPETITION sees in-country acquisitions as relatively less appealing – and although we think that such acquisitions would actually promote a pan-European single market agenda, we would concede that they do so indirectly (by helping to tidy up today's messy landscape, in preparation for subsequent multi-country deals).

By contrast, a cross-border merger which entailed some degree of overlap at a national level would advance both in-country and pan-European consolidation in parallel. In such a transaction, there would be 'something in it for everyone'. In our view, for DG COMPETITION, the cross-border component to the transaction would provide an incentive to grant approval, on the basis that such deals inherently promote the EC's goal of creating a single internal market.

The US precedent

In aspiring to the creation of a continent-wide single market, Europe obviously hopes to exploit the economies scale that have been such a powerful positive force for the US economy. One of the EC's historic achievements from the GSM era was to ensure that this technology was mandated right across Europe, giving the continent's mobile industry a scale advantage. Partly in consequence, European operators and vendors went on to at one point dominate the industry – while the US sector for a while languished in relative disarray.

Those times, though, have long since passed. Admittedly, trans-Atlantic comparisons can be difficult. However, one fact that should be clear is that Europe's historical lead in terms of mobile technology has, in recent years, been swiftly eclipsed by the new-found dominance of US operators and vendors.

There are many reasons for this. The presence of such a global centre of technology excellence in the form of Silicon Valley – with all its attendant financing – has clearly helped in the context of the convergence of telecoms with information technology. For example, this helps to explain how Nokia (NOK1V FH, EUR5.4, N(V), TP EUR5.2) was displaced by Apple (AAPL, USD546, NR) in handset leadership. In the deployment of LTE, the 'old world' has also been lagging the 'new', and here the explanation lies in part with the fact that Europe has taken longer to issue the relevant spectrum.

However, whatever these circumstances, the relative trajectories are still startling. The US started a long way behind, and has been rapidly overtaking Europe in an industry where the latter once enjoyed a substantial lead. Admittedly, in terms of absolute numbers, Americans pay substantially more for their mobile services than do Europeans (the GSMA estimates monthly revenue per subscription of USD69 vs USD38 respectively), but this has to be seen alongside considerably higher usage – and not only of voice. According to Cisco's figures, this year US customers will use twice as much data per connection as their EU counterparts (810MB vs 415MB – with the gap getting progressively larger over time).

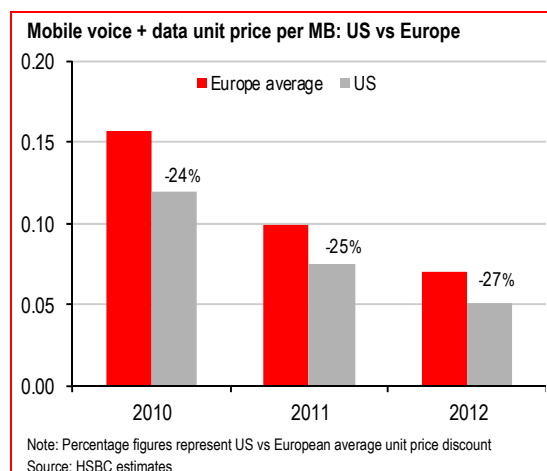
Comparing prices

We have conducted our own international analysis, in order to compare unit prices in Europe with those in the US. We find this the fairest possible basis on which to compare pricing: dividing the price paid by the quantity consumed. In particular, this neutralises the problems presented by 'unlimited' offers. Whatever the size of the bundle, actual usage is – by definition – finite. Indeed, customers' usage is practically constrained by what networks are in fact capable of delivering (especially pertinent at peak hours). On this basis, where networks have been relatively under-resourced, 'unlimited' offers can represent much less appealing value-for-money than might at first be apparent.

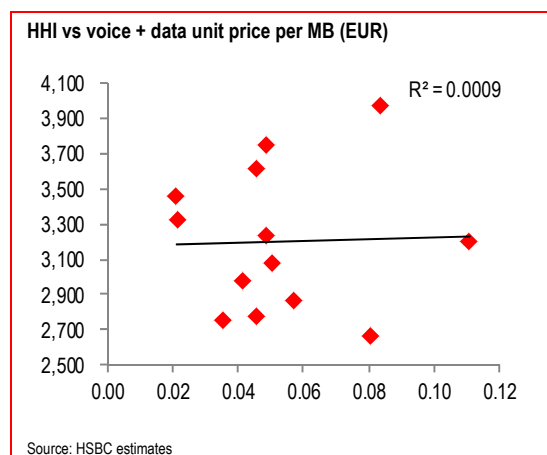
Our starting point is Cisco's global wireless data volume figures. To this we add voice usage, having first translated it into its data equivalent. We then compare this with the ARPU in each market to derive a national price per MB. Our conclusion is that the US is actually materially cheaper than Europe. Those accustomed to working from headline ARPU figures might find this surprising, but bear in mind that the gap between US and European usage is considerably greater than the gap in ARPUs.

Mobile voice + data unit price per MB (EUR)			
	2010	2011	2012
UK	0.113	0.068	0.046
Germany	0.175	0.108	0.081
France	0.225	0.162	0.111
Italy	0.141	0.085	0.057
Spain	0.135	0.074	0.051
Europe average	0.157	0.099	0.070
US	0.120	0.074	0.051
US discount	-24.0%	-24.9%	-27.0%

Source: HSBC estimates



While on the subject of this pricing analysis, it is also worth mentioning that we find little relationship between the unit prices we have derived and levels of market concentration (as measured by HHI, the sum of the squares of the market shares). This should be evident from the accompanying chart, which reveals only a meagre R^2 .



Quality of service considerations

Returning to the trans-Atlantic contrast, another way of approaching this same topic is to consider the quality of the service that customers purchase. According to Cisco's figures, the average US mobile data connection speed in 2012 was around 75% faster than the average in Europe (2.5Mbps vs 1.5Mbps).

This gap in connection speeds reflects the greater pace of adoption of LTE in the US. It must be acknowledged that there are various factors underpinning this (as was mentioned earlier), including Europe's slower release of spectrum. But it is also a function of the much greater capex seen in the US, which – along with other global peers – has been out-investing Europe in terms of telecoms infrastructure.

Fate of the equipment vendors

Another contrast between the US and Europe is in the sharply divergent fortunes of their respective equipment vendors. This topic has already been mentioned briefly, but is worth returning to and expanding upon. After all, at one stage Europe dominated the global handset market courtesy of Nokia's pre-eminence. However, this lead has been ceded to Apple (and Samsung), with the Finnish manufacturer selling its devices division to Microsoft (and for less than the latter paid for Skype).

In future, there is little guarantee that handset vendors will arrange their production with Europe specifically in mind. An early indication of this has already been witnessed with Apple's release of iPhones that support LTE, but not at European-designated frequencies.

This suggests that in the near future European operators are going to need to fight for the attention of vendors that will predominantly be American or Asian in origin. Given the fragmented nature of the continent's mobile industry, they at present lack much bargaining power, which suggests episodes like that with the iPhone mentioned above are likely to be repeated.

The ability to negotiate with globally powerful vendors will depend not only on the operators' scale, but also on their ability to convincingly argue that they have alternate means at their disposal of attracting and retaining customers –

other, that is, than by providing access to a given new device. This necessitates an ability to demonstrate service differentiation against their operator rivals.

Therefore, we believe that policies which promote static over dynamic efficiencies, and therefore render the task of achieving differentiation more difficult, effectively run the risk of advantaging vendors over the operators that are their customers. Such policies may result in Apple and Samsung (005930.KS, KRW1,280,000, OW, TP KRW1,900,000) continuing to take a disproportionate share of the value chain in the European mobile industry.

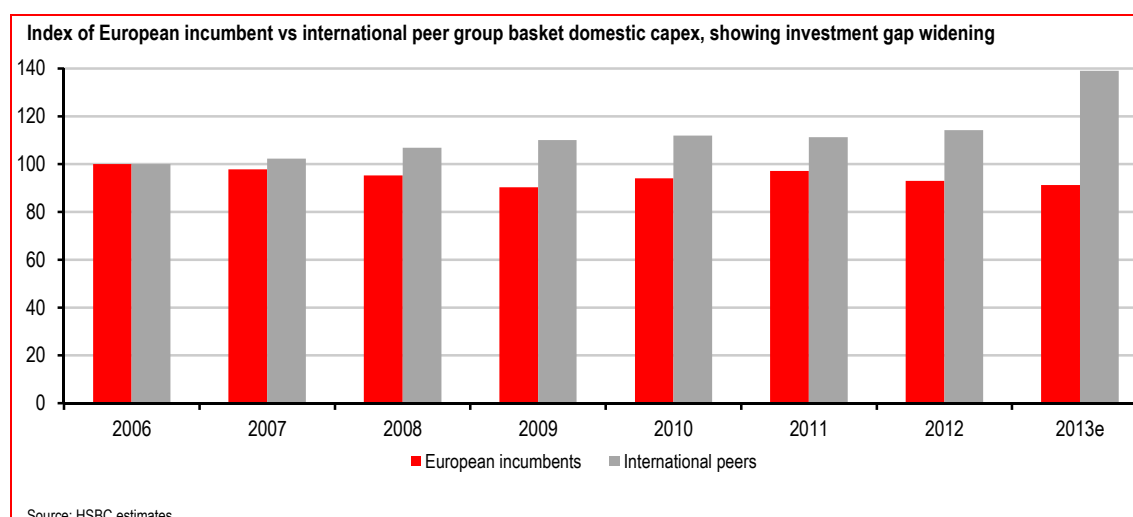
Possible US consolidation

Finally, we should mention the possibility of consolidation in the US market. In the past, those in Europe dubious about the merits of four-to-three consolidation have drawn attention to the fact that US regulators blocked AT&T's attempt at this with its proposed takeover of T-Mobile (DT's subsidiary in the US) in 2011. In setting out its reasoning, the Department of Justice (DoJ) indicated its preference for there being four rather than three wireless operators with national scope. (Although, it should be added that the US authorities have been content to see a far greater

degree of differentiation between the operators, for example in terms of spectrum holdings).

From a merger control perspective, one obvious concern with any deal involving either of the two RBOCs acquiring the fourth player would be that it would make the gap with the already troubled third mobile player, Sprint (S US, USD8, N, TP USD7.2), insurmountable. But the latter could become reinvigorated thanks to Softbank's (9984 JP, JPY7064, NR) investment, and is now itself seeking to grow further by merging with T-Mobile (*Bloomberg*, 19 January 2014). If granted the go-ahead, the result of a merger between Sprint and T-Mobile might well present the RBOCs with a really effective, scale competitor – and we think there is some possibility that the DoJ may find this scenario palatable.

Clearly, European competition regulators are fully independent, and hardly bound by decisions in other jurisdictions. However, that said, we believe that a US deal such as that discussed here could cause some interesting ripples. The US would become a three-operator market (in line with other countries such as China), and moreover there is the prospect of other nations following a similar path in the not too distant future – for example, Brazil (see our report, [Brazil Telecoms](#), 14 January 2014).



We would stretch our argument one step further by highlighting that, if a set of such large markets decided that three players are sufficient, it might make it more intellectually challenging to defend Europe's present superabundance of operators.

International interest in Europe

International parallels could become all the more striking if US operators – or other global players – decide to use their balance sheet strength to make substantial acquisitions in Europe. How might this be expected to change the landscape?

In fact, of course, international buyers have already made their substantial presence felt. For example, America Movil (AMX US, USD22, N, TP USD23) has acquired a substantial position in KPN – although the story has hardly been a happy one.

There have also been many reports that AT&T may be scrutinising Europe for potential targets (*Bloomberg*, 30 August 2013). Vodafone has been frequently mentioned as a target, but the RBOC recently issued a statement at the request of the UK Takeover Panel that it would not be making a bid. However, we very much doubt that this puts an end to the matter (see our report, [Vodafone – AT&T does not intend to make a bid](#), 27 January 2014).

Admittedly, AT&T is now prevented from making a hostile bid in the next six months – but we had always felt it would be most unlikely for any approach to take this format. Much more plausible (in our opinion) would be a friendly offer (that is to say, one with the agreement of Vodafone's board), and AT&T is still quite entitled to pursue this option. We should also add that there may be other interested parties: for example, the *Daily Mail* reported on 26 January 2014 that China Mobile (941 HK, HKD74, OW, TP HKD94) might be interested in acquiring a stake in Vodafone.

Another potential Asian consolidator is Hutchison Whampoa (13 HK, HKD103, N, TP HKD94), which owns the Three family of mobile networks. Hutchison has already consolidated the Austrian mobile market, and is now seeking permission to purchase Telefonica's O2 unit in Ireland. According to the press, Hutchison has also been in talks (*FT*, 5 April 2013) with Telecom Italia (TIT IM, EUR0.83, OW, TP EUR1.05) about a possible combination in Italy, and is now also said (*FT*, 22 December 2013) to have held discussions with WIND there.

All this reported activity from international players rather suggests that consolidation is likely to occur in any case. The only question is over the identity of its participants. Will European operators be permitted to engage in this process, or will they effectively be excluded, and the field left to international operators from outside Europe?

As we have already discussed, a combination of factors makes it difficult for European telecoms players to lead this process, at least for the moment. First, financial investors appear opposed to most varieties of cross-border deal, given the track record of such acquisitions over the last 15 years or so. Second, many operators do already have some degree of overlap in terms of their operating activities, and the risk is that the resulting in-country consolidation would be countenanced only at the cost of onerous remedies. By default, this tends to leave the field to international players that currently lack much (if any) presence in Europe.

If the end result is that it is international buyers that conduct the majority of the M&A, we expect this might be politically contentious. Furthermore, if AT&T was to purchase an operator such as Vodafone that has come closest to establishing a pan-European presence, it would bring to bear a potentially extremely powerful combination of global scale plus cross-market reach. In our view,

this might well merit a regulatory re-evaluation of the heretofore avowedly national nature of telecoms markets.

No bar to global buyers

In theory, if merger control policy blocks the attempts of European operators to combine, then the field would be left open to global players from outside the EU. As we have pointed out above, it is hard to see how this would be politically acceptable. Might this induce protectionism by way of a response?

While this approach might be tempting, we think it would raise some insurmountable difficulties – and there is little sign of this type of protectionism taking hold at present. Certainly, DG CONNECT has remained clear that Europe is open to investment. Many European multi-nationals – with telecoms operators prominent amongst them – have holdings in non-European markets, and hence we believe it would be highly problematic for the EC to adopt a protectionist stance to inward investment.

This is not to deny that the disappearance of certain businesses – such as Nokia’s handset operations – have had a charged impact. But the fact remains that Europe has plenty of strategic reasons to avoid a protectionist stance, in our view. We have also wondered whether the recent rise to prominence of privacy issues might introduce fresh difficulties, in particular for US firms looking to buy into the European market. Again, though, we suspect that there would be too much at stake for Europe to impede deals on this basis.

Finally on this topic, it will not be forgotten that one of the most recent attempts at investment into Europe has ended (for the present, at least) in failure: AMX’s August 2013 bid for control of KPN. KPN’s Supervisory Board perceived AMX’s approach as “not friendly”, deviating from the Dutch standard practice of agreeing a “merger protocol” before formally announcing a tender offer.

Given the strategic nature of KPN as the incumbent and owner of critical infrastructure, the independent Foundation decided that AMX’s approach represented a potential threat to KPN’s “continuity, independence and identity” and decided to exercise its call options, thereby halving the voting rights of the ordinary shares and making KPN effectively non-biddable. AMX consequently withdrew its tender offer.

However, we would argue that these developments reflect the specific nature of the relationship between KPN and AMX. To give a contrasting example, Liberty Global’s (LBTYA US, USD80, OW, TP USD90) bid for a full take-over of the Dutch cable operator Ziggo (ZIGGO NA, EUR32, N. TP EUR34) announced on 27 January 2014 received the full support of Ziggo’s Management and Supervisory Boards, having adhered to the standard practice set out by the Dutch takeover code (for instance, agreeing with the Supervisory Board not only on the consideration, but also on a series of guarantees to safeguard levels of employment and investment).

The Austrian case

- ▶ Questions over market definition: how to reflect OTT, WiFi constraints?
- ▶ Efficiency gains not taken into account offsetting upward price pressure
- ▶ Tough remedies, but auction showed 3 networks the right number

Learning from Austria

In any discussion about in-country mobile consolidation, precedents will inevitably loom large. There has been only one such deal completed in the recent past: the purchase of Orange Austria by Three. Naturally, this acquisition has attracted a great deal of interest – and, with it, not a little controversy. The present section reviews the verdict that this deal could proceed, the remedies imposed as a condition of this approval, and the reasoning that lay behind these decisions as set out in the case documents assembled by the European Commission's merger control regulator, DG COMPETITION.

Market definition controversy

In any instance of proposed consolidation, DG COMPETITION must of course analyse the likely impact of a proposed combination on the market. But this begs an important question: what precisely is the market? Should it be thought of as encompassing telecoms as a whole, or perhaps even extended to include payTV in quad-play bundles? Or should it be conceived of in narrower terms, consisting instead of mobile services only, or some subset of these services – separating pre-pay from post-pay customers, for instance, or perhaps consumers from business users? To understand DG COMPETITION's conclusions in Austria, we must first follow its logic for defining the market in the way that it does.

The decision on this matter is of great significance, because the narrower the market is defined, the fewer the number of participants it is likely to contain and the greater the degree of market share concentration. And higher concentration is precisely what is liable to set the alarm bells ringing at a merger control regulator, out of the fear that it entails easier competitive conditions, and thus is liable to result in higher prices.

As a starting point, DG COMPETITION references the recommendation of EC on relevant product and service markets. This document is the responsibility of the EC's telecoms regulator, DG CONNECT, and is periodically updated: in fact, it is presently being revised as part of the digital single market programme. In future, we would argue that there should scope for substantial changes to the definitions: for example, the introduction of a new market that combines fixed-line and mobile services.

This prospect could open up some interesting opportunities in terms of giving greater emphasis to the breadth of telecoms markets, and might reasonably address some of the anxieties over concentration levels (the broader a market, the less likely it is that concentration levels will be judged to be a problem – and so act as a block on consolidation). But at present, even though the current set of definitions are largely focused on fixed-line, and only identify one mobile market

(wholesale voice termination, referred to as market number 7), this has still provided sufficient foundation for merger control bodies to then deploy a much more granular series of sub-market definitions – in which levels of concentration have been found to be an issue.

The case documents published by the Commission¹ on the Austrian merger review process in fact detail a series of potential market definitions that were considered (including differentiating between technology types, between business and residential and between voice and data), but were then rejected. We would agree that it seems to make little sense breaking the market down into the above-mentioned sub-categories, but there is one area where we would express certain reservations.

Fixed-line and mobile data services

This is in the tricky territory of fixed-line and mobile data services. The case documents make the argument that there is limited substitutability between mobile data and fixed-line data offerings, owing to the latter's lack of mobility. The difficult problem here, though, is the question of how to reflect the fact that overlaps like that between fixed-line and mobile can materially constrain the behaviour of participants in either market, even while allowing that neither is a perfect substitute for the other.

The case documents note that a fixed-line service is not a substitute so far as a customer requiring mobility is concerned, but does acknowledge the role of WiFi in bringing a degree of mobility to fixed-line offerings. As we have ourselves argued many times in the past (see *Honey, I shrunk the cells*, April 2012), WiFi cannot replace cellular

platforms – but that is not to suggest its presence will not act as a constraint on mobile pricing.

A mobility customer would surely be hard-pressed to rely upon WiFi as a solution in place of a cellular-based network. But that is not to say that the wide availability of WiFi would not divert a material portion of the traffic that they generate away from the mobile network proper. Such customers would therefore be able to purchase smaller buckets of data usage – and the greater the expense of the cellular service, the greater the incentive to actively seek out ways to divert more of the traffic to WiFi.

The relevant question here is whether relatively rigid market definitions fully capture the extent of the pressures acting upon mobile providers. In this particular example, the market would need to be defined as fixed-line plus mobile (thus encompassing WiFi and cellular platforms) to have captured both forms of connectivity. Even if one reaches the conclusion that these two areas remain, at heart, separate markets, how should the 'chain of substitutability' between overlapping telecoms markets be handled? Here it seems apposite to quote from a section of the case documents that actually specifically relates to the closeness of competition analysis:

Products may be very different, and still constrain each other significantly (p. 58, Decision, Case No COMP/M.6497).

VoIP and OTT

A similar point should be made with respect to over-the-top based services (such as VoIP and instant messaging), which utilise data connectivity to undercut more conventional services such as voice and text messaging. It is hard to see how any market definition dealing purely with telecoms services can address the fact that some of the most powerful pricing constraints have their origins outside the telecoms sector altogether.

¹ Case No COMP/M.6497 – HUTCHINSON 3G Austria/ORANGE AUSTRIA, http://ec.europa.eu/competition/mergers/cases/decisions/m6497_20121212_20600_3210969_EN.pdf

The extent of OTT-based services is notoriously difficult to access and track. However, while acknowledging this, we remain unclear as to how and where the significant constraints imposed by OTT offerings impinged upon the market analysis summarised in the Three/Orange Austria case documents.

At one stage, the case documents note that the possibility of supply-side substitution should not imply the necessary existence of a competitive constraint – since this requires not only an ability but also an incentive to enter, and in the opinion of DG COMPETITION, all the most obvious players are already present. Whatever one's views on the latter clause, it does seem fair that, “there cannot be a presumption of competitive constraint from the mere ability to expand in the relevant market.” But equally, we would add, the mere absence of conspicuous entry should not be interpreted as indicating no constraint is present – and OTT is a case in point.

OTT offerings do not constitute a network service or a wholesale proposition. But they very clearly curtail network operators' retail pricing freedom. Since a properly functioning retail market is the goal of telecoms regulation, we believe that the impact of OTT players demands specific consideration when considering mergers between operators in mobile network operator (MNO)

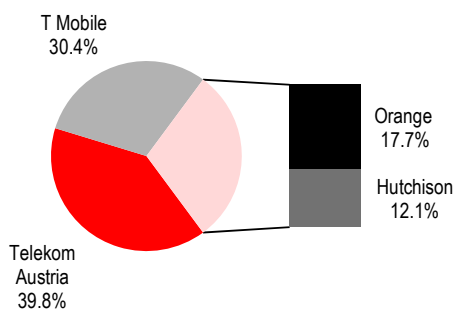
markets. Otherwise, the very definition of such markets will tend to lead to the OTT dimension being unduly neglected.

Causes for concern

Having identified several mobile markets, the case documents then set out the grounds for DG COMPETITION's concerns. These boil down to four sets of problems:

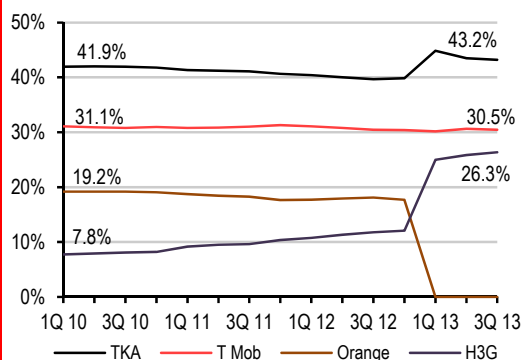
- ▶ **Market structure:** Austria is regarded as being “already highly concentrated” – hence the worry about a proposal that would lead the number of MNOs declining from four to three
- ▶ **High diversion ratios between the merging parties:** in other words, many customers leaving Three went to Orange Austria and *vice versa*, with the consequence that the merger would meaningfully diminish these customers' degree of choice
- ▶ **The industry's substantial margins:** if mobile margins are deemed generous, this would obviously raise questions about whether operators like Orange Austria could really be said to be struggling to sustain network investment

Austrian subscriber market share 2012



Source: Companies

Austrian subscriber market share trends



Source: Company data, HSBC calculations

- **The pre-merger importance of the merging parties in the acquisition of new customers:** the operators are close competitors in the pursuit of gross adds, and hence new customers to the market may find their breadth of choice curtailed as a result of a merger

The issue of sustainable competition

One of the most obvious potential rebuffs to the above issues is that they are relevant only if both the merging MNOs can legitimately be regarded as sustainable competition. In our opinion, though, this is far from clear – given the high degree of gearing at Orange Austria. However, DG COMPETITION concluded that the contention that the constraint imposed by Orange Austria was likely to deteriorate, “cannot be accepted on the basis of the evidence.”

Admittedly, the consolidating parties did not invoke the so-called ‘failing firm’ defence. However, while neither of these operators was facing imminent bankruptcy, we think that this fact should not eclipse the risk that Orange Austria would have been unable to justify the heavy investment that is required of a mobile operator (especially in a market transitioning towards LTE).

While this is plainly not the same thing as a bankruptcy, it could certainly prove critical, and it is therefore a risk that (in our opinion) should be taken very seriously when weighing up whether the proposed deal would enhance or undermine competition. After all, operators with markedly substandard networks would not be able to apply much by way of competitive pressure.

Market share analysis

Although DG COMPETITION declined to discriminate some sub-markets, as discussed previously, it nonetheless chose to examine the broader mobile market through the lens of certain of its components: specifically, contract voice and

data offerings, and data-only offerings. Moreover, the merging parties’ positions were reviewed not only in respect of their existing market shares in these areas, but also with an eye to their performance in terms of gross adds – ie customers new to the market in question.

This is something of a hornet’s nest. DG COMPETITION explains:

It is generally recognised within the Commission’s merger control practice that, within a market, competition concerns may arise in relation to certain segments which have a particular importance for the market as a whole. Post-paid [ie contract] bundles and data tariffs are... of particular importance in terms both of revenue and future market developments. It is therefore important that the Commission examines the effect of the transaction not only on the market as a whole, but also on each segment separately. An effect on important segments within the relevant market is... an effect on that market as a whole. (p. 37, Decision, Case No COMP/M.6497)

Clearly, analysis of a given market will need to pay attention to its component parts. But prospective merger candidates will be forgiven for thinking that the above statement of practice looks exceedingly open-ended. In a market of any normal degree of complexity, there are always likely to be certain segments where some operators do better, and others where they will fare worse. This is likely to be still more the case when the segment in question is examined in terms of (intrinsically more volatile) gross adds figures, rather than customer or revenue market shares (which will tend to trend more gradually).

We would question whether variations of operator performance in terms of individual segments justify intervention – as well as whether this intervention should extend well beyond the segment in question, by way of requiring remedies that will impact the entire market.

Competitive pressure

The next issue for DG COMPETITION is to establish whether there would be sufficient sources of competitive pressure remaining, were the two challengers Orange Austria and Three to combine. This topic encompasses the role of MVNOs and OTT players, but we should first consider Three's argument that its own ability to continue to apply competitive pressure is actually dependent on the deal's approval (as opposed to being impaired by it).

The capacity argument

The economic advisors working for Three contended that, without the deal, the company would face capacity shortages that would fundamentally undermine its ability to compete:

as soon as [Three] becomes capacity constrained, it will have little incentive to lower prices, as it will be unable to increase output. (p. 68, Decision, Case No COMP/M.6497).

This a line of reasoning that closely parallels our own views on the mobile capacity crunch.

In response, DG COMPETITION countered that, if Three really were in danger of hitting a capacity ceiling, then this would rationally already be reflected in its pricing offers, "given that these engage capacity at least two years forward." But we do wonder whether such a 'reasonable' assumption is actually warranted in practice.

For example, one option for operators selling data packages is that they under-provision the network and accept a relative deterioration in average bandwidths (which may be manifest as a slower pace of bandwidth improvement than would have otherwise been the case with fuller investment), even if the size of the data bucket remains unchanged.

In other words, there are other ways of dealing with impending capacity issues than adjusting pricing plans, and hence the absence of such action does not

necessarily indicate the absence of a capacity ceiling. In particular, capacity can be rationed on patience rather than on price (that is to say, customers can be persuaded to curtail their bandwidth consumption by relatively slower network speeds – which can be just as effective in this regard as raising tariffs).

Managing the capacity crunch

We believe that there is a 'capacity crunch' that all operators face, given steep growth in data demand but a hard ceiling to the radio efficiency of network technology (courtesy of the Shannon limit). Managing this capacity crunch will require continuous investment, and consequently we would argue that Three's arguments on this topic hold merit. This is especially the case in light of the fact that Orange Austria's difficulties would likely undermine its own scope for network investment. Note that the company trailed with a clear last place in the 2012 *Connect* survey of the quality of Austrian mobile operators' networks.

Admittedly, the case documents note that the 'failing firm' defence (in which a merger is defended on the grounds that the target could otherwise not continue in business) was not invoked. Nonetheless, we believe it would be valid for the merging parties to argue that their ability to act as an effective competitive force would be enhanced by the merger relative to the scenario where, as independent networks, both faced capacity issues.

Indeed, this perspective would be highly compatible with DG COMPETITION's subsequent assertion that there are significant barriers to entry in the mobile market. We would concur that the capital expense involved (not to mention the paucity of the returns) indicates that entrants are unlikely. We would simply press the same point harder: it is also difficult to see how the market's smaller players (ie the merging parties) could make network investments at the same pace if separate as they could if merged.

The presence (or lack) of MVNOs

The case documents also cite the absence of MVNOs in Austria as further evidence for a lack of competitive pressure that could offset the impact of the merger. However, the MNOs would no doubt counter that the materially lower prices for cellular services that are seen in Austria relative to most European nations simply indicate that the retail market is already intensely competitive.

Indeed, conceptually, one might well have broad misgivings about scrutinising the wholesale market for defects when the desired endgame – namely a competitive retail market – is so clearly in place. But in particular, the absence of MVNOs in a market where prices have been considerably lower than those of the peer group, should not (in our opinion) be taken as supporting the view that MVNOs would not emerge as a competitive constraint under those circumstances that merger control bodies might fear – namely the return of greater pricing power to the MNOs.

DG COMPETITION is able to relate several interviews with potential MVNOs in which the latter claim that the Austrian MNOs do not maintain sufficient a gap between their wholesale terms and retail tariffs (p. 72, Decision, Case No COMP/M.6497). In our eyes, though, this only raises the question, does this reflect excessively high wholesale prices or excessively low retail prices?

MNOs might legitimately be prepared to endure greater percentage discounts to their retail pricing than to their wholesale pricing: the former wins them ‘ownership’ of a customer, whereas in the case of the latter, the customer relationship belongs to the MVNO – and so is less valuable to the MNO. If, as this reasoning suggests, it is the low level of retail prices that results in a tight margin between wholesale and retail prices, then absence of MVNOs is neither an indication of a lack of competitiveness in the market, nor a

predictor of the constraints that would be imposed by MVNOs were retail pricing to be firmer.

Many outside observers will have regarded the Austrian market as intensely competitive precisely because of the highly aggressive pricing present there – hence in large part the surprise within the financial markets at what was perceived as the stringency of the remedies required of Three. However, we would note that, given that DG COMPETITION treats Austria as a national market, its central concern is not (we believe) the relative levels of tariffs in this country as compared with its EU peers. In terms of cross-country comparisons, we suspect that it is rather the absence of MVNOs that is the more significant consideration.

The irony is that this could even imply that Austria is in fact a relatively difficult market in which for DG COMPETITION to assent to consolidation (whereas, to repeat, the financial markets may have assumed that Austria’s relatively low prices would have greatly facilitated a positive decision). From DG COMPETITION’s perspective, other countries (hence separate markets) with perhaps higher prices but MVNOs present have (by virtue of the latter’s existence) greater safeguards in place that a merger would not lead to consumer harm.

Countervailing buying power

One further source of competitive constraint considered in the case documents is that of countervailing buyer power – that is to say, the ability of customers to either negotiate with the operator or switch to alternative suppliers. The text makes the reasonable point that customers are not able to leverage their joint purchasing power to extract more attractive terms (although individually many customers and businesses do plainly negotiate on price, as well as on other terms and conditions).

However, the discussion does not cover the topic of OTT services, which have provided a ready mechanism for customers to take their voice and messaging commerce elsewhere – in volumes sufficient to trigger a profit warning at KPN in 2011, for example. In our view, applications like Skype and WhatsApp now rather undermine the presumption that mobile customers lack countervailing purchasing power.

Upward pricing pressure

Perhaps the central component of the case documents is the work conducted by DG COMPETITION assessing the likely magnitude of the tariff increases that it anticipates as a result of the merger. These calculations are based upon a Gross Upward Pricing Pressure Index (GUPPI) analysis: an academically derived means of estimating the degree to which merging parties might be incentivised to lift their tariffs – albeit not one free from controversy.

The case documents contend that, with certain assumptions, it is “possible to go beyond the general UPP [upward pricing pressure] result directionality and to quantify the unilateral incentive for the merged entity to increase prices as a result of the merger.” This viewpoint, though, has come under question.

Charles Rivers Associates (CRA), a respected economic consultancy that acted on behalf of Orange Austria, has provided its own cogent analysis of the Austrian decision process, and questioned how far UPP-type techniques can be relied upon. CRA believe that UPP is really appropriate only as a ‘screen’ to identify whether a given market is liable to experience price rises in the event of consolidation and “should not be relied upon in an in-depth merger investigation.” (*The Competition/Investment Trade-Off Revisited? Lessons from Hutchison 3G/Orange Austria*, CRA Competition Memo, April 2013).

In the case documents, DG COMPETITION does set out to counter the criticism that the UPP approach is simply too blunt a tool by explaining some of the subtleties with which it is able to deal. For example, it argues that upward pricing pressure should be understood in relation to the trajectory that tariffs would have taken had the merger not taken place: hence, if decreasing prices were to be expected without the merger, even a positive UPP calculation would not necessarily imply that DG COMPETITION was expecting to see higher absolute prices post-merger.

Upward pricing pressure might also be manifest in other, implicit, forms – such as through lower handset subsidies, or alternatively, by reducing another form of investment, that in capex. Consequently, DG COMPETITION argues that the UPP analysis can capture the impact not merely on prices but quality adjusted prices (referred to technically as hedonic prices).

ARPU problematic in UPP calculations

This becomes vitally important, because the UPP calculations have been performed not on unit price directly, but instead on ARPU. The case documents explain that this “allows the use of a single value to conceptually represent the price of the ‘typical’ phone bundle”. However, while convenient, the risk in this approach is that ARPU trends might be driven by improvements in the bundle of mobile services provided – for example, faster speeds or larger data allocations. Thus, it is perfectly possible that unit prices might fall at the same time that ARPU grew. In this context, it is therefore crucial that ARPU be a hedonic measure.

In an isolated system, where network quality was constant, use of ARPU as a hedonic measure would probably be less contentious. But what about in a dynamic system, where network investment is one of the key variables? Here the main concern voiced in the case documents is that the UPP analysis could suggest the merger would

lead to lesser investment and therefore a lower level of services available at the same price,” since “this would benefit the firm in the same way as raising the price and [would] possibly be easier to implement. (p. 83, Decision, Case No COMP/M.6497).

But what if the merger instead encouraged investment, by providing the new combined entity with efficiency gains and better prospects, and therefore greater incentive to commit to capex?

Efficiencies a vital part of the equation

In the conventional formula used for UPP analysis, a separate term is assigned to the efficiency gains that the merger in question can be expected to liberate. However, the case documents state:

the [merger] Parties have not provided sufficient evidence to recognise efficiencies in this case. Therefore there is no need to include efficiencies in the UPP analysis, since the existence and relevance of such efficiencies has not been established. (p. 83, Decision, Case No COMP/M.6497).

Naturally, we find this worrisome. It implies that the most significant benefit from the merger has not been factored into the calculations – so the incentive to raise prices has been captured, but not the incentive to invest. Another way to put this is that it reflects the propensity to lift ARPU, but not the volume increase from associated investment. Only the two combined would be properly hedonic, in our view: effectively a unit price, a measure that combines the price with the capacity supplied in return for it.

We would therefore echo CRA’s stance that merger analysis must take account not only of price competition between the parties, but also of network investments made to improve service quality, since the latter are such a significant element of mobile market competition. The key question then becomes:

what is the magnitude of the investment-related synergies that would be needed to alleviate the upward price pressure generated by the merger?

Without factoring in both, the risk is that pricing pressure tests will materially overstate the potential negative impact of mergers.

Using appropriate time horizon critical

A final note on this point: certain industry observers have identified significant price increases post the merger in Austria, which might give one to suppose that the UPP calculations had in fact materially underestimated the upward pricing pressure (*MNO consolidation in Austria*, Rewheel, September 2013). However, we believe that there are fundamental problems with such analysis. (NB our own summary of the post-merger pricing activity in Austria is given later in this section).

The most fundamental issue, to our mind, is the time scale involved. By creating a more supportive environment for investment, we believe that consolidation promotes network deployment, which leads in turn to lower unit prices. However, this effect will necessarily take time, as it is a function of infrastructure roll out. Surveying prices immediately after a merger is therefore to assess only one side of the equation, and will necessarily give a distorted picture. Indeed, this raises a further question: whether the 2-3 year time horizon that is (perfectly understandably) the norm in merger control analysis is suited to a network intensive industry such as telecoms.

Additionally, some in the industry have questioned the consultants’ analytical approach. For balance, we would recommend reading the Communications Chambers’ report, *A critical analysis of the Rewheel paper, “EU27 mobile data cost competitiveness report – May 2013”*, 17 June 2013, which sets out in considerable detail how the data in a previous report was handled.

Dynamic efficiency gains

We therefore see the scope for potential efficiency gains as the pivotal element in the debate over how the analysis of the Austrian merger was conducted. From the perspective of DG COMPETITION:

the Commission's practice is to assess efficiencies as a countervailing factor and the burden of proof rests upon the [merging] Parties to the Proposed Transaction to establish the existence and significance of the efficiencies to the necessary standard of proof... (p. 96, Decision, Case No COMP/M.6497).

The case documents state that, prior to the issuance of the Commission's Statement of Objections (SO) to the proposed merger (that is to say, well after the initial application for approval), Three

did not sufficiently address, let alone prove, that the requirements to acknowledge such efficiencies... were met. (p. 96, Decision, Case No COMP/M.6497).

The document goes on to state that it was only in its response to the SO that Three "eventually claimed efficiencies as a formal defence" (our italics).

It seems surprising that parties proposing such a merger would leave this critical topic so late, although one interpretation would be that efficiencies were raised from the outset, but not as a formal defence. In any case, it seems clear that DG COMPETITION believes the industry has not made the argument for dynamic efficiency gains either forthrightly or convincingly.

The case documents further set out the line of reasoning that, even in the event of improved network quality, there is the risk that the merging parties would merely increase prices (relative to what they would otherwise have been) so as to claw back some or all of the benefits that

customers would have thereby derived. This scenario is, indeed, plausible – in fact, we believe that it is actually necessary that the merging parties enjoy some of the upside from the improved network capacity or it would not be possible to justify the necessary additional investment.

Balancing returns and investment

In essence, if customers are to enjoy the fullest benefit of unit price declines (courtesy of network investment), they will need to share some of the resulting upside with the operators. If there is no upside, the investment will not take place at the same pace, and consequently unit prices will be relatively higher. Rather than argue that there will be no 'claw back' of the benefits of investment, we would contend that the operators' case should be that it is this very return that will drive the additional investment that will leave customers enjoying lower unit prices – or, to put this another way, that the claw back will not outweigh the impact of lower unit prices.

Hence (in our opinion) the vital importance of going beyond a GUPPI test, which measures purely the propensity to increase pricing, and rather employ a UPP test, which incorporates an efficiency component. It is the efficiency gain (specifically, dynamic efficiency gains) that enables lower unit prices – and to omit this side of the equation inevitably leads to the conclusion that the merger would clearly result in anti-competitive effects (relative price rises).

However, for dynamic efficiency gains to be given their due weight, there will need to be willingness on both sides. The case documents describe the merging parties' argument the transaction would permit them to extend their geographical coverage (which certainly seems very plausible) as "a mere statement of intent and not a verifiable piece of evidence." The text continues:

Furthermore, [Three] has also failed to show an identifiable positive impact on consumers which is not marginal. (p. 101, Decision, Case No COMP/M.6497).

By definition, any projected network investment can be no more than “a mere statement of intent”. Indeed, the analysis of any merger is laden with ‘statements of intent’ in the form of, for instance, company budgets, customer acquisition targets, etc. These items are not dismissed on account of their inevitably contingent status. So while, to repeat, we think the industry must do a better job of putting the dynamic efficiency gains case, it will also need to secure an open-minded hearing.

On this last point, we do take some encouragement from the fact that DG COMPETITION states its preparedness to consider arguments of an efficiency gain nature:

the alleged effects of... increased network quality... as a result of more available network appear theoretically appealing. (p. 100, Decision, Case No COMP/M.6497).

Additionally, *Total Telecom* has quoted a senior DG COMPETITION official, Mr Eduardo Martinez Rivero, as commenting that “Prices are not the only competitive measure” or “the only parameter” considered (2 July 2013). While the specific topic was network sharing rather than consolidation, we suspect his reported view that the “potential for network improvement... would also be taken into account” would also apply to merger analysis.

In view of the tremendous importance of this topic, we have set out in a dedicated section that follows later in this report the detailed reasons why we regard dynamic efficiency gains as the key to unlocking the consolidation issue – to the benefit of customers and operators alike.

Network sharing as alternative

A substantial additional hurdle to those seeking to justify consolidation on the basis of the efficiency gains that it would bring is the necessity to demonstrate that there are no other (to quote DG COMPETITION), “less anti-competitive means to attain the claimed efficiencies” (p. 97, Decision, Case No COMP/M.6497). One alternative to a full merger would be for the parties to enter into a network sharing agreement of some form or other. The case documents set out what is, in effect, a sliding scale of such possibilities:

a domestic roaming agreement with other MNOs, a joint venture to develop LTE, large scale network sharing or even a merger only of the Parties’ networks with the commercial and retail assets of Orange remaining active in the market as an independent MVNO. (p. 98, Decision, Case No COMP/M.6497).

DG COMPETITION is certainly on firm ground when it states that certain forms of network sharing arrangements are common practice within the industry. However, we think it very unlikely that network sharing can unleash anything like the same dynamic efficiency effects as a merger between two operators. While we have been enthusiastic to endorse such agreements, we do not believe that they add to investment – if anything, they have merely permitted the same network capacity but at lower capex.

To avoid any confusion, this certainly means that network sharing is worthwhile. But we see little evidence that it has enabled operators to deploy more capacity than they would otherwise have done. Given the importance of this topic, we return to it later in the document, with our own examination of the evidence as to what network sharing can – and cannot – deliver.

Remedies

We would identify two sets of important remedies in the Three/Orange Austria consolidation: those with respect to MVNOs and to spectrum. The financial markets have regarded both as exceedingly onerous. Our own opinion is that they are harsher than we feel was warranted on the basis of dynamic efficiency gains that we believe would ultimately be of great benefit to the customer – though note that DG COMPETITION would doubtless contend that the dynamic efficiency case was not made convincingly. However, be that as it may, we would also observe that the remedies were not quite so blunt as many observers might initially have concluded.

Provide capacity to MVNOs

With regard to Austrian MVNOs, we would again make the point that their paucity in number could simply reflect the exceedingly competitive nature of the country's pricing environment. Hence it will be interesting to see how the requirement on Three to provide capacity to MVNOs fares: how many takers will there be, and how committed will their efforts be to this market?

The MVNO obligation for Hutchison is based on a cost-plus methodology. Such remedies can provide a ceiling for retail market price rises in the short term. However, we would draw attention

to the fact that the pricing structure to which Three has committed as a remedy is variable in nature. In other words, MVNOs must pay for the capacity they use, rather than having access to it on a flat-rate basis. If usage of mobile data continues to rise, input costs for the MVNO will rise with it, as we illustrate in the accompanying table. This is obviously critical if incremental network investment is to achieve a return (so as to justify further such investment, and thus progressively lower unit prices).

Although the MVNO would only face input costs of EUR4.1 per month for a typical user today (consuming 300 voice minutes, 200 texts and 500MB of data), that same user will generate costs of EUR6.6 if their data consumption doubles. Indeed, if the user was to fully consume the typical offer in the Austrian market today (1,000 minutes, 1,000 texts and 1,000MB), the input costs would rise to EUR13.6 per month.

A comparison with the EUR10 retail price of the existing no-frills brands (raised from EUR7 in the course of 2013, including VAT) suggests that a prospective MVNO has little flexibility with which to embark upon an aggressive price-discounting strategy. We estimate costs for sales, marketing, customer care and billing would be at least EUR2.5 per customer, so the MVNO would

Three's MVNO reference offer: the MVNO's input costs rise with growing usage; direct costs already today exceed current retail price points for a heavy user

			Typical User today		Typical User tomorrow		Heavy User today		Lowest retail price point today (ex VAT)	
Base input prices of Hutch for MVNOs										
EUR	unit prices (EUR)	unit	usage	cost (EUR)	usage	cost (EUR)	usage	cost (EUR)		bucket
Voice	0.010	Minutes	300	3.0	300	3.0	1000	10.0		1000
Text	0.004	SMS	200	0.8	200	0.8	1000	4.0		1000
Data	0.002	MB	500	1.0	2000	4.0	1000	2.0		1000
Total direct input costs for MVNO per month				4.8		7.8		16.0		8.0
Discount input prices of Hutch for MVNOs (if MVNO commits to certain volumes)										
EUR	unit prices (EUR)	unit	usage	cost (EUR)	usage	cost (EUR)	usage	cost (EUR)		bucket
Voice	0.0085	Minutes	300	2.6	300	2.6	1000	8.5		1000
Text	0.0034	SMS	200	0.7	200	0.7	1000	3.4		1000
Data	0.0017	MB	500	0.9	2000	3.4	1000	1.7		1000
Total direct input costs for MVNO per month				4.1		6.6		13.6		8.0

Source: HSBC

have to price such an offer at EUR6.6 excluding VAT if it was to break even on today's typical customer usage patterns – while needing to scrupulously avoid attracting heavy users. Since its costs are linked to usage, the MVNO will have to ration the capacity it offers on price.

No room for MVNOs to cover total costs on current retail prices

EUR per customer per month	total direct input costs for MVNO per month	Retail price point in the market today (ex VAT)	Gross margin for MVNO (before sales, marketing, customer care, billing costs)
Typical user today	4.1	8.0	3.9
Typical user tomorrow	6.6	8.0	1.4
Heavy user today	13.6	8.0	-5.6

Source: HSBC calculations

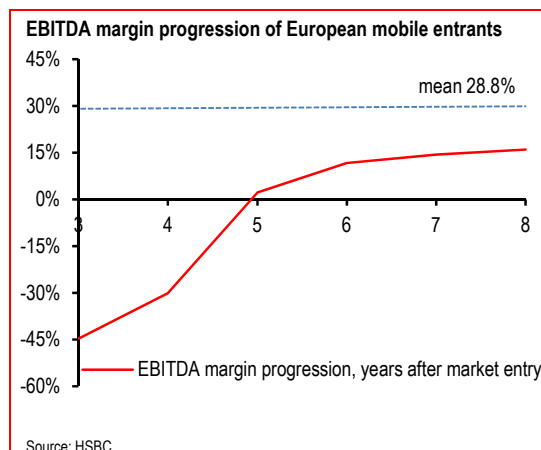
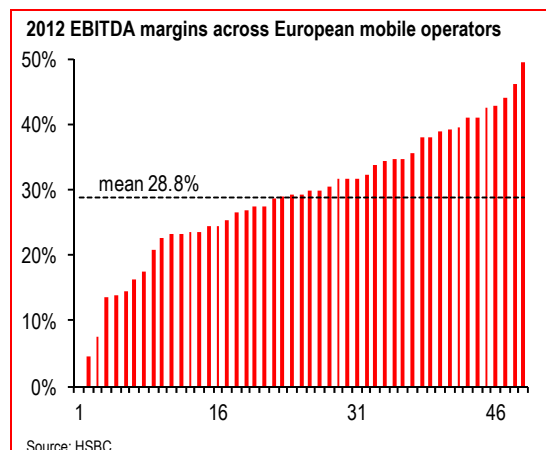
Spectrum commitments

As mentioned, Three also made commitments on spectrum as a remedy, undertaking to hand over frequencies to a fourth player in the market. This was the subject of particular consternation at the time of the deal's approval: many in the financial markets wanted to understand the merits of embarking on the risky and expensive task of consolidation, when a pre-condition of the deal was the market subsequently return to four players. However, as should now be plain, the detail of this remedy was somewhat different.

Specifically, Three committed to give spectrum to any fourth player securing spectrum in the Austrian 4G auction. But when the dust settled, only the three incumbent operators remaining (ie Telekom Austria, DT and Three/Orange) obtained spectrum. With no entrant, the obligation to hand over spectrum lapsed.

In effect, what DG COMPETITION organised was a revealing experiment. In our view, the regulators were well aware there was a significant possibility that no entrant would appear (the case documents state that “the Commission is aware that there is no guarantee that a MNO will effectively enter the market”, (p. 117 Decision, Case No COMP/M.6497). Indeed, we would make our customary argument that, in the presence of a regulator-imposed arbitrage – the MVNO undertakings – it would be very odd if an entrant did choose to expend its capital on a network roll out when a capex-free wholesale option was being made available.

Nor would prospective mobile network entrants be able to derive much comfort from the track record of their predecessors. An analysis of the margins achieved by Europe's entrants of the 2000-era and after reveals a dismal picture, with most struggling to make anything like adequate returns – as the accompanying charts indicate. (Indeed, these graphs should help give the lie to



the notion that Europe's mobile markets need not fewer but greater numbers of participants: it is clear that conditions are already sufficiently tough that entrants of a *decade's* vintage are not yet generating sustainable returns).

Nonetheless, by accepting a proposal from Three that it divest spectrum to an entrant, should there be such demand, DG COMPETITION introduced what might be considered an insurance policy. In the event that those operating in the mobile sector (and therefore with some expertise in the field) deemed the remedies accepted as light (taking the view that prices would likely rise as a consequence of the deal's approval), then they would have the motive to enter the Austrian market. (Perhaps to a lesser extent, the MVNO remedy could be considered as fulfilling a similar function).

However, we would argue in addition that attention should be paid to the outcome of this experiment. MVNOs have signed up to Three's offering, but not in great numbers, and no entrant appeared looking for spectrum on which to construct a network of its own. The evidence here indicates that the most appropriate number of mobile network operators is three.

