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Setting licence fees for renewing telecommunication spectrum based on an auction

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ABSTRACT

This paper presents a methodology for setting fees for the renewal or extension of spectrum licences, by using the outcome of an auction for comparable licences but with a different licence period. The methodology is a combination of market and cash flow valuation and consists of two main steps. First, prices for spectrum corresponding to that of the licences to be extended are derived from the auction outcome. Second, the relative value addition of the extension period for the new licensee, compared to the value of the licences auctioned, is derived by using a model for the development of EBITDA for an operator over time. A combination of these two is used to calculate fees that match the opportunity costs of extension. Thus, optimum alignment is achieved with the policy objective of using licence fees only to promote efficient use of spectrum, while avoiding state aid at the same time.

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1. Introduction

In developed countries, spectrum licences for wireless communication are mostly awarded by means of an auction or a beauty contest or hearing (Zaber & Sirbu, 2012). Spectrum licences commonly have a predetermined duration. When they expire, governments can award them again, or under certain circumstances they can opt for renewal or extension. In the latter situation, licensees are offered the option to continue using the spectrum. Such an extension can be for a limited period, for instance to accommodate a transition, for a full new licence term or even indefinitely, and may be used to facilitate a change in the licence conditions concerning the use of spectrum. Setting the appropriate licence fees is an important issue in such cases (Gurmazi & Neto, 2005).

This paper describes how licence extension fees can be calculated if market information about the value of spectrum is available from a spectrum auction including the same or similar frequencies but for a different licence period. A methodology is presented which involves deriving prices from an auction that correspond to the extended licences in terms of underlying spectrum, and adjusting these for the deviating licence period by means of the curve describing value creation over time for a mobile network operator. Taking the auction outcome as a starting point implies the use of market information on the value of frequency bands and optimum alignment of the extension fees with the policy objective of using licence fees only to promote efficient assignment and use of spectrum, whereas state aid is avoided at the same time.

This paper is organized as follows. Section 2 provides a brief discussion of the literature and regulatory context of spectrum assignment, licence renewal or extension, and setting licence fees. The theoretical framework proposed for setting

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licence extension fees based on an auction is presented in Section 3. Section 4 elaborates this framework, after which Section 5 applies this methodology to a Dutch case study concerning the extension of licences for 900 and 1800 MHz bands. Section 6 concludes.

2. Literature and regulatory context

There is extensive literature on auction design,¹ and there is some literature in which auctions are compared with beauty contests or alternative procedures to award spectrum. Auