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TELECOMS DISCUSSION PAPER

# Is pricing spectrum at market value good for consumers?

Prof. Maarten Janssen, Paul Reynolds / January 2018

Governments have earned substantial sums from the sale of licences to use radio spectrum. A growing number of authorities have also introduced annual charges for the use of spectrum even for spectrum already assigned to operators. The UK regulator, Ofcom, decided in 2015 to triple the annual fees for key mobile spectrum to close to £200m per annum in total. The Court of Appeal of England and Wales recently overturned Ofcom's decision in an appeal brought by EE (CEG provided economic advice to EE on the Ofcom consultations and an expert report on the likely effects of annual fees in the initial appeal before the UK High Court). The Court rejected the argument advanced by Ofcom that a direction from the Secretary of State to set the licence fees to reflect full market value implied that Ofcom did not have to consider the objectives of the EU's regulatory framework for electronic communications in setting the fees. These objectives include promoting the optimal use of spectrum, ensuring maximum benefits to users, promoting competition and promoting efficient investment and innovation in new and enhanced infrastructures. In this discussion paper, we discuss the likely effects of spectrum licence fees on these objectives. We find that, where the spectrum licences are tradeable, licence fees are unlikely to promote any of these objectives while they are likely to harm investment.

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## Introduction

In many countries, licences for spectrum which form a critical input for the ongoing supply of mobile services are approaching the end of their terms. While these licences could be re-auctioned, a plan to do so creates substantial uncertainty for existing operators. This risks deterring investment and discouraging them from competing to acquire new customers. Many authorities instead allow spectrum licences to be automatically renewed or made indefinite (potentially with some exceptions such as where spectrum is to be re-allocated to a higher value, new use). These authorities may decide to require operators to pay a fee for

their ongoing use of the spectrum.<sup>1</sup> Without the licences being re-auctioned, these fees will need to be set administratively. In this discussion paper, we discuss the likely effects of the level of spectrum fees on end-users, efficiency, competition and investment.<sup>2</sup> We also consider issues in seeking to identify the market value of spectrum when there have not been any recent market transactions for that spectrum.

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<sup>1</sup> Countries that levy annual spectrum usage charges that are intended to reflect market value or opportunity cost include Australia, Hong Kong and the UK.

<sup>2</sup> The European regulatory framework does not allow for spectrum fees to be levied simply to raise government revenues. We do not consider this role for spectrum fees in this paper except to note that it is generally less distortionary to raise government revenues on an economy-wide basis rather than through sector-specific measures.

The likely effects of spectrum fees have been given renewed relevance from a decision of the UK Court of Appeal of 22 November 2017<sup>3</sup> that requires Ofcom, in carrying out its radio spectrum functions, to take into account the policy objectives set out in Article 8 of the EU Framework Directive in addition to the 2010 direction from the Secretary of State that included a requirement for the relevant licence fees to be revised to “*reflect full market value*”. The upshot of the Judgment is that while Ofcom could initially estimate a level of licence fees with reference to market value, consideration of the Article 8 objectives (particularly maximising users benefits and promoting competition and investment) might lead to a determination that it is optimal to set fees that depart from the estimated market value. In practice, given significant uncertainty over the market value of the fees, the Article 8 objectives might lead Ofcom to choose a value from the lower or higher end of the range in which the market value is estimated to lie. The Judgment consequently raises the question, which we address in this paper, of whether setting spectrum licence fees at some estimate of market value is likely to be optimal.

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### What are the effects of raising the level of spectrum fees?

Regulators frequently invoke competitive market outcomes as the benchmark that they will use to set prices or otherwise regulate firm conduct. Given that competition often, although not always<sup>4</sup>, maximises

benefits to consumers it may seem natural to set spectrum prices based on an estimate of the competitive market value of the spectrum, such as could arise in an auction. A well-designed auction can be effective in allocating spectrum to the uses and users that will deliver the greatest benefits to society. To acquire spectrum in an auction the operator that values the spectrum the most should be prepared to bid (just) more than the value of the spectrum to the operator with the next highest willingness to pay. As market value is determined by the highest price that an alternative operator would be willing to pay it also reflects the opportunity cost of the spectrum, i.e. its value in its next best use.

Where a regulator has decided that a licence should be renewed, setting a price for the use of the spectrum based on an estimate of what price would be paid for the licence in an auction might be expected to have similar efficiency-enhancing effects to auctions in ensuring that the spectrum is assigned to its best use. In particular, where fees for the licence are based on its market value, then only the operator that can generate greater value from the spectrum than the fees would retain the licence. However, where the relevant spectrum is tradeable (as is the case in the UK), operators can be expected to already be considering what price they could get for the licence compared with the value to them in retaining the licence. Indeed, this is simply a specific instance of the reason why market-based economies generally support efficiency. Voluntary trade enables any party that values a product or asset more highly than the existing owner to offer a price somewhere between their valuations to buy the asset from the willing seller.

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<sup>3</sup> EE Ltd vs Office of Communications & Ors [2017] EWCA Civ 1873.

<sup>4</sup> Some exceptions include the time-limited monopolies granted by patents to encourage innovation and the case for adjusting prices for externalities such as pollution.

Assuming that operators do take into account the opportunity cost to them of continuing to hold the spectrum rather than to sell the licence, what is the impact of annual per MHz licence fees for the use of the spectrum? Annual fees set at the same level whichever company holds the spectrum, generally do not change the opportunity cost of holding spectrum. On the one hand, how much a buyer would be willing to pay for a licence will be reduced by the amount of the fees. On the other hand, if the current licence holder sells the licence, they would save having to pay the fees. Thus, the total opportunity cost for an operator to continue to hold the licence will be the sum of the highest price an alternative operator would be willing to pay (now reduced by the amount of the fees) plus the amount of the fees that the existing licence holder would otherwise save. This is the same opportunity cost as before the fees were imposed, that is:

$$\begin{aligned} & \text{Opportunity cost after fees} = \\ & (\text{Value to alternative operator before fees} - \text{the fees}) \\ & + \text{the fees} = \text{Value to alternative operator before fees} \end{aligned}$$

An exception to this conclusion arises where the fees are set above the highest value of the spectrum to any alternative operator. In this case, the fees would reduce the opportunity cost to the existing licence holder. If the fees are set too high, then no operator would want to hold the spectrum. The risk of valuable spectrum being left idle is a danger of annual licence fees particularly given significant uncertainty over the value of the spectrum. Ofcom stated that it adopted a conservative approach partly in recognition of this risk.<sup>5</sup>

<sup>5</sup> Ofcom, Annual licence fees for 900 MHz and 1800 MHz spectrum – Statement, 24 September 2015, para. 1.38.

If the annual fees are set so that they do not impact opportunity cost then they will not lead to any change in spectrum holdings and hence not change the efficiency of the current allocation of spectrum. If operators are already taking into account the opportunity cost of the spectrum then licence fees which do not impact opportunity cost would also not be expected to impact consumer prices.

Higher annual licence fees are a cash outflow for operators. They can be expected to lead to lower investment as empirical studies find that cash flow is a substantial driver of investment levels. A recent US study of all non-financial firms listed on the New York Stock Exchange (excluding the smallest 10%) found that an extra dollar of cash flow is associated with \$0.32 of additional investment for firms that are the least likely to be constrained in their ability to raise new funds externally and \$0.63 of additional investment for firms that are the most likely to be constrained.<sup>6</sup> The importance of internally generated funds for investment<sup>7</sup> can be explained by the higher costs of external financing. Raising new debt and equity externally carries administrative costs including banking fees, transaction advisors and lawyers. Significant amounts of new debt may affect the credit rating for a company and lead to significantly higher interest rates or require greater collateral. Raising equity carries a further cost in that outside investors with less information on the firm's prospects demand a discount on

<sup>6</sup> Lewellen, J. and K. Lewellen, "Investment and cash flow: new evidence", *Journal of Financial and Quantitative Analysis*, Vol. 51, No. 4 August 2016, pp. 1135-1164. See also L. Vartia, "How do taxes affect investment and productivity", OECD Economics Department Working Papers, No. 656, 2008, para. 10).

<sup>7</sup> The World Bank Enterprise Surveys find that globally 71% of new investment is financed internally, particularly by retained earnings.

the price that they pay for shares reducing the value of current equity. A reduction in internal funds can make some investments no longer economically worthwhile because operators would need to rely on higher cost external finance. Investment may also be affected through other means such as if operators perceive there is a risk of further increases in licence fees that would reduce the profitability of new investment.

Where operators differ in their current profitability, there may also be effects on competition as an increase in licence fees could lead to less profitable operators cutting back investment more if they are forced to rely more on costlier external finance.

If licence fees are only likely to reduce investment and potentially distort competition, why did Ofcom decide to raise them? In its final statement, Ofcom took the position that it was simply implementing the Secretary of State's direction. However, in its 2014 consultation, Ofcom argued that: *"While the business may be aware of the opportunity cost of holding spectrum rights which it could otherwise trade to rivals, it may be less responsive to these opportunity costs than to the direct costs of an ALF [Annual Licence Fee]."*<sup>8</sup> While it is likely that some organisations (such as public sector ones) might not be responsive to opportunity cost, this is highly unlikely to be the case for the mobile operators which in the UK are managed in the interests of their private shareholders (including large institutional investors) and where each operator knows exactly who holds which spectrum as well

as having access to the same technological knowledge.

Assuming that Ofcom is correct and that operators were not considering the opportunity cost of spectrum, what would then be the effect of raising licence fees? Ofcom's view is that licence fees that are not set too high could support a more efficient allocation of spectrum by encouraging operators who value spectrum by less than its value to alternative operators to sell their spectrum. However, on Ofcom's logic, imposing or raising fees would raise the cost of supplying mobile services with a higher volume of services requiring more spectrum and hence more annual fees to be incurred (i.e. the annual fees can be considered as part of the variable cost of supplying services). This would be expected to lead to higher prices to consumers by the extent to which the opportunity cost of holding the spectrum was not already being factored into prices. In terms of direct financial impacts on operators, revenues would rise to cover some or all of the costs of the licence fees. Depending on the extent to which operators are assumed to ignore or discount opportunity cost as well as the difference in operators' valuations, there is likely to be a significant range in which the licence fees do not change whether it is more valuable for operator to retain the licence versus selling the licence to an operator with a higher intrinsic value for the spectrum.

At best, licence fees could lead to some improvement in the efficiency in the allocation of spectrum but at the expense of higher consumer prices and potentially some negative impact on investment. More

<sup>8</sup> Ofcom Annual licence fees for 900 MHz and 1800 MHz spectrum, Further Consultation, August 2014, para. A5.14.

likely, licence fees will not impact the allocation of spectrum but would lead to lower investment. That the case for annual licence fees to increase efficiency is weak should not be a surprise as governments do not generally intervene in other markets (including property markets) because of concerns that businesses do not properly take into account the opportunity cost of retaining assets.

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### Issues in estimating market value

Finally, even were regulators to consider it optimal to set spectrum fees in line with market value, they would need to deal with the practical difficulties in estimating market value. Ofcom undertook substantial analysis including a number of consultations over several years to seek to estimate market value (expressed as the price per MHz per annum for each band) on the basis of a combination of the prices paid for spectrum in other frequency bands in a 2013 auction in the UK as well as the prices for spectrum in a range of bands in other European auctions. While benchmarking can be informative, there is a need to consider the impact of differences in supply and demand conditions (such as the availability of other spectrum, demography and prevailing traffic forecasts), differences in licence conditions (such as the licence term and any coverage obligations) as well as whether the prices paid in the auctions might be distorted by strategic considerations or a lack of competition.<sup>9</sup> An

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<sup>9</sup> In the Ofcom process, there was also debate over the appropriate discount rate to be used to convert a one-off auction price into an annual licence fee. Ofcom changed its position in response to arguments advanced by CEG (for EE) and others to accept current yields to maturity on bonds with a similar Macaulay duration to the ALFs payments.

indication of the uncertainty of benchmarking is provided by the fact that Ofcom decided to reduce its estimate of the value of 900 MHz spectrum by 22% largely in response to one new European auction.

The main alternative to benchmarking is to estimate market value by reference to the change in network costs for an operator were they to gain or lose an increment of spectrum. This method recognises that additional network investment particularly in sites can substitute for spectrum in supplying traffic volumes. While any such modelling depends on the quality of the assumptions being made, regulators have substantial experience in modelling the costs of mobile networks. A model can also be used to take into account the key supply and demand factors impacting the value of the specific spectrum band in the relevant country.

While both benchmarking and modelling can be used to help inform spectrum value, there will remain significant uncertainty. This uncertainty should be taken into account in the decision as to whether to impose annual licence fees. If licence fees are imposed then, as Ofcom recognises, adopting a conservative approach would help minimise the cost of errors.

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