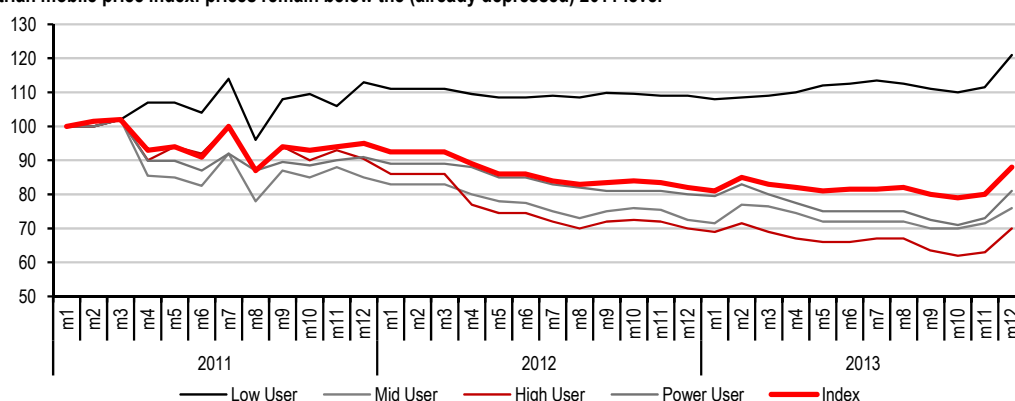
Recent pricing developments

Since consolidation in Austria was given the go-ahead, we have seen a series of pricing initiatives aimed at creating more sustainable conditions. In general, the market leader Telekom Austria (TKA AV, EUR6.5, N, TP EUR6.2) has led this process, by establishing higher price points – but, at the same time, generally enriching the service offering with higher speeds, larger allocations (both in terms of calls and data) and enhanced functionality (adding cloud storage capacity). We illustrate the details in the accompanying table but would note that price levels on average still remain below the level seen in 2011, before consolidation took place.

Re-pricing in the discount segment

On 15 January 2013, in an attempt to signal an end to the price war, Telekom Austria's no-frills brand Bob lifted the price for its smartbob XL tariff (1,000 minutes/1,000 texts/1,000 MB per month) from EUR9.9 a month to EUR19.9. However, at the same time, it increased the size of the package to 2,000 minutes, 2,000 texts and 2,000 MB per month. With both the price point and volume raised by 100%, the unit price is unchanged.

Austrian mobile price index: prices remain below the (already depressed) 2011 level



Source: RTR

Orange continued to promote 1,000 minutes/1,000 texts/1,000 MB packages priced at EUR7 a month until the brand was abandoned by Three in September 2013. In our view, Orange Austria's commercial strategy was governed by its high debt burden, which left it very little room for handset subsidies. The company's focus was therefore on price-discounted SIM-only offers. Meanwhile, T-Mobile Austria continued to offer the same package for EUR10, although from the summer of 2013 these tariffs no longer featured in its advertising campaigns.

In October, Telekom Austria adjusted the equivalent tariffs of its second no frills brand Yesss! (which it had acquired from Orange). The price point was raised from EUR8.8 to EUR9.9, while the service package was increased from 1,000 minutes/texts/MB per month to 1,500. In other words, while prices were raised 12.5%, the capacity provided was increased by 50% – amounting to a significant reduction in unit prices. Three Austria then raised the price for its equivalent package from EUR7 to the same EUR10 level in its tariff grid re-launch in October and later on raised minute and data allowances.

More recently, Telekom Austria has raised prices for its existing bob brand customer base by between 13-25%. However, despite this being a significant price increase in percentage terms, we estimate that the absolute impact on the company's revenues will only be a low single-digit million figure, indicative of the fact that

these price changes only impact a small portion of Telekom Austria's mobile business.

Monthly tariffs on bob (Telekom Austria's main discount brand) with respect to January 2014 price changes to existing customers

EUR	new	old	delta	feature
bigbob	9.9	8.8	13%	1GB/1000min/1000SMS
smartbob	11.9	9.9	20%	2GB/2000min/2000SMS
bob broadband	5.0	4.0	25%	1GB data
gigabob	9.9	8.8	13%	9GB data

Source: Company website, HSBC

Re-pricing in the broader market

During 2013, the Austrian operators moved to new core tariff grids that offered unlimited voice and texts, with pricing tiered by data volume and speed. For example, in March 2013 T-Mobile launched new tariffs, implicitly raising prices of its lower tier offerings by 13-15%, but later in the year it also reduced the charges on its larger packages by 12%.

In April, Telekom Austria announced its new tariff portfolio, which involved moving to unlimited voice and texts, but with data tiered by volume. The company retained the same price points as previously, but this time on a promotional basis. The list prices are EUR5-10 higher, but (as of yet) there is no set expiry date to the promotions.

Subsequently, in November, the company raised prices by EUR5 (13% to 17%) for its mid-range tariffs, but also added more value into the packages (such as cloud storage space and increased international call allowances). Meanwhile, the pricing on its high-end tariff was actually cut by 8%.

Austrian tariff changes during 2013

Date	Tariff changes
Jan-13	TKA's no frills- brand bob raised the price of the XL tariff from EUR9.9 to EUR19.9 and raised the volumes offered by 33%
Mar-13	T-Mobile launched new tariffs implicitly raising prices of its lower tiers by 13-15%
Apr-13	TKA launches new A1 tariff grid with unlimited voice and SMS but tiering by data volume and speed
Aug-13	Three abandons the Orange brand and with it the most aggressive tariffs
Sep-13	Three launches new tariff grid but only raises prices for its lowest tariff
Oct-13	TKA raises prices of Yesss! Brand by 12.5% but also increases volumes by 50% – an implicit unit price decrease
Nov-13	TKA raises prices of most tariffs by EUR5 or 10-20% but also enriches products adding more roaming minutes and cloud storage
Jan-14	TKA raises prices of bob no frills tariffs for existing customer base by 13-25%

Source: Company websites, HSBC

In short, Austrian operators have increased certain tariffs, but have focused on the low end of the market, where we would argue that price levels were unsustainably low. Moreover, the operators have typically added to their bundles at the same time, so that the unit price increase is less than the headline price rise might suggest. Indeed, as a result of this process, in several cases unit prices actually declined.

Note, however, that in the accompanying table summarising recent tariff developments, it is the change in headline offer price (rather than the change in unit price) that is cited. In other words, promotions are included rather than stripped out, while no adjustment is introduced to take account of any service enhancements that have been made to a package. (A unit price would clearly be preferable, but many of the packages feature unlimited allocations of minutes and/or data, which render such a calculation impossible without tariff-by-tariff usage statistics). Finally, we would also emphasise that it is very early days post the merger, and with greater network investment, there is every prospect for unit price declines to gain momentum.

Austrian tariff changes in 2013: more for more

End 2013								End 2012						
Telekom Austria	Package	EUR/month	Min	Msg	Data (GB)	Int'l Units*	Download speed	Package	EUR/month	Min	Msg	Data (GB)	Download speed	Headline price Δ*
	With handset							With handset						
	A1 Basic	19.9	1000	1000	100 MB	N.A	4Mbps	A1 Basic	19.9	1000	500	Unlimited	4Mbps	0%
	A1 Go! S	34.9	Unlimited	Unlimited	1.0	N.A	4Mbps	A1 Go! S	29.9	2000	1000	Unlimited	4Mbps	17%
	A1 Go! M	44.9	Unlimited	Unlimited	3.0	50	21 Mbps	A1 Go! M	39.9	3000	1000	Unlimited	21 Mbps	13%
	A1 Go! L	54.9	Unlimited	Unlimited	5.0	100	42 Mbps	A1 Go! L	59.9	Unlimited	Unlimited	Unlimited	42 Mbps	-8%
	Discount brand							Discount brand						
	Smart bob XL	19.9	2000	2000	2.0		1Mbps	Smart bob XL	9.9	1000	1000	1.0	1Mbps	101%
	Yess!	9.9	1500	1500	1.5		1Mbps	Yess!	8.8	1000	1000	1.0	1Mbps	13%
T-Mobile	Package	EUR/month	Min	Msg	Data (GB)		Download speed	Package	New price	Min	Msg	Data (GB)	Download speed	Headline price Δ*
	With handset							With handset						
	SmartNet unlimited S	22.49	Unlimited	Unlimited	2.0		4.0Mbps	All inclusive 1000	19.99	1000	1000	1.0	2.0Mbps	13%
	SmartNet unlimited M	31.49	Unlimited	Unlimited	4.0		21Mbps	All inclusive Music 2000	29.99	2000	1000	4.0	7.2Mbps	5%
	SmartNet unlimited L	40.49	Unlimited	Unlimited	6.0		42Mbps	All inclusive 3000	45.99	3000	1000	6.0	21Mbps	-12%
	SmartNet unlimited XL	49.49	Unlimited	Unlimited	6.0		100Mbps	All inclusive 4000	55.99	4000	1000	6.0	21Mbps	-12%
	Without handset							Without handset						
	SmartNet 1000	10	1000	1000	1.0		4Mbps	All inclusive 1000	10	1000	1000	1.0	2Mbps	0%
	Discount brand							Discount brand						
	Tele.ring Masta Mini	5	500	100	0.05			Tele.ring Masta Mini	5	500	100	0.05		0%
	Tele.ring Masta Max	10	1000	1000	1.0			Tele.ring Masta Max	10	1000	1000	1.95		0%
	Tele.ring Masta Mega	15	2000	2000	2.0			Tele.ring Masta Mega	15	2000	1000	1.95		0%
H3G Austria	Package	New price	Min	Msg	Data (GB)		Download speed	Package	New price	Min	Msg	Data (GB)	Download speed	Headline price Δ*
	With handset							With handset						
	Hallo S	10	1000	50	0.05		2Mbps	Comfort	7	1000	100	0.05		43%
	Hallo M	15	1000	1000	1.0		2Mbps							
	Hallo L	20	1000	1000	2.0		4Mbps	L	20	1000	1000	2.0		0%
	Hallo XL	30	2000	1000	4.0		21Mbps	XL	30	2000	1000	4.0		0%
	Hallo XXL	40	3000	1000	6.0		42Mbps	XXL	40	3000	1000	6.0		0%
	SIM only							SIM only						
	Hallo SIM	10	1500	1000	2.0		2Mbps	3 Single	7	1000	1000	1.0		43%

*Note: Headline price change refers to the change in the headline price of the given package (including the impact of promotions), not to the change in its unit price
Source: HSBC

Dynamic efficiency gains

- ▶ Capex the most important driver of lower mobile unit prices
- ▶ Healthy margin essential to secure optimal capex/unit pricing
- ▶ Empirical data confirms higher margins tend to lead to higher capex

The case for consolidation

In the broadest of terms, there are two different sets of factors that act to drive prices lower: static and dynamic effects. To date, and for understandable reasons, regulators have tended to rely upon the former category – seeking to increase the level of competition in a given market, or even intervene directly to determine tariffs. Such tactics have their merits, especially early in an industry's transition away from the monopoly PTT era of the 1990s.

However, there is only so far that such techniques can be taken. If Europe is to harness the full productivity benefits associated with telecoms technology developments, it will need to leverage dynamic efficiency gains that can naturally compound over time. The most important of these, in our view, is network investment in next generation equipment – which, thanks to Moore's Law, boasts continuously improved performance. This section examines why dynamic efficiency gains lead us to the conclusion that consolidation is the most desirable outcome for Europe's citizens.

Margin-investment linkage

We believe that there is a close linkage between operators' margins and their levels of investment. Margins determine whether operators generate the cash flow that is required to sustain capex, and are also an excellent barometer of the health of a

given market: those generating attractive returns are likely to receive greater investment, while those under pressure are (*ceteris paribus*) likely to see capital withdrawn in response. Financial markets would regard this as axiomatic, but it will nonetheless be important to demonstrate a clear correlation between these two elements to address DG COMPETITION's concerns in this area.

It may be objected that there are individual markets where margins have deteriorated and yet investment has continued. However, what we seek to show in this report is that, as a whole, Europe is falling behind its global peers in terms of investment – and that unit prices are relatively higher as a result. So while there will inevitably be some variation at a country-by-country level, the overall continental picture is troubling.

Consolidation's impact on investment

But is consolidation a solution? Understandably, one of DG COMPETITION's worries is that fewer operators in a market may not necessarily lead to increased network investment. Its conclusions on this front may have been drawn from the post-merger track record of the Netherlands, where consolidation from four to three players was permitted in 2007. The Dutch parliament was clearly dissatisfied over service quality levels in the wake of the merger, and this seems to have provided the impetus behind

proposals to re-introduce a fourth player by ring-fencing spectrum for an entrant in the 2012 auction.

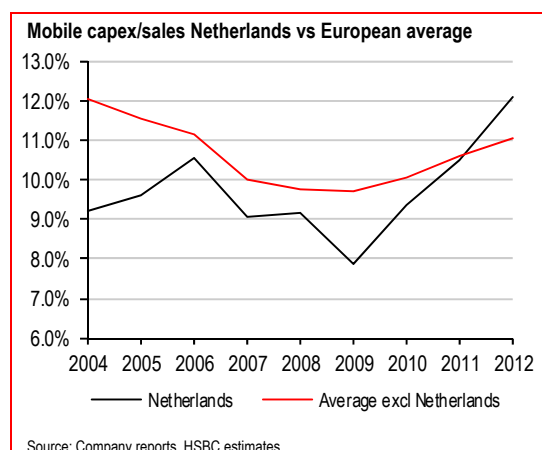
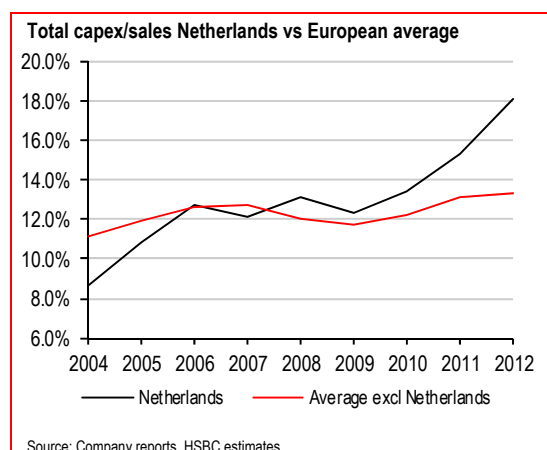
In our view, the impact that consolidation had on investment in this particular example is rather opaque. One problem is the fact that KPN no longer provides a breakdown between fixed-line and mobile capex, and thus we must estimate the proportion of its expenditure devoted to mobile. Consequently, the accompanying charts show total capex/sales ratios for the Dutch sector alongside our estimates specifically for the mobile subsector.

In terms of total sector investment (fixed-line plus mobile), it should be apparent that Dutch capital intensity tracked what was seen elsewhere in the sector. Mobile capex, to the extent that we can imply it, did lag, but appears to have done so only relatively mildly, with the exception of 2009. However, it should be born in mind that one the rationales for conducting a merger is the scale efficiencies on offer. In moving over a period of years from five operators to three, and therefore 'rolling in' a pair of consolidated networks into the remaining three, there would have been scope for modest capex efficiencies, which would be manifest as a transitory dip in capital intensity.

Interestingly, though, this situation appears to have reversed in the 2010-12 period, with mobile capital intensity increasing once more, to overtake the European average. We would point out, however, that this improved trajectory may be vulnerable in the decade ahead, in the aftermath of the excessively expensive Dutch spectrum auction that took place at the end of 2012. In our opinion, the auction structure almost guaranteed exorbitant bids, and the long-term result is likely to be less investment in Dutch mobile infrastructure.

What we would certainly concede, though, is that the industry did not conspicuously exert itself to use the Netherlands as a demonstration of the linkage between consolidation, increased investment and lower prices. But even if, for the sake of argument, we adopt the harder-line position that the Dutch industry fell prey to short-termism, we would still argue that the example of a solitary market is insufficient to overwhelm the broader empirical evidence that margins and investment are linked. If this is the case, consolidation will very reasonably be presumed to promote capex. (This line of argument is set out in detail later in the present section).

On the short-termism charge, it should also be mentioned that the sector as a whole was experiencing extreme pressure over the years subsequent to the merger. In theory, of course, the



better conditions in the Dutch market that followed in wake of consolidation should have attracted additional capital – transferred from other countries where conditions were even worse.

However, in practice, where a company is under tremendous strain at a group level, the chances are that economies are required of all its constituent units – even those that would otherwise merit more generous investment. We cannot help but observe that, despite the central role almost all commentators attribute to communications infrastructure, at a time when the EC was itself under severe financial strain, it was funding for the most forward-looking aspects of spending such as the Connect Europe Facility (CEF) that was eliminated.

Dynamic efficiency arguments

Whatever the background to DG COMPETITION's misgivings about the relationship between margin and investment, the telecoms industry certainly seemed to come to a hard conclusion that there was little to no scope for dynamic efficiency gain-based arguments (such as consolidation sustaining greater capex, leading to lower unit prices) prevailing with the merger control authorities. In fact, we suspect that many operators believe that DG COMPETITION does not, in practice, ever clear cases on efficiency grounds.

This may explain why the industry's typical approach has been to argue that any given transaction in question is inherently pro-competitive, and only if there is disagreement on this point, to move the debate onto efficiencies. Admittedly, it would be possible to incorporate efficiency-related arguments in a broader, 'pro-competitive' pitch – these need not be the preserve of those mounting a purely efficiency-based case. But given DG COMPETITION's apparent stance that consolidation has anti-competitive effects, we would

argue that there is surely a compelling argument for the industry recognising this from the outset, and therefore placing greater immediate emphasis on the centrality of dynamic efficiency gains.

However, if the telecoms sector has work to do on this front, it would also appear to the outside observer that DG COMPETITION could usefully build confidence on the reception with which such lines of reasoning would be met. On the basis that it is very much in Europe's interests that the right decisions be taken, it would clearly be most regrettable if efficiency gains that were available from consolidation were to go unrealised as a result of the deals in question not progressing (either being rejected, or not proposed in the first place, on the presumption that the verdict would be negative).

Challenging calculations

A particular fulcrum of controversy is the asymmetry between measures of potential upward pricing pressure resulting from a merger, and the dynamic efficiency gains that might offset these. Telecoms operators seem resigned to the fact that dynamic efficiency gains will be extremely difficult to quantify, whereas the UPP analysis that they must counter-balance is comparatively straightforward to calculate (even if its interpretation remains contentious). The risk here is that operators come to regard the process as impossible, or – worse still – perceive the refutation of dynamic efficiency gain-based arguments as merely providing a convenient scapegoat for those looking to block consolidation.

Experienced practitioners would doubtless be the first to concede that even UPP and GUPPI tests require sensitive calibration and handling, and are not purely objective processes, instead requiring subjective inputs and interpretation. Nonetheless, we do sense there is a disparity at present between the superficially 'scientific' measures assessing

upward pricing pressure, and the rather vaguer nature of the evidence provided on efficiency gains. What follows is therefore our humble effort to introduce some greater objectivity and empiricism into the dynamic efficiency gains side of the case.

An additional issue is the time scale over which dynamic efficiency gains are assessed, which tends to be of the order of two to three years. Many in Brussels would concede that this raises particular problems for the telecoms sector, where projects tend to be long-term by virtue of the quantity of infrastructure that is typically involved.

While it is understandable that merger control authorities should wish to focus on nearer-term consequences, the reality in telecoms is that longer time periods are often more relevant. In turn, this may suggest the utility of a more clearly articulated industrial policy for the sector, something which is largely lacking today. An overt industrial policy has emerged in other areas, examples perhaps being the financial sector (where arguably the member states have been motivated by fear to accept a much greater degree of centralised regulation) or aerospace, where Airbus (AIR FP, EUR57, NR) is now able to compete capably against Boeing (BA US, USD143, NR).

Evaluating dynamic efficiencies

In seeking to highlight the value of dynamic efficiency gains, we follow a three-step process:

- ▶ First, we seek to demonstrate that unit prices are primarily driven downwards by dynamic rather than static effects – and in particular by capex
- ▶ Second, we set out a conceptual model that attempts to illuminate why the telecoms industry requires healthy margins in order to sustain network investment

- ▶ Third, we show that this model is not merely of theoretical interest, by establishing empirically a positive linkage between margins and capex

Capex is key

In short: it is capex that is most effective in driving lower unit prices, and capex is best secured via healthy (though not excessive) margins. Our account here presents work originally conducted by researchers from Orange, specifically the derivation of a number of relevant mathematical models. We would like to express our gratitude to Marc Lebourges, François Jeanjean and Claudia Saavedra for their assistance.² However, while we have utilised the formulae in question, we have tested them in an independent analysis of our own against market data.

In terms of data sources, for the analysis of the relative importance of the various drivers of unit price declines, we have used our own aggregated numbers based on operator provided data, with the exception of national data traffic, where we have employed Cisco's VNI figures. The countries included are France, Germany, Italy, Japan, Spain, UK, US, Brazil, China and India, for the years 2008-12.

For the analysis of the correlation between margin and capex, we have largely utilised OECD statistics. However, we have normalised penetration rates to account for the fact that these now often exceed 100% in many countries, and have used company data for margins and HHI scores. The countries

² Jeanjean F. (Orange), "Static and dynamic causes of the decline in the price of mobile telecommunication services", 24th European Regional Conference of the International Telecommunication Society, Florence, Italy, 20-23 October 2013; Lebourges M., Jeanjean F. and Saavedra C. (Orange), "The Inefficiency of Perfect Competition in the Electronic Communications Industry", 15 November 2012; Jeanjean F. (Orange), "Incentives to invest in improving Quality in the Telecommunications Industry", Chinese Business Review, volume 12, no. 4, p223-41; Lebourges M. (Orange), "What should a competition policy that supports growth through technological progress look like in Europe? The European Commission's theories and practices vs. lessons from modern economic growth theories", November 2013.

incorporated were Belgium, Chile, Canada, Czech Republic, Germany, Hungary, Italy, South Korea, Mexico, Poland, Portugal, Spain, Sweden, Switzerland, US and UK, where there was a largely complete dataset available for 2001-11, albeit missing a few observations. In our breakpoint analysis we used a simplified subset of this data and eliminated outliers.

Unit price drivers

We start with the premise that customers derive the greatest benefit when they enjoy the lowest unit prices. However, as has already been discussed in relation to the Austrian merger control analysis, even the question of what *type* of price to consider when judging consumer welfare is not entirely straightforward. A measure such as ARPU is unsatisfactory, in our view, because it does not intrinsically take account of changes to network quality of service. Looking at the development of ARPU over time tells us little about the value-for-money provided: for example, if the ARPU associated with a mobile service increased modestly, but the volume of data bundled doubled, in reality a price decline would have taken place, but the superficial appearance would be that of inflation. To take account of this problem, we have chosen to employ unit price as our measure.

What, then, drives unit prices? The trajectory is plain enough – downwards – but what are the primary factors behind this? Clearly, there will be several relevant variables, two obvious ones being the level of competitive intensity and the extent of network investment. For regulators, the central question will be, which of these two is the more important? If the former, regulation should look to ensure that each market maintains as large a number of operators as possible (something similar to present arrangements – given interventions such as ring-fenced spectrum for entrants and MVNO wholesale obligations for

incumbents). But, if it is instead investment that is primarily responsible for lowering prices, the regulatory focus should shift towards promoting greater network capex.

In fact, we can see three obvious factors that might be expected to have a bearing on the continuous fall in unit prices; these are:

- ▶ Declining operating costs;
- ▶ Increasing level of competitive intensity;
- ▶ Greater network investment.

An economist would classify the first pairing as being static in nature, but regard the third item as dynamic. (Analysis is said to be dynamic when it takes into account changes in market conditions, such as to the demand function and production technology; otherwise the analysis is said to be static). The first goal of our analysis is simply to determine whether static or dynamic efficiency gains are the more important in terms of sending unit pricing lower, and thus delivering better value-for-money services to mobile customers.

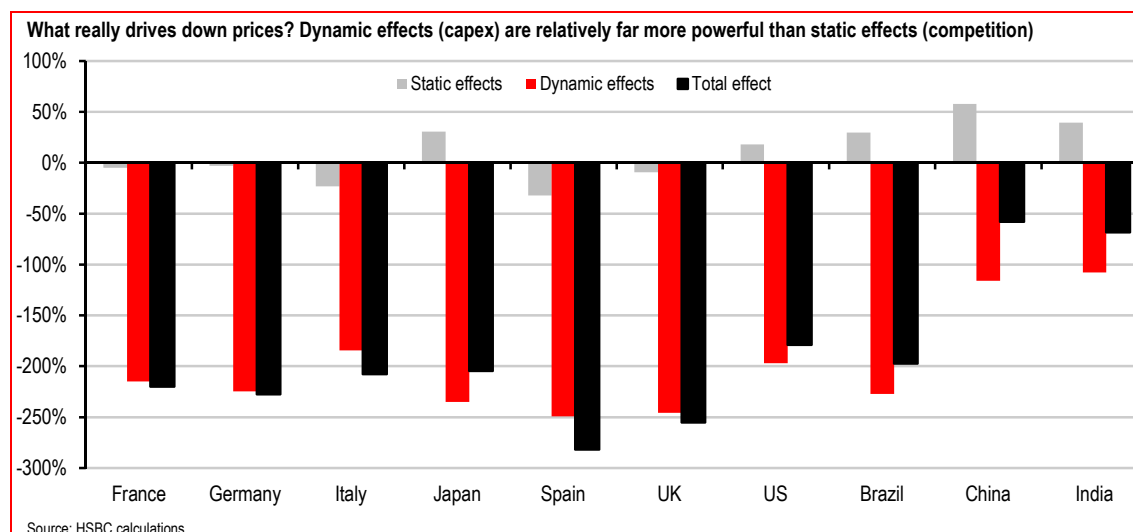
Dynamic vs static effects

For purposes of maintaining readability, we have siphoned off detailed discussion of the mathematics involved into the accompanying boxed area. A brief summary would be that we have fashioned a formula that brings all of the above elements together, and which, when fed with data points on the factors listed above (drawn from a selection of major global markets) produces predictions that can then be compared to observed data. The fact that the fit between these two is very good indicates that the formula is correctly calibrated, and we can then proceed to ‘decompose’ it into its constituent components, in order to identify which of the input variables is most significant in propelling the unit price declines observed.

All this information is presented in the accompanying chart, which contrasts the relative size of the static effects (reflecting not just competition, but also operating costs) with that of the dynamic effects. Note that the quantities shown here are *not* themselves the CAGR contributions of the static and dynamic drivers, but are derived from them. What is of interest is their relative size – as this indicates the extent of their significance in accounting for the unit price declines observed over the period. The chart clearly indicates that dynamic effects (network investment) are far more powerful in driving down unit prices than are static effects (such as competition).

That investment represents such an important factor is intuitively reasonable, given in particular the fact that telecoms technology makes intensive use of electronics and processing power, and therefore benefits from the advances predicted by Moore's Law. However, the comparatively weak nature of competitive effects will likely be of more surprise. Nonetheless, this can be accounted for mathematically, and a detailed explanation is given in the boxed text: see pages 52-54.

The brief summary would be that an operator's margin typically accounts for but a minority of its unit price. Greater competitive intensity would indeed lower this margin, but the latter is not a sufficiently important quantity in terms of determining the unit price to make a dent comparable with what can be achieved via dynamic effects (such as investment). Moreover, margins can only be lowered so far, whereas it is always possible to increase investment, thus adding to volumes, and thereby driving further reductions in unit price.



Dynamic vs static: the detail

We are interested in understanding what is powering the persistent trend of progressively lower unit prices in mobile markets. Unit price is, obviously, the combination of two elements: revenue and quantity. Our objective is to derive a formula that expresses these two in terms of the relevant drivers that we wish to consider – network investment, operating costs and the level of competitiveness – such that we can examine which has the greatest explanatory power.

With regard to the first of these, the thesis is that network investment in progressively more efficient technology powers tremendous volume growth. (The investment will lower marginal costs, leading to lower prices, while the improvement in service quality will also lead to more consumption). We will need to capture this algebraically, by tying the quantity of investment to the quantity of traffic. However, this task is complicated by the fact that investment is plainly not the only important input in determining traffic growth rates.

Any formula seeking to explain volume growth must also take account of the fact that users will naturally consume more capacity over time, as they acquire progressively greater experience of using mobile services and imitate the increasing consumption of the people they see around them. (Though note that even this pair of effects is partially driven by the availability of improved services, and these are in turn driven in large part by network and technology upgrades). Hence we need an equation combining both some measure of network investment (to reflect the greater capacity added) with some measure of time (to reflect the growth in customers' demand through imitation and experience).

In order to tackle this, we first construct an equation that accounts for traffic growth only

through the passage of time, and a second that accounts for it only through investment in additional capacity. We then combine the two formulae in a single, 'general case' equation that encompasses both drivers.

To represent the process of traffic growth from imitation we use the formula:

$$\frac{dT}{dt} = \alpha_t T \quad (1)$$

where α_t represents the coefficient of imitation, T the traffic and t the time. The fact that imitation is presumed to drive the growth in traffic means that the increase in volumes is proportional to the current traffic. Implicit in equation (1) is that network investment merely provides the necessary capacity to meet the growing demand.

We use a second formula, given below, when it is instead the provision of additional capacity (and the associated improvement in quality of service) that encourages customers to lift their consumption. The increase in volumes that results from network investment is proportional to current traffic.

$$\frac{dT}{dK} = \alpha_K T \quad (2)$$

Here K represents the cumulative investment. At time t :

$$K_t = \sum_{i=0}^t I_i$$

while I_t is the amount invested at year t and α_K the coefficient of sensitivity to improved quality.

In a scenario in which investment is constant over time, $\forall t, I_t = I$, and the cumulative investment increases steadily: $K_t = (t + 1)I$, therefore $dK = Idt$ and $dT/dt = \alpha_K IT$, which means that equations (1) and (2) become very similar, with $\alpha_t = \alpha_K I$. If instead, though, the investment is volatile, then the two equations become very different.

Let us then assume that λ is the coefficient of the contribution of the variations in investment to the traffic such that:

$$I'_{t+1} - I'_t = \lambda(I_{t+1} - I_t)$$

I' represents the effective impact on traffic of the variations in network expenditure. If $\lambda = 0$, then traffic growth is driven entirely by the passage of time (as customers imitate the usage patterns of others and become more experienced with the service, consequently relying upon it more). If, on the other hand, $\lambda = 1$, then it is investment that entirely accounts for the expansion in traffic volumes. Let us then denote:

$$K'_t = \sum_{i=0}^t I'_i$$

We can incorporate this into a 'general case' formula, similar to equation (2) but replacing K with K' , giving:

$$\frac{dT}{dK'} = \alpha_{K'} T \quad (3)$$

We are able to test this against actual data to derive the value of λ that best explains the traffic. We assume the initial conditions in the year 2008: $t_0 = 0$, traffic for the year 2008 is $T = T_0$ and $I_0 = I'_0$. The resolution of equation (3) on the basis of the initial conditions gives:

$$\ln\left(\frac{T}{T_0}\right) = \alpha_{K'}(K' - K'_0)$$

and thus:

$$K'_t - K'_0 = \lambda(K_t - K_0) + (1 - \lambda)K_0 t$$

Therefore:

$$\ln\left(\frac{T}{T_0}\right) = \alpha_{K'}[\lambda(K - K_0) + (1 - \lambda)K_0 t] \quad (4)$$

Note that when $\lambda = 0$, traffic depends only on time, with in this case $\alpha_t = \alpha_{K'} K_0$, whereas when $\lambda = 1$, traffic is driven only by investment.

We can then test equation (4) against a data set drawn from a series of major global markets, varying λ and using an OLS regression:

$$\ln\left(\frac{T_{i,t}}{T_{0i,t}}\right) = \alpha_{K'_i}[\lambda(K'_{i,t} - K_{0i}) + (1 - \lambda)K_{0i}t] + \varepsilon_{i,t} \quad (5)$$

where i indexes the country and t the time in years, while ε is the error term; see the accompanying table for the results.

As can be seen from the table, the value of λ that has the best explanatory power in terms of the growth of traffic is around 0.5. This implies that both investment and time contribute towards explaining volume growth.

Armed with formulae that will reflect both the investment- and time-related aspects to traffic growth, we can now proceed to combine this in a formula for unit price that also incorporates operating costs and the level of competitiveness. Once this is complete, we can reformulate it to test it against actual market data to establish which elements are most important in explaining unit price trends.

We can express unit price, up , as revenue, R , divided by traffic, T . Clearly, unit price is inversely proportional to the quantity of traffic for a given level of revenue. In order to capture the degree of competitive intensity, we will use the EBITDA margin as a proxy (the more competitive, the lower the margin). EBITDA, E , is equal to R less operating costs, C . The Lerner index L is defined as E/R , and as a consequence, $R = C/(1-L)$, where $(1-L)$ is our proxy for competitive intensity. For traffic we take as our basis equation (4), which gives us:

$$T = T_0 e^{\alpha_{K'}(\lambda(K - K_0) + (1 - \lambda)K_0 t)}$$

We can then write an equation for unit price thus:

$$up = \frac{C}{T_0(1-L)} e^{-\alpha_{K'}(\lambda(K-K_0)+(1-\lambda)K_0t)} \quad (6)$$

The contribution that is made by each of the variables to the unit price is driven by its elasticity, formulae for which we give below:

$$\varepsilon_C = \frac{\partial up}{\partial C} \frac{C}{up} = 1 \quad (7)$$

$$\varepsilon_{(1-L)} = \frac{\partial up}{\partial (1-L)} \frac{(1-L)}{up} = -1$$

$$\varepsilon_K = \frac{\partial up}{\partial K} \frac{K}{up} = -\lambda \alpha_{K'} K$$

$$\varepsilon_t = \frac{\partial up}{\partial t} \frac{t}{up} = -(1-\lambda) \alpha_{K'} K_0 t$$

The sign of the elasticity of operating costs is positive, as – *ceteris paribus* – an increase in operating costs increases the unit price. The sign of elasticity of competition is negative, since an increase in competitive intensity, again *ceteris paribus*, reduces the EBITDA margin and unit

price. The signs of both investment elasticity and time elasticity are negative, because both investment and imitation over time increase traffic volumes, which reduces the unit price. Whereas the elasticities of operating costs and competitive intensity are static, remaining equal to 1, the impacts of imitation and investment are dynamic and increase over time. As a consequence, the dynamic effects soon become dominant.

We can now move on to use an actual dataset, drawn from mobile markets over the period 2008-12, to test our work. The first step involved is to take our unit price formula (6) and refashion it so that each term represents the relative change of one of the key parameters (ie cost, competitiveness, investment and time) over this timescale.

Estimating the value of λ

λ	0	0.2	0.4	0.5	0.6	0.8	1
Variables	lnTT0	lnTT1	lnTT2	lnTT3	lnTT4	lnTT5	lnTT6
France	0.000159	0.000157	0.000156	0.000155	0.000154	0.000152	0.000151
SE	7.83E-06	7.68E-06	7.57E-06	7.53E-06	7.5E-06	7.47E-06	7.47E-06
Germany	0.000134	0.000135	0.000136	0.000137	0.000137	0.000138	0.000139
SE	6.33E-06	6.32E-06	6.34E-06	6.36E-06	6.39E-06	6.48E-06	6.6E-06
Italy	0.000212	0.000206	0.0002	0.000197	0.000194	0.000188	0.000183
SE	1.22E-05	1.17E-05	1.13E-05	1.11E-05	1.1E-05	1.07E-05	1.05E-05
Japan	4.1E-05	3.99E-05	3.89E-05	3.84E-05	3.79E-05	3.69E-05	3.6E-05
SE	1.89E-06	1.82E-06	1.77E-06	1.74E-06	1.72E-06	1.69E-06	1.66E-06
Spain	0.000278	0.000281	0.000284	0.000286	0.000288	0.000291	0.000294
SE	1.17E-05	1.17E-05	1.18E-05	1.19E-05	1.19E-05	1.21E-05	1.24E-05
United Kingdom	0.000208	0.000207	0.000206	0.000206	0.000206	0.000205	0.000204
SE	8.99E-06	8.88E-06	8.82E-06	8.81E-06	8.8E-06	8.83E-06	8.9E-06
United States	2.39E-05	2.3E-05	2.21E-05	2.17E-05	2.13E-05	2.06E-05	1.99E-05
SE	1.31E-06	1.25E-06	1.19E-06	1.17E-06	1.15E-06	1.12E-06	1.09E-06
Brazil	0.000115	0.000113	0.000111	0.00011	0.000109	0.000107	0.000105
SE	5.4E-06	5.25E-06	5.13E-06	5.09E-06	5.04E-06	4.98E-06	4.95E-06
China	1.06E-05	1.03E-05	9.94E-06	9.78E-06	9.62E-06	9.32E-06	9.04E-06
SE	9.54E-07	9.14E-07	8.81E-07	8.67E-07	8.55E-07	8.34E-07	8.18E-07
India	3.98E-05	4.38E-05	4.87E-05	5.16E-05	5.48E-05	6.26E-05	7.29E-05
SE	3.8E-06	4.14E-06	4.59E-06	4.86E-06	5.17E-06	5.93E-06	6.99E-06
Observation	50	50	50	50	50	50	50
R-square	0.989473	0.989661	0.989740	0.989742	0.989719	0.989599	0.989365
F	375.9856	382.8833	385.8682	385.9378	385.0804	380.5869	372.1332

Note: SE = standard error
Source: HSBC estimates

This yields the formula:

$$\ln\left(\frac{up_4}{up_0}\right) = \ln\left(\frac{C_4}{C_0}\right) - \ln\left(\frac{(1-L)_4}{(1-L)_0}\right) - \alpha_{K'}[\lambda(K_4 - K_0)] + 4(1-\lambda)K_0 \quad (8)$$

where the numerical subscripts refer to the years beyond 2008. The value of λ used is 0.5 (for the reasons discussed previously).

The accompanying table shows the observed data as set against the predictions from our formula, with the latter also decomposed into the individual elements pertaining to operating costs, competition, investment and time. Note that the quantities given here are *not* themselves price CAGRs (in the case of the leftmost and rightmost columns) or contributions to price CAGRs (in the case of the central four columns). Rather, the six columns relate to the terms in equation 8 above. What is important is their relative size – as this indicates the extent of their significance in accounting for the unit price declines observed over the period.

Reassuringly, there is a very good fit between the observed data and our model's predictions. Looking at the constituents of the latter, it is clear that the key factors powering the decline in unit prices are investment and time rather than cost and competition. In other words, comparing the

two categories of driver over the period 2008-12, the dynamic effects had a vastly greater impact than the static effects. This differential essentially reflects the nature of the elasticities involved:

- ▶ The elasticities of the dynamic effects increase over time, whereas those of the static effects are constant.
- ▶ The static effects are essentially capped (for example, operating costs cannot sustainably exceed revenues), whereas investment can increase indefinitely.

Competition's limitations

The best way to set out why the impact of competitive intensity on pricing is necessarily relatively limited is to consider in straightforward mathematical terms how unit prices are composed. A network's unit price is defined as its revenues divided by its traffic. The revenue portion is subdivided into two parts: operating costs and EBITDA margin. Let us assume for the sake of example that operating costs account for 70% of revenue and margin the remaining 30%. Let us then take the extreme case that an escalation in competitive intensity entirely eliminates this margin. (It might be countered that margins cannot decline to zero on a sustained basis; we would agree with this point, but still feel that this hypothetical case is instructive).

Observed data set against predictions from formula (8)

Country	$\ln\left(\frac{up_4}{up_0}\right)$ Unit price (observed)	$\ln\left(\frac{C_4}{C_0}\right)$ Operating cost	$\ln\left(\frac{(1-L)_4}{(1-L)_0}\right)$ Competition	$\alpha_{K'}[\lambda(K_4 - K_0)]$ Investments	$\alpha_{K'}[4(1-\lambda)K_0]$ Time	Using equation 8 Unit price (modelled)
France	-201%	5%	-10%	-111%	-104%	-220%
Germany	-207%	-4%	1%	-111%	-114%	-228%
Italy	-200%	-23%	0%	-99%	-85%	-208%
Japan	-214%	32%	-1%	-128%	-107%	-205%
Spain	-258%	-26%	-7%	-120%	-129%	-282%
United Kingdom	-235%	-5%	-4%	-125%	-121%	-255%
United States	-173%	20%	-2%	-109%	-88%	-179%
Brazil	-189%	30%	-1%	-120%	-107%	-197%
China	-62%	75%	-17%	-62%	-54%	-58%
India	-67%	47%	-8%	-36%	-72%	-68%

Note: columns correspond to terms from equation 8
Source: HSBC estimates

Given the composition of revenues (operating costs plus margin), the effect here of removing the margin would be to reduce revenues by 30%, and hence also the unit price by 30%. What should therefore be evident here is that the level of margin provides a hard cap on the extent to which competitive intensity can reduce unit prices. By contrast, there is no hard cap on the volumes that enhanced investment can help to drive – and therefore it is investment that dominates in terms of the factors driving unit prices downwards.

Furthermore, as touched on above, there is a limit to the extent of margin pressure that operators can bear before looking to withdraw – and in most cases they are unlikely to wait to see zero margins. Hence the size of the unit price cuts available by pressurising margins is likely rather smaller than the 30% cited in this example.

Note also that the impact on unit prices from lowering margins is one-off, in that it cannot be repeated. Having eliminated margins to zero in our scenario, the process cannot simply be iterated. Again, by contrast, investment can recur year after year after year – provided margins are available to both justify and fund it. This will grow volumes (the denominator in the unit price equation) and thereby lower prices, in an effect that *can* be repeated year after year after year. (Admittedly, it would be possible to use competitive pressure to progressively reduce EBITDA at a given CAGR, but the impact on unit price would diminish continuously as the EBITDA component of that unit price became smaller and smaller).

It could be supposed that the lower unit prices that result from depressing the EBITDA margin will stimulate extra usage via an elasticity of demand effect. However, this in turn implies the availability of the associated additional capacity – and therefore also the availability of the extra investment needed to support it. In reality, under

circumstances of contracting margins, investment will be curtailed. As a consequence, the greater the impact of competitive intensity, the harder it will be to count on volume elasticity – because the latter is dependent on investment that will be withdrawn.

The ARPU angle

It may also be helpful to think about pricing dynamics in terms of ARPU rather than revenue. Of course, on one level, the conversation to be had here is an identical one to that set out above. Taking as our starting point the equation unit price equals revenue divided by volume, it will be clear that this can simply be restated as unit price equals revenue per user (ie ARPU) divided by volume per user – either formula will give the same answer.

However, discussions of the mobile industry's situation so commonly employ ARPU as their frame of reference that we believe it will be helpful to recast our findings in terms of this most prominent of metrics. So the first thing to say is that the analysis presented here is not intended specifically to identify the drivers of ARPU decline. Competition is clearly an important factor impacting ARPU trends. But we are not interested specifically in ARPU – instead we are interested in the combination of ARPU and the 'quantity' of service that it purchases: in other words, in unit price.

In identifying the drivers of unit price declines, we must take into account not only fluctuations in ARPUs but also in volumes. Multi-year variations between European countries tend to be relatively small in terms of the former by comparison to the latter. (ARPU CAGRs tend to vary by single digit amounts, although there can be more volatility on a 1-2 year time frame; whereas volume growth rates display much larger discrepancies).

Since both numerator and denominator are of equal importance in a unit price calculation, given the bigger 'swings' to which volumes can be

subject, it is easier to drive unit price declines by this route, rather than via ARPU declines, which tend to move within a much narrower band.

European ARPU has tended to decline by mid-single digit percentages over the past few years. Markets at the benign end of the spectrum have seen low-single digit compound declines, whereas countries experiencing more acute price conditions have witnessed high-single digit rates of deterioration (and, in a few instances, worse still). Given the industry's operational gearing, such differences very reasonably attract a great deal of attention. However, the rates of change involved are dwarfed by the far larger annual changes seen in volumes, where CAGRs can reach towards 100%.

Consequently, for all the headlines that competitive intensity generates, in the formula for unit price (which is what we are interested in: ARPU divided by volume per user), it is the volume growth that is the big swing factor. As a result, it is those things that drive volume growth (principally investment) that have by far the greatest effect on unit prices. (Note that our analysis aggregates revenues and volumes from both voice and data).

Another way of putting this is that the focus on ARPU trends can lull us into the supposition that markets undergoing particularly large ARPU contractions are experiencing particularly aggressive unit price competition. However, the two are not synonymous.

For example, take the case of France, which has been notable over the past couple of years for its turbulent mobile market conditions, following Iliad's (ILD FP, EUR164, OW, TP EUR210) entry as a fourth network. Perhaps not surprisingly, the contribution of competition in lowering unit prices was greatest in France out of all the European countries incorporated within our

survey. (Admittedly, our figures do not include 2013, which was another difficult year for the incumbent operators there – but the effect was already evident in 2012, Iliad's mobile first full year of operation). As a result of the heightened competitive intensity, ARPU in France has also fallen by more than in most other EU states.

One might naturally presume that France therefore experienced the greatest unit price declines among its peers, but this is not the case over the period 2008-12. In fact, volume growth has been slower in this market (carriers under severe ARPU pressure are likewise under pressure to reduce investment – and certainly the incumbent operators are hardly directly incentivised to persuade customers to increase their usage, as they will struggle to monetise it). In France, the combination of deeper ARPU erosion but slower volume growth (at least over the years 2008-12) means that unit price declines were not markedly different from those observed in the European peer group.

Margins drive capex: theory

The fact investment is such a critical driver of falling unit prices (and thus of maximising the value-for-money citizens receive) has important ramifications. It implies there is likely to be a linkage between the welfare of operators and that of their customers. It is probable that those operators able to achieve levels of profitability sufficient to support aggressive investment will be those able to provide the lowest unit priced services to their users.

This issue can be approached from two separate directions: firstly, by using modelling to demonstrate mathematically how the need for sufficient margins arises; and secondly, by an empirical study of what levels of margin are able to sustain heavy network investment. The model is summarised here (see the boxed text for a detailed explanation), while the empirical work is described later in this section.

One prominent feature of the telecoms industry is the way in which new generations of technology continuously appear. Successive technologies overlap, resulting in a continuous trend of progress, rather than separate and alternate phases of advance and stagnation (which is closer to how classical economics tends to model this process).

The most fundamental reason for introducing a new technology is the lower unit cost that it will provide. This, in turn, reduces marginal usage cost and marginal price. The resulting higher volumes will lower both average unit cost and average price. However, over time, without investment in further new iterations of technology, operators will be left providing capacity on platforms that no longer represent the lowest unit cost solution. As a consequence, unit costs – and thus prices – will be higher than need have been the case.

To encapsulate this process, we use a theoretical model, with the aim of deriving the necessary level of profitability required to sustain efficient (in the sense of minimising unit costs and prices) network

renewal. The model works on the basis that network must be replaced every T years with the latest generation of equipment. (NB generation in this sense should not be taken as synonymous with and restricted to the 2G/3G/4G generations, which are ‘super-cycles’ of technology).

Having input the demand growth rate for capacity and the speed of technological progress (effectively the rate by which the unit cost of adding a given unit of capacity declines), we can derive the optimal frequency T for upgrading network assets, in order to minimise costs over time. There is a balance to strike here between, on the one hand, getting proper use out of assets deployed (ie not cycling through them over-rapidly) and, on the other, the desirability of catering to growing demand with cost-efficient current technology. Perhaps not surprisingly, rapid rates of technological progress imply low levels of T .

It is then possible to imply the levels of EBITDA margin required to support this rapid degree of asset renewal so as to be able to cope with tremendous on-going growth in demand for volume. We work on the basis of a pre-tax discount rate of 10% and demand growth of 15% (if anything, rather on the low side), and conclude that an EBITDA margin of towards 40% is required to support the optimal level of investment. (Note also that the model does not take any account of spectrum costs).

We would suggest that the model’s specific margin output should be seen as indicative of an appropriate order of magnitude, rather than being interpreted as precisely the figure necessary to secure optimal network expenditure. Clearly, the simplified model used here can only be an approximation to reality. However, that said, we would nonetheless argue that the model does accurately reflect one of the mobile industry’s most important features: the fact that a healthy margin is required to sustain investment. This raises the question of whether or not European operators are generating sufficient margin to drive the most desirable levels of network expenditure.

Efficient investment: the detail

As a starting point, take a mobile operator facing demand that increases steadily at rate d such that, if the initial demand is normalised to 1, then demand at time t is $D(t) = (1+d)^t$. In parallel, unit capacity costs should decrease through time, thanks to new technology being more efficient. With a technological progress rate defined as g the unit capacity cost at time t is $c(t) = 1/(1+g)^t$.

So as to meet the continuous growth in demand, the mobile industry invests to expand its capacity every T years. At time $t = 0$, the operator invests $K(0) = c(0)D(T)$ to meet demand until year T , and at this point it then invests $K(T) = c(T)D(2T)$ to satisfy demand until year $2T$, and so on. The net present value of this capex at a renewal rate of T and a discount rate of a is:

$$\begin{aligned} Capex(T) &= \sum_{i=0}^{\infty} \frac{K(iT)}{(1+a)^{iT}} \\ &= \sum_{i=0}^{\infty} \frac{(1+a)^{(i+1)T}}{(1+g)^{iT}(1+a)^{iT}} \\ &= \frac{(1+a)^T}{1 - \left(\frac{1+d}{1+a+g+ag}\right)^T} \end{aligned}$$

When capacity expansion occurs too often (in other words, where T is small), then investment costs are large. However, if capacity is built only infrequently (in other words, where T is large), then the company misses out on the benefits of technological progress, as it buys upfront capacity to satisfy future years' demand. Between these two extremes, there is an optimal rate that minimises the NPV of capex.

Obviously, there are several sets of simplifications made by this model. For example, it assumes that there is just one category of assets, whereas networks are composed of numerous different types of equipment, each subject to their own pace of replacement. Nonetheless, this model can be considered as capturing the generic process of renewal that applies to each type of network asset.

The model also assumes that, when a technology is upgraded, its successor takes over all the demand at once, and no capacity from the old technology is retained. In reality, of course, technological generations tend to overlap, and often co-exist for many years. However, while this consideration is of importance in terms of optimising the equipment renewal process, it should not detract from the model's ability to capture the cost efficiency motivations underpinning network asset upgrades.

In order to then model an operator's decision process, it is necessary to take into account its other forms of expenditure. In addition to capex, it must spend on opex (operating expenditure) if it is to satisfy its customers' requirements. In turn, opex can be divided into two rough categories: that which is related to the network (termed here technical opex, or $Opex_{tech}$) and sales, general and administrative expenses (termed here $Opex_{sga}$).

Technical opex is driven by the network assets, and the model supposes that $Opex_{tech}$ are a percentage r of assets. Hence the NPV of $Opex_{tech}$ depends on the asset renewal pace:

$$\begin{aligned} Opex_{tech}(T) &= \sum_{i=0}^{\infty} \int_{iT}^{(i+1)T} \frac{rK(iT)}{(1+a)^t} dt \\ &= r \frac{1 - (1+a)^{-T}}{\log[1+a]} \frac{(1+d)^T}{1 - \left(\frac{1+d}{1+a+g+ag}\right)^T} \end{aligned}$$

Meanwhile, SG&A expenses tend to be factored off sales. Here, it is assumed that $Opex_{sga}$ is a proportion m of revenue.

