

Pricing Spectrum at Licence Renewal

Many regulators are renewing or extending expiring spectrum licences rather than re-auctioning them. What's the right way to price spectrum renewals?

1 Administrative spectrum pricing

Where regulators set spectrum fees, they typically reflect estimates of the spectrum's opportunity cost – what we often call the 'market price' as a shorthand – with the aim of encouraging efficient use. Renewal prices are often estimated using similar techniques to those for setting reserve prices, such as benchmarking or occasionally a discounted cashflow model of alternative users.

Reserve prices are usually set at a significant fraction of estimated opportunity cost to reduce incentives for all forms of competition-suppressing strategic behaviour. However, because reserve prices are set below opportunity costs, reflecting uncertainty about these estimates, they seldom affect auction outcomes.

In contrast, renewal prices *always* affect incumbent operators. This leads to strong incentives for lobbying and potential for disputes around administratively-set renewal prices.

In response, national authorities have often emphasised the various ways in which their pricing methodologies are conservative. We'll discuss those technicalities in a separate paper, but in practice approaches tend to be not just conservative, but *highly* conservative. Here our focus is on what objectives are appropriate for setting renewal prices and whether regulators are perhaps being too apologetic.

2 Efficient allocation of spectrum

Encouraging spectrum transfers

Auctions are intended to achieve efficient allocation of spectrum given the prevailing

circumstances at a point in time. However, circumstances change and efficient outcomes cannot be assumed to remain the same forever. At least in theory, secondary trade of spectrum might adjust holdings, but we know that such trades are rare, being almost entirely due to either enforced divestments on foot of mergers, or exit of unsuccessful fringe operators.

Secondary markets and their limits

If renewal pricing cannot itself achieve efficient allocation, the task of correcting any remaining misallocation falls to secondary markets — trading, leasing and liberalisation. In a perfect world with well-defined, transferable rights and low transaction costs, private bargaining would reallocate spectrum to its highest-value use regardless of the initial assignment. No-one would leave an unused opportunity for mutual gain on the table.

In practice, the evidence across jurisdictions suggests that secondary spectrum markets remain stubbornly thin. Several structural features explain this thinness:

- Multi-dimensional fit and search costs. A trade requires a buyer's needs (band, bandwidth, geographic footprint, technical conditions) and a seller's surplus to align simultaneously across several dimensions, which sharply limits the pool of feasible counterparties and makes the market inherently "thin".
- Strategic withholding. Incumbents have limited incentive to release "excess" spectrum where the buyer would use it to compete in the seller's own downstream market — a classic raising-rivals'-costs dynamic that is particularly acute in concentrated mobile markets.
- Interference and technical coordination costs. Trades typically require regulatory sign-off, coordination over interference, and sometimes harmonisation with neighbouring licensees, all of which raise the transaction cost relative to a simple transfer of title.
- Regulatory and competition constraints on trades. Spectrum caps, "use it or lose it" provisions, and merger-control style scrutiny of acquisitions (to prevent re-concentration) are often necessary safeguards but mechanically reduce the set of trades that can clear.
- Valuation opacity. Because transactions are infrequent and idiosyncratic, there is no continuous market price; each deal must independently establish value, which raises negotiation costs and the risk of negotiation breakdown.

The upshot is that secondary trading is a real but limited corrective.

Spectrum fees can help by creating *actual* costs, rather than opportunity costs, of holding spectrum.

This can encourage the return or transfer of spectrum if spectrum prices reflect the current opportunity cost to alternative users. The price steers spectrum toward its highest-value user, deters hoarding, and signals scarcity.

Some of the same frictions preventing secondary trades might also affect operators' responsiveness to spectrum prices – there still needs to be some process for the spectrum to change hands – but the fee is a fully transparent direct cost and does not depend on operators second guessing what somebody else might be willing to pay.

A fixed set of MNOs does not mean a fixed efficient allocation

An argument put forward by operators in favour of low renewal fees (or, in the extreme case, renewal 'for free') is that there would be no realistic alternative user of the spectrum. Whilst incumbent operators may have a clear advantage over new entrants, this is an assertion that would go untested if existing licences are just rolled over.