Network operators set out to minimise the NPV of their various costs, in effect solving the following equation:

$$\begin{aligned} &\min_T Capex + Opex_{tech} \\ &= \min_T \frac{(1+a)^T}{1 - \left(\frac{1+d}{1+a+g+ag}\right)^T} \\ &\quad + r \frac{1 - (1+a)^{-T}}{\log[1+a]} \frac{(1+d)^T}{1 - \left(\frac{1+d}{1+a+g+ag}\right)^T} \end{aligned}$$

While it is not possible to derive an explicit solution for this formula, one can be computed with the help of numerical methods via software. We utilise this approach to calculate the optimal asset upgrade pace (designated T^*), using a value for d of 15% (if anything, on the low side), for r of 15% and for the pre-tax discount rate of 10% (a set of figures we see as appropriate to the mobile industry).

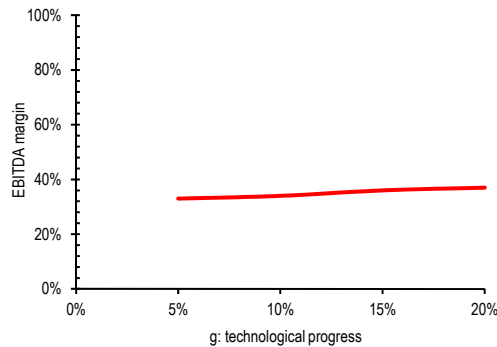
The next step is to establish what level of EBITDA margin will support the optimal level of network investment. If revenue must cover costs, then revenue must, at a minimum, equal $Capex + Opex_{tech} + Opex_{sga}$. Therefore, the EBITDA margin required to cover the minimising social cost of investments that would satisfy demand is:

$$EBITDA = \frac{Revenue - Opex_{tech} - Opex_{sga}}{Revenue}$$

$$= \frac{1 - m}{1 + r(1 - (1 + a)^{-T^*})\log^{-1}[1 + a]}$$

The accompanying chart shows the EBITDA margin required to sustain the optimal level of investment, with m set to 30% (again, a figure observed in the mobile industry). This suggests that an EBITDA margin around 40% is appropriate to support the desired level of network expenditure. (However, note that – as a simplification – the model takes no account of the costs of spectrum).

Required EBITDA margin to support investment as a function of rate of technological progress



Source: HSBC estimates

If the profitability of a mobile operator falls beneath this level, then the model suggests it would be unable to maintain the optimal level of investment. On an assumption that demand must be satisfied, the implication is that the cost involved would increase. But one simplification made in the model is that the growth in volume demand is exogenous, whereas – in reality – the fact that the industry was not cost efficient would likely lead to relatively higher prices and lower usage.

Margins drive capex: reality

So much for the theory, what about the empirical evidence: what does data drawn from a broad range of global mobile operators indicate about the linkage between margins and capex? This portion of the report looks at the relationship between margin and capex in a cross-section of global mobile markets. In summary, we find that, up to a certain threshold, network investment increases with the margin, while above this threshold, investment rises at a slower pace.

As inputs, we have used 16 countries over the time period 2001-11. We utilised regression analysis to test what factor best drove the variable in which we are interested, namely investment (here represented by capex per user, referred to as *CAPU*). Of the possible drivers (margin, the potential for market growth, the level of competitive intensity, GDP per capita and the number of operators per market), we found that margin per user (EBITDA divided by the number of subscribers, designated *MAPU*) was most closely correlated with network investment. Our findings are shown in the accompanying page of charts.

On the basis of our data set of 172 observations, the correlation coefficient between *CAPU* and *MAPU* is 0.54, which is higher than the critical value at the 0.1% p-value level for 100 observations in the Pearson table of 0.324 (two-tailed probabilities). We therefore conclude with a very high degree of confidence that the correlation between *CAPU* and *MAPU* is statistically significant.

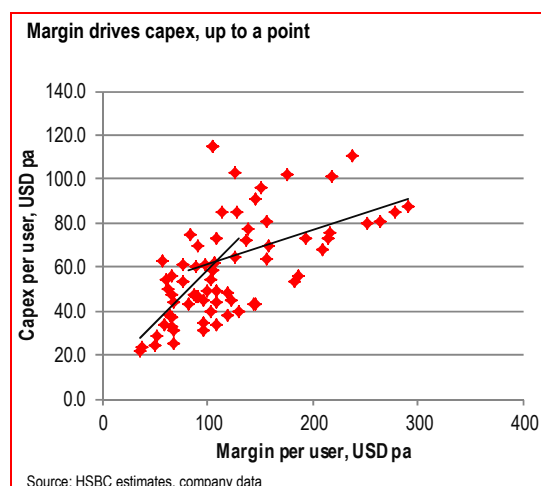
Additional complexities

However, this is not the whole story. Clearly the other drivers also have a role, even if none has the same significance as margin. Furthermore, above a certain point, *MAPU* in isolation becomes a less clear-cut driver of *CAPU* – and is better combined with another measure, *PMG* (potential market

growth, defined as $q(1-q)$, where q is the penetration rate). We identify this transition as occurring at around a margin of USD104, by means of having undertaken a Chow test.

There is a risk in being too precise with such a figure. Clearly, circumstances will vary operator by operator and market by market – there is no single *MAPU* number at which the transition will necessarily take place. Indeed, the François Jeanjean paper cited earlier concludes that the *MAPU* breakpoint lies instead at USD117. In the discussion that follows, we simply work on the basis that the transition occurs very approximately in the territory of these two estimates, which we average to USD110.

Beyond this breakpoint, *CAPU* becomes more closely correlated with $MAPU \times PMG$. In relatively less well penetrated markets, there is still the clear opportunity for growth, and hence network investment continues at a comparatively rapid pace. By contrast, in countries which are already closer to saturation, there is somewhat less incentive to spend on *CAPU*. The accompanying chart shows both these best fit lines, indicating how operator investment behaviour shifts above a certain level of margin generation.



Implications for Europe

We find that this analysis nicely complements our earlier theoretical work on margins. The latter demonstrated that a certain degree of margin is required to support the optimal level of investment (that giving rise to the lowest unit costs), while the research outlined here has quantified that margin empirically.

Intriguingly, the average percentage margin of the two operators with *MAPUs* nearest to the USD110 breakpoint is 35%. This is close to the figure of towards 40% that emerged from our theoretical model. Moreover, a *MAPU* of USD110, when compared against the associated subscriber-weighted ARPU, represents a margin of 36%.

As was flagged in our earlier discussion, we should be wary of overstating the theoretical model's degree of precision. However, that said, our empirical observations are very compatible with the model's indication that margins supporting optimal levels of network investment lie somewhere towards 40%.

The significant correlation between *MAPU* and *CAPU* up to this breakpoint suggests that, at these levels, incremental margin is invested in incremental capex because it is efficient to do so. However, operators' enthusiasm for further incremental capex diminishes once they are spending at optimally efficient levels. Hence, when margins surpass the level required to support optimally efficient investment, the relationship between margins and capex weakens.

As the accompanying table indicates, most European countries exhibit *MAPU* figures that are beneath the breakpoint of USD110. Our theoretical analysis suggests the associated percentage levels of margin do not sustain optimally efficient investment, while our empirical work indicates that, in practice, additional *MAPU* (up as far as the breakpoint) would likely be invested in additional capex. We therefore conclude that higher margins would lead to higher investment, enabling European operators to optimise their capex to deliver capacity at the lowest unit cost.

HSBC estimate of 2013 MAPU by European country (USD) – countries in red are below estimated break-point of USD110

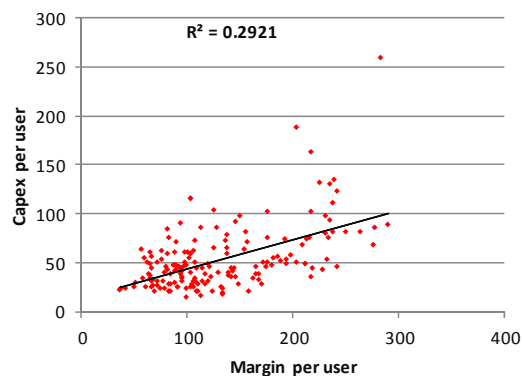
Belgium	112.5
Germany	81.4
Italy	90.7
Portugal	74.3
Spain	94.8
Switzerland	217.9
UK	63.0
France	106.5
Subscriber weighted average	89.3

Source: HSBC estimates, company reports

Further empirical research

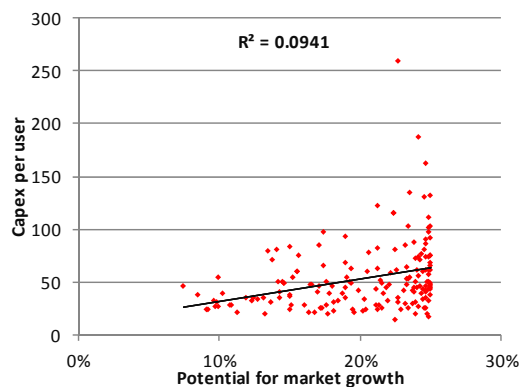
Another potentially revealing angle – although one (alas) beyond the scope of the present report – would be to adapt the illuminating approach pioneered by the Harvard economist Philippe Aghion (see, *inter alia*, Aghion, P., Bloom, N., Blundell, R., Griffith, R. and Howitt, P., *Competition and Innovation: An Inverted-U Relationship*, Quarterly Journal of Economics, May 2005, pp.701-28).

MAPU vs CAPU



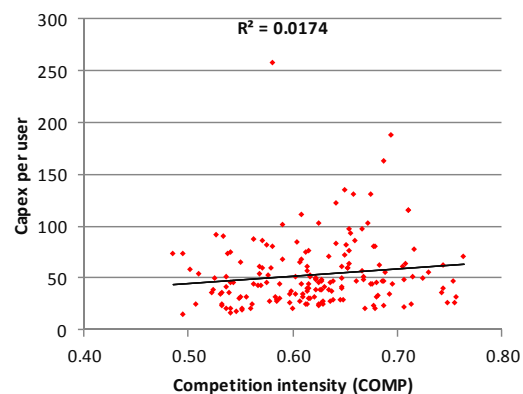
Source: OECD data

PMG vs CAPU



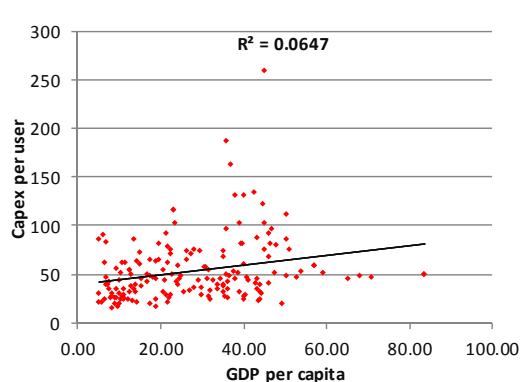
Source: OECD data

COMP vs CAPU



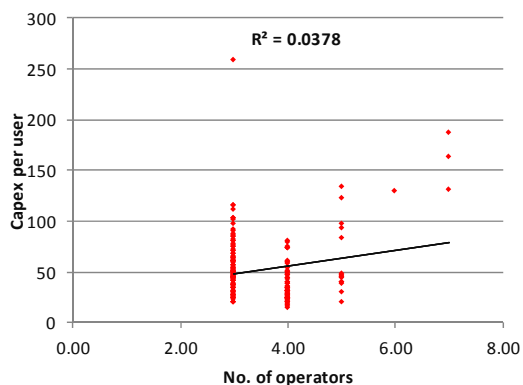
Source: OECD data

GDP per capita vs CAPU



Source: OECD data

Number of operators vs CAPU



Source: OECD data, HSBC

Professor Aghion's work identifies – across the broad economy – an inverted-U shape relationship between the level of competitive intensity and the level of innovation. That is to say, competition can boost innovation, but beyond a certain point, it can also hamper it (by depressing the returns available). This suggests that there is an optimal relationship between margin and investment, and that considerable care is needed when working on the basis that competitive intensity necessarily drives investment. This again raises the question of whether measures such as spectrum remedies that are intended to facilitate entry into the mobile market (though instituted with the best of intentions) are actually in the interests of citizens and customers.

Conclusion: margins matter

In summary, we believe that the empirical work we have set out in this section underlines once more the supreme importance of dynamic efficiency effects, as opposed to their static counterparts. Margin enables investment, and investment ensures capacity is available at ever-lower levels of unit cost. While under certain circumstances, competition likewise can drive investment, it can also have the opposite effect where margins are sub-par. Moreover, it should not be lost sight of that it is the level of investment that provides the most dramatic falls in unit cost, not competition *per se*. Hence our contention that policy should be directed at maximising dynamic efficiency gains – because we believe this will optimise the outcome for customers.

Finally, note that the effect identified here is quite distinct from a conventional argument based around scale:

- ▶ In an economy of scale-based argument, market concentration leads to lower unit costs and greater profitability – but this enhanced profitability is not itself necessary to generate the lower unit costs. Hence regulators may object that they want customers to benefit

from the lower unit costs but without having to support the operators' higher profitability.

- ▶ In a case that centres on dynamic efficiency gains, though, profitability is *actually required* to drive the investment that will lower the unit costs. In this instance, profitability is no mere undesirable side-effect, but rather the factor that sustains efficient network investment (at least up until the margin per user threshold mentioned earlier). Market concentration is therefore important because it provides the margin conditions necessary to support optimal levels of capex.

This distinction might at first seem like splitting hairs, but we think it is actually essential. The Austrian merger case saw the Commission questioning whether it was necessary for Three and Orange Austria to actually combine in order to secure cost efficiencies. As previously discussed, operators seeking merger clearance must not only demonstrate that there are efficiency gains to be had, but must also show that these are merger specific, and could not be secured by other means thought less likely to result in anti-competitive results. Network sharing arrangements are one alternative to mergers that have been repeatedly mentioned.

We have always argued that there is good reason for regulators to approve network sharing, since we believe that these agreements do result in lower unit costs, which is to the advantage of customers. However, we have also highlighted that few of the benefits are retained by the operators themselves. This is important because it is margin that drives investment. So network sharing might provide, in essence, a one-off unit cost improvement that is passed on to customers (the economy of scale logic summarised above). However, it will do little or nothing to create conditions that will underpin margins sufficient to

optimise network investment – in other words, it will not support dynamic efficiency gains.

Hence we feel that there are good reasons to be cautious about the extent of the role that network sharing can play in reducing costs and benefiting the customer. In particular, we fear that it may be touted as an alternative to consolidation, when we think it is in reality a mechanism to capture an entirely different effect. Network sharing is desirable because it leverages economies of scale. However, only market structures capable of supporting adequate margins are capable of liberating the most effective driver of lower unit prices, namely network investment. In our view, network sharing and consolidation are not alternatives, and are both desirable goals.

Network sharing

Given the prominence that network sharing has attained, being cited in the Austrian case as a potential alternative to a full-blown merger, we feel that some further analysis of this topic is warranted. We should begin by repeating our view that there is much to commend the concept of network sharing. Such arrangements are likely to reduce the cost of supplying a given unit of capacity. Taking into account the highly competitive nature of European mobile markets, such efficiency gains are likely to be transmitted near-immediately to customers – a good reason, in our view, for regulators to look upon such proposals sympathetically.

However, what we think network sharing is most unlikely to accomplish is any sustainable improvement in the profitability of the network operators themselves. To repeat the point made above, this does not imply that network sharing should be impeded – since customers benefit as a result. But it does suggest that network sharing is most unlikely to change the attitude of operators to network investment. Declining revenues (which seem more than probable in circumstances where

the savings delivered by network sharing are being rapidly transferred to customers) will ultimately dissuade management teams from committing capital to the country in question. Network sharing may represent an elegant way of going about this process of capital withdrawal, but that is the phenomenon it likely underpins.

Network sharing agreement analysis

In other words, we should be clear about what these agreements can accomplish, and what is likely beyond their reach. To substantiate our argument, we have undertaken an analysis of Europe's network sharing arrangements and compared these agreements on a country-by-country basis to local tariff levels. The accompanying table summarises Europe's network sharing arrangements.

If network sharing does not persuade operators to economise on capex, but simply enables them to spend more effectively, we should see more capacity added, and hence lower unit prices, in those countries where it has taken greatest hold. But the less positive alternative is that operators simply reduce their capital intensity and allow the greater efficiency provided via network sharing to 'take up the slack'.

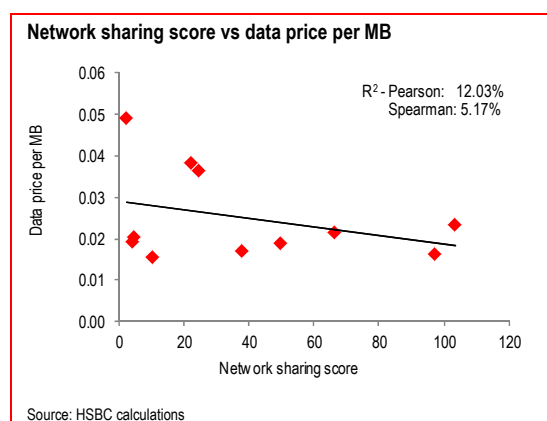
As long-term advocates of network sharing, we would have anticipated such agreements to provide some positive effects for customers, but for these to be curtailed by the dismal economic reality of the sector, which has not invited operators to commit more capital than is absolutely necessary. And this is indeed what we find. We do identify a correlation between network sharing and unit prices – countries with more network sharing typically do have lower unit prices – but the effect is a weak one.