The efficient allocation might change even without market entry or exit. Marginal blocks could change hands as consumer market shares wax and wane, or operators might want to 'defragment' holdings to obtain larger contiguous blocks in fewer frequency bands.

In some cases, value that could be created from shared spectrum use by users that are more dispersed and less well organised, disadvantaging them in contesting spectrum from incumbent users. For example, spectrum might be geographically shared by many users of private networks who cannot easily come together. Shared unlicensed use of the spectrum on a non-exclusive basis, which may have huge value (as we know from WiFi or Bluetooth applications), but large numbers of uncoordinated users typically lack a means to assert their need for spectrum.

In rolling over existing licences, regulators need to be aware that they are making an *active* decision that forecloses such possibilities for changes in spectrum assignment. Therefore, careful consideration – and appropriate evidence – will be needed so that inefficiencies are not being locked in, potentially advantaging existing licensees and suppressing innovation.

Distribution of rents

Allocative efficiency is the primary concern in spectrum pricing, but not the only one. The mobile sector is highly unusual in that the grant of spectrum access by government creates an absolute entry barrier. Only a limited number of high bandwidth networks can be supported by a physically limited supply of spectrum. Need for rural coverage has led to concentrated outcomes with few network operators – now typically down to three in many countries after recent concentrations. This is an intrinsically oligopolistic, rather than a competitive market structure.

The value of spectrum is the additional rent that an operator will enjoy under oligopolistic competition downstream, compared with the counterfactual in which it does not hold that spectrum. Even if the efficiency consequences of spectrum pricing are limited, there is a secondary decision about how the economic rent generated by the spectrum — a scarce public resource — should be divided between the licence holder and the public.

3 Operators' arguments for lower spectrum prices

Operators have widely advanced arguments that higher spectrum prices are necessarily bad for consumers because they will pay more or because there will be less resources for investment, leading to worse services or less coverage. The implication is that renewal fees should be set at very conservative estimates of the market price, or deliberately below it to benefit consumers.

The pass-through claim

Operators frequently argue for lower renewal fees, contending that the savings will flow through to consumers in the form of lower retail prices. This argument implicitly assumes something close to a competitive pass-through of a reduction in fixed, sunk costs, which does not translate into lower marginal pricing decisions even under intense competition.

A spectrum renewal fee, once paid, is a fixed cost; it does not enter marginal cost and so has no mechanical reason to affect price-setting in any market structure, perfectly competitive or

otherwise. Even setting that aside and treating the fee as if it affected costs at the margin, pass-through under oligopoly is generically incomplete and falls with market concentration: theoretical and applied work on cost pass-through shows that the share of any cost saving passed to consumers depends on the curvature of demand and the intensity of competition. It can be expected to be well below 100% in concentrated markets such as mobile telephony.

Empirical work occasionally finds a positive correlation between spectrum prices and consumer prices. However, the well-trodden arguments that higher spectrum prices lead to the consumer paying more get the direction of causality wrong. Limited spectrum availability determines market structure, which determines competitive behaviour by operators, including consumer pricing, and so the profits that operators make. This oligopolistic competition in turn determines what spectrum is worth.

A simple thought experiment shows why this argument that spectrum fees set consumer prices is wrong. If we suddenly cut ongoing spectrum fees and refunded auction prices for spectrum held by operators, who would pocket this – customers or shareholders?

The investment claim

The second argument is that reducing spectrum fees leaves a larger pool of internal funds that will be spent on network investment.

Operators' arguments about investment amount to a claim that they should retain oligopolistic rents, as they are best placed to use these. However, why should operators have preferential access to funding from retained rents, rather than having to turn to capital markets and compete for capital allocation against other industries? This undermines economically efficient trade-offs at the macroeconomic level. Internal efficiency within companies can also be undermined by retained rents that weaken the discipline of capital markets. "The best of all monopoly profits is a quiet life", said Hicks.

If mobile operators think that spectrum policy should, in effect, give them preferential access to capital at a cost to the state, there needs to be

clear reasoning and public debate about what market failure such a policy is seeking to address. Perhaps severe capital market imperfections are holding back profitable investments, or perhaps there are social benefits of rural coverage that MNOs cannot capture, but these need to be explicitly identified. Investment is good, but only if its benefits exceed the opportunity costs of investing those funds elsewhere, possibly in a different sector.

If policy makers calculate the benefits to additional investment in network coverage or quality, then the subsidy to MNOs for providing these investments can be made explicit. Explicit subsidies can be tied to network improvements, placing behavioural restrictions on the operator as a condition of licence renewal or receiving the subsidy. This approach has a better chance of success and offers better value for money than arbitrary, no-strings-attached discounts.

If the social benefits of increased coverage or resilience can be provided by a single network, then there is even scope for competition between the operators to provide this at the lowest cost. Simple roaming requirements can protect consumers in the intervention areas.

The holdup claim

A further argument on investment says that, aside from the supposed effect of current fees on operators' ability to fund network investments, the discretion of the State to determine future licence fees reduces the incentive to invest now.

Suppose there is no alternative use of the spectrum. Without continued spectrum access, the value of the existing licensee's business would be lost or severely reduced. Economic theory suggests that renewal prices would be the outcome of a bargaining process between licensee and State that creates a mutually acceptable division of this value.

However, this approach could be detrimental to investment incentives. Subsequent splitting of the surplus the operator has already created through its investment and network build-out might be anticipated by the operator. This is the regulatory hold-up problem, well established in the infrastructure-regulation literature.

The mechanism is straightforward. If operators anticipate that a portion of any value they create from successful commercial exploitation of the spectrum will be clawed back by the regulator at next licence renewal (as the anticipated 'bargained' renewal fee increases with value that the operator creates) then the expected marginal return to that investment falls today.

Critically, this problem arises due to bargaining-referenced pricing, because it is precisely the link between the fee and the value the operator itself has created that generates this disincentive. However, this effect is absent if licence renewal prices follow 'market prices', set not by the operator's own value but by the value of an *alternative* user. There is then no direct link between one operator investing in its network and the value a different entity places on its spectrum.

4 Conclusions

Setting the right price

The public interest is best served by setting spectrum prices at the right price – that set by opportunity cost, which is what a hypothetical efficient market might set. We don't have such a market, but we do have occasional auctions that reveal this price.

NRAs are arguably being overly apologetic about renewal pricing for spectrum in the face of intense lobbying from operators. Clearly if regulators took operators' arguments at face value, incumbents should retain existing spectrum rights at a trivial price to maximise claimed benefits to consumers. New entry or even rearrangements of existing spectrum would be blockaded. Operators would have been gifted protected market positions through public concessions. Spectrum allocation would become ossified. Market dynamism and radical innovation would be lost forever. Therefore, this can't possibly be the correct approach. We are in a world of trade-offs. Therefore, a careful, balanced analysis of what recent spectrum auctions can tell us about opportunity cost is needed.

Investment and intervention

How sympathetic should we be to the arguments made about the need for investment being

supported by lower spectrum prices? We want investment where it returns benefits exceeding cost, otherwise it is wasteful. Investments need to cover the opportunity cost of not being able to use that capital elsewhere – including in entirely different sectors.

There may be a case for more coverage or more reliability from mobile networks, but the need to intervene derives from a failure of oligopolistic competition to meet reasonable user needs. If there is a solid case for intervention, it is appropriate to discount spectrum prices to reflect the cost of these obligations. However, the public is then paying for a clear and defined benefit that must be delivered, rather than discounting spectrum prices in the hope that some shadowy mechanism translates that bonus not into shareholder returns, but into better services for customers.

Moving forward

Looking forward, we face increasing difficulties in estimating reasonable opportunity costs if NRAs set administrative prices for renewal of existing licences left in the hands of incumbent operators. Not only do incumbents glue themselves to their spectrum holdings whether or not this is efficient, but we lose fresh auction data about what spectrum is worth. This will become an increasing problem if non-competitive renewal processes become widespread. Alternative methodologies to assess opportunity cost will be needed.

Otherwise, there is a real risk that we sleepwalk into a situation where a major source of competitive discipline on the mobile sector is lost if spectrum holding become essentially eternal. How can innovators and successful operators expand? The only dynamic will be buying failing operators for their spectrum.

DotEcon advises regulators and operators on spectrum awards and renewal process. We work on spectrum pricing both on setting appropriate objectives and estimating market values using our Spectrum Awards Database.