Operators involved in agreement	Date of announcement	Type of Sharing	Expected benefits / targets at announcement	Other comments
UK				
Vodafone O2	2012	<ul style="list-style-type: none"> ▶ Mast/Tower sharing (passive) ▶ Spectrum and core network remain independent and both companies continue to run competing services 	<ul style="list-style-type: none"> ▶ 18,500 masts representing an increase in sites of more than 40% for each operator ▶ Targeting 98% indoor population coverage across 2G and 3G by 2015 ▶ Foundation to deliver nationwide 4G service faster than could be achieved independently 	<ul style="list-style-type: none"> ▶ 66% of Vodafone's sites shared at group level ▶ For VOD group, c.70% of new sites deployed in FY 2012 and FY 2013 were shared
T-Mobile (now EE) 3UK	2007	<ul style="list-style-type: none"> ▶ RAN sharing (Access) i.e. base station sites, hardware and infrastructure for 3G ▶ Spectrum, core network of each company and 2G network of T-Mobile remains independent and both companies will run competing services ▶ Created JV MBNL by transferring 3G RAN assets to it for further expansion and maintenance 	<ul style="list-style-type: none"> ▶ Pooled 3G mobile networks to increase reach to 98% of the UK population ▶ To save GBP2bn over a decade by cutting out c.5,000 phone masts ▶ Geographical gap fillings ▶ By 2009 end, plan to have 13,000 sites, covering 98% of UK population with a mobile broadband speeds up to 7.2 Mbps (c. 20x faster than existing 3G) 	<ul style="list-style-type: none"> ▶ Reportedly the deal has been recently updated to include 4G deployment (Financial Times, 2 February 2014) and to allow greater differentiation in networks between the two parties
Vodafone Orange (now EE)	2008	<ul style="list-style-type: none"> ▶ Mast/Tower sharing (passive) for both 2G and 3G ▶ Spectrum and core network remains independent 	<ul style="list-style-type: none"> ▶ To cut the total site numbers by 15% i.e. 3,000 fewer masts 	<ul style="list-style-type: none"> ▶ This deal has now expired
Germany				
Vodafone Telefonica	2009	<ul style="list-style-type: none"> ▶ Share existing 2G and 3G sites (masts) 		
Spain				
Telefonica Vodafone	2007	<ul style="list-style-type: none"> ▶ Site sharing with shared usage of power, cabinets and mast 		<ul style="list-style-type: none"> ▶ Until 2009, around 2,200 sites were shared
Orange Vodafone	2006 & 2014	<ul style="list-style-type: none"> ▶ 2006: 3G RAN sharing ▶ 2013: site sharing 	<ul style="list-style-type: none"> ▶ Extend coverage by 25% and cut number of antennas in rural areas by 40% ▶ 1,000 sites in rural areas to be dismantled by each operator, eventually sharing 2000 sites 	<ul style="list-style-type: none"> ▶ Sharing agreement for towns with fewer than 25,000 people ▶ Limited scope in context of c.16k VOD sites and 14k Orange sites in Spain
Telefonica Yoigo (Telias)	2013	<ul style="list-style-type: none"> ▶ TEF to use Yoigo's 4G network over 1800MHz band ▶ Yoigo to have access to TEF's 2G and 3G network ▶ Yoigo will also get access to Telefonica's broadband infrastructure 	<ul style="list-style-type: none"> ▶ Telefonica could offer 4G service via Movistar brand ▶ Yoigo to extend coverage in 2G/3G 	<ul style="list-style-type: none"> ▶ Telefonica has approached Ericsson as technology partner to roll out 4G network
Belgium				
Mobistar KPN/BASE	2012	<ul style="list-style-type: none"> ▶ Passive sharing of infrastructure ▶ RAN remains independent 		<ul style="list-style-type: none"> ▶ At Dec 2012, Mobistar network had 5,762 sites, of which 730 are shared with other operators
France				
Bouygues SFR	In progress	<ul style="list-style-type: none"> ▶ Sharing of passive infrastructure (sites, antennas, etc.) and RAN sharing 	<ul style="list-style-type: none"> ▶ Announced in February 2014, network implementation to start in 2015 ▶ Synergies to represent c20% to 30% of opex+capex from 2018 while cumulated costs in the first 3 years could represent 1 year of savings 	<ul style="list-style-type: none"> ▶ 57% population coverage, excludes densely populated areas ▶ Each operator is to retain its own innovation capacity and complete commercial independence as spectrum and backbones remain independent
Orange	2012	<ul style="list-style-type: none"> ▶ Sharing of passive infrastructure 	<ul style="list-style-type: none"> ▶ Sharing c2,500 sites in very low density areas 	<ul style="list-style-type: none"> ▶ Agreement signed in February 2010 by Orange, Bouygues telecom and SFR followed by Iliad in July 2010

Operators involved in agreement	Date of announcement	Type of Sharing	Expected benefits / targets at announcement	Other comments
Italy				
Telecom Italia Vodafone	2008	<ul style="list-style-type: none"> ▶ Passive sharing of network sites ▶ No electronics to be shared 	<ul style="list-style-type: none"> ▶ Reduce the unit cost of renting sites ▶ Progressive reduction of the number of radio stations ▶ 9,860 of each of the two operators' sites and future sites 	<ul style="list-style-type: none"> ▶ Agreement for 6 years
Vodafone / Wind	2009	<ul style="list-style-type: none"> ▶ Site sharing 		<ul style="list-style-type: none"> ▶ Agreement for 6 years
Telecom Italia 3 Italia	2009	<ul style="list-style-type: none"> ▶ Site sharing 	<ul style="list-style-type: none"> ▶ 2,000 sites to be shared 	<ul style="list-style-type: none"> ▶ 3-year agreements
Austria				
Telecom Austria T-Mobile 3 Austria	2005	<ul style="list-style-type: none"> ▶ Masts sharing in Lower Austria 	<ul style="list-style-type: none"> ▶ To save taxes on masts in Lower Austria ▶ Cooperation agreement between operators for reduction of ratio of individually deployed masts from 2/3rd to 1/3rd in lower Austria ▶ 80% sharing rate for new mobile masts ▶ Individually deployed masts expected to be reduced by 50% 	
Netherlands				
Tele2 T-Mobile	2013	<ul style="list-style-type: none"> ▶ Site sharing for 4G network 	<ul style="list-style-type: none"> ▶ Tele2 gains access to majority of antenna sites 	<ul style="list-style-type: none"> ▶ 10-year deal
Vodafone KPN	2012	<ul style="list-style-type: none"> ▶ Site sharing (pilot project) 		<ul style="list-style-type: none"> ▶ Reportedly Vodafone and KPN Netherlands have abandoned plans to pursue this network sharing program in Jan 2014 (Telecompaper, 2 Jan 2014)
Sweden				
Telenor Tele2	2009	<ul style="list-style-type: none"> ▶ Joint 2G and 4G network ▶ Formation of a joint venture for network construction and spectrum sharing 	<ul style="list-style-type: none"> ▶ Net4mobility a JV rolled out common LTE network with spectrum sharing and infra sharing ▶ Also serves for 2G network replacing older Telenor and Tele2 2G 	<ul style="list-style-type: none"> ▶ Regulatory cap of 70% for infrastructure sharing in Sweden
Telenor 3Sweden	2001	<ul style="list-style-type: none"> ▶ Active network sharing agreement for 3G ▶ JV 3GIS formed to maintain 3G network 	<ul style="list-style-type: none"> ▶ Shared 3G network outside Stockholm, Gothenburg and Malmö 	<ul style="list-style-type: none"> ▶ Regulatory cap of 70% for infrastructure sharing in Sweden
Teliasonera Tele2	2002	<ul style="list-style-type: none"> ▶ Joint 3G network ▶ Formation of a JV for network construction and spectrum sharing ▶ SUNAB JV formed to rollout joint 3G network based on Tele2 license 		<ul style="list-style-type: none"> ▶ Regulatory cap of 70% for infrastructure sharing in Sweden
Denmark				
Telenor Teliasonera	2011	<ul style="list-style-type: none"> ▶ RAN sharing for 2G, 3G and 4G (LTE) networks ▶ Common infrastructure company to build the joint network ▶ Core network not shared 	<ul style="list-style-type: none"> ▶ Joint spectrum win in 2012 	
Portugal				
Portugal Telecom / Vodafone/Sonaecom	2012	<ul style="list-style-type: none"> ▶ Sharing of passive infrastructure 	<ul style="list-style-type: none"> ▶ 31% site sharing as on 2012 by Portugal Telecom 	<ul style="list-style-type: none"> ▶ Portugal's regulator ANACOM, states that 25% of sites shared by 3 MNOs in Portugal in 2012

Source: Company data, regulators, HSBC

Our method is to evaluate each individual network sharing agreement for its network coverage and depth. The latter is captured on a scale of 1-3: arrangements covering masts receive a rating of 1, those encompassing RANs of 2 and those extending all the way to the core network of 3. National figures are produced by weighting both these sets of figures by the relevant operators' market shares. We then combine the national coverage and depth figures to produce a national network sharing evaluation total.



If the efficiency gains resulting from network sharing flow through to greater capacity being deployed, then it should show in lower unit pricing, especially in terms of data services – which is the service area where the additional capacity would be brought to bear. However, we observe only a weak correlation, with an R^2 of 0.12. Given that we are employing a ranking as a proxy for network sharing, we have also calculated a Spearman rank correlation coefficient (of -0.23). Squaring this value provides a R^2 of 0.05, again indicating that the relationship is limited.

Our conclusion is therefore that network sharing does bring a certain degree of benefit to customers, and that such arrangements should be encouraged (quite aside from their other positive impacts, such as those of an environmental nature). However, we do not see evidence that

network sharing can substitute for the positive effects on investment and thus on unit prices that we believe would be brought about through industry consolidation.

Competition policy

Having discussed merger control analysis at a relatively detailed level, it is perhaps now time to pull back, and consider the issues in higher-level terms. At present, it would seem reasonable to summarise the EC's approach as predicated on the notion that competition promotes customer welfare, with perfect competition implicitly the ideal goal. Market power, on the other hand, is typically regarded as deriving from anti-competitive behaviour rather than being perceived as a fair advantage that has been 'purchased' with (for example) heavy investment.

The focus of competition authorities has therefore tended to be on the upward pricing pressure that can result from market power, rather than on balancing this with associated benefits, in the form of the additional returns supporting additional investment and thus lower unit pricing. In our view, the problem that this raises is that, if operators become convinced they cannot invest their way to a position of greater market power, their incentives to spend will be much impaired.

A frequently repeated mantra is that competition drives investment – we could not agree more. But this does raise the question, what type of competition? Most industry observers would agree that scope to build an advantage through network investment is both an extremely vigorous form of competition and a powerful impetus to commit to capex. Granted, said competitive advantage is itself hardly compatible with the concepts inherent in economists' models of perfect competition. But the reality is that if this particular incentive is undermined, it removes one

of the strongest ways in which competition and investment are propelled.

Even in a scenario where operators worked on the basis that the re-emergence of market power would not be permitted, they might well still retain unimpaired their instinctual urge to compete. But what would undoubtedly change, in this situation, would be the availability of capital. Financial investors have every incentive to commit additional capital to industries where there is scope to build a position of market power and secure returns from this – but in circumstances where this is not possible, and where the market constitutes a nil- or negative-sum game, the impetus will instead be to withdraw capital.

Innovation has to be funded

This raises particular issues in terms of innovation, a factor that has often been treated as essentially exogenous in nature – and therefore something that will take place irrespective of market conditions within a given industry. But the reality in many sectors, telecoms emphatically included, is that innovation requires considerable capex in support (new network technologies are of little practical benefit unless they are actually deployed). Innovation in telecoms is better considered, in our view, as endogenous – a function of operators having the incentive and the ability to fund investment in network upgrades.

The linkage between profitability and investment is acknowledged elsewhere by the European Commission: for instance in the *Report on the Alert Mechanism Report 2013*, 28 November 2012. However, the EC's focus would seem to be on the industrial segment, with service sectors such as telecoms perceived as an input cost to be minimised.

We would naturally concur that Europe's best interests are likely served by minimising the unit

costs of telecoms services, so supporting the productivity growth that Europe will require if it is to catch up with peers such as the US. But there is scope for inconsistency here: if better margins in the industrial sector are seen as desirable in that they support greater investment, the same argument could surely be made of a capital-intensive network industry subject to rapid technological change, such as telecoms. The risk is that, even with the right goal in mind (ie lowering unit prices), policy choices are made that undermine investment and thus curtail the potential for network upgrades, unit cost declines and hence productivity improvements (in other sectors as well as telecoms).

The role of the financial markets

Telecoms operators may nonetheless wish to continue investing for a whole variety of reasons, but ultimately management teams will only be able to persuade financial investors of the merits of this if there is actually some prospect of thereby securing better market conditions. This is another reason that we believe the proposed changes to European telecoms regulation are so important, especially in the field of spectrum policy.

Historically, it is difficult to avoid the impression that spectrum issuance has been treated as a form of competition policy, with interventions such as the reservation of spectrum for entrants or existing smaller operators common as a means of neutralising the market power of the larger players. But operators might struggle convincing financial investors on the merits of network investment as a mechanism of differentiation if spectrum is reserved for third/fourth relatively weaker operators. (Note that spectrum is a synthetic equivalent of capex: simply put, operators can either apply greater spectrum on existing base station sites, or instead build more sites to work their existing spectrum holdings harder).

Further academic evidence

A growing body of academic literature is now looking to refine previous notions of the linkage between competition and innovation: for instance, the output of Philippe Aghion at Harvard. This work should not be seen as a reflexive return to the views of Schumpeter, but rather recognition of the fact the competition-innovation relationship is complex, with effects working in both directions. Specifically, Aghion draws attention to the fact that companies will be discouraged from investing if they have reason to believe that competition policy will undermine the competitive advantage that they had hoped to build (Aghion and Griffith, *Competition and Growth: reconciling theory and evidence*, MIT Press 2005).

Aghion's paper in conjunction with Bloom, Blundel, Griffith and Howitt ('Competition and innovation: An inverted-U relationship', *The Quarterly Journal of Economics*, May 2005) has already been mentioned. This research found that the relationship between competition and innovation broke down beyond a certain level of competitive intensity, since competition reduces the rewards available from investment and thus the incentive to undertake it. The paper presents an analysis of over three hundred companies listed on the London Stock Exchange, comparing the level of competition that they faced (measured by margin) against their level of innovation (captured via citation-weighted average patents).

The use of patents as a proxy for innovation is not something that is directly applicable to the telecoms sector (although the larger operators have no shortage of such patents). However, our own analysis set out earlier in this section indicates that higher levels of competition/lower margins do indeed also curtail network investment. (Moreover, we would add that patents themselves would not leverage innovation to the advantage of European citizens – this would require investment in the

physical equipment and software that exploit these patented innovations, ie capex).

The degree to which the telecoms sector is exposed to technology change combined with the extent to which it is demanding of infrastructure investment is unusual. Not all industries are the same in this regard, and we would argue that it is important to take such factors into account when evaluating the degree of concentration present in the industry. What the inverted U-shaped curve indicates for telecoms is that a sector such as this, which requires a great deal of fixed asset investment, will need to generate healthy cash flows: in order to both support the necessary expenditure, as well as to justify it to the financial markets (which might otherwise impede such projects on account of their poor track record in delivering returns).

Conclusion: a complex relationship

We would certainly not advocate that competition bodies should abandon the nostrum that competition can support innovation. But this heuristic needs to be tempered, in our opinion, with an acknowledgement that the relationship is complex, and that competition can at the same time have effects that undermine investment. Hence we would argue that it would have been useful in the recent Austrian ruling to have given greater consideration as to how efficiency gains from the merger might have acted as an offset to the upward pricing pressure analysis.

Not just deployment, depth

Finally, it may be objected that our concerns over European network investment are being overtaken by events – and that investment in LTE is, at long last, getting underway in earnest. However, we would counter that the roll out is badly lagging that seen in the US (despite the lead that the EU once enjoyed in this field). It very much remains to be seen whether European LTE networks will

match their North American peers for the extent of coverage provided – especially when taking into account the higher challenge factor present in the US, given its lower population density.

The extent of LTE's availability is an important matter when considering drivers of productivity growth: not all deployments are to be considered equal. This is especially relevant in light of recent academic research considering the question of why levels of global income have diverged, even while technology's deployment has become near-ubiquitous (after all, even the poorest countries today generally play host to not one but several mobile operators).

According to a paper authored by Diego Comin and Marti Mestieri (*If technology has arrived everywhere, why has income diverged*, NBER Working Paper Series, no. 19010, May 2013), the differences between countries in the time taken to deploy a new technology have progressively shortened. However, there seems to be an increasing gap in the extent of the penetration of new technologies. This research concludes that it is differences in the diffusion of new technology (essentially its penetration rate) that account for the bulk of the income divergence seen across countries. Consequently, what should be of interest is not only the 'binary' matter of whether or not LTE is deployed, but also the extent of that roll out. In this regard, Europe has a great deal of catching up to do.

Disclosure appendix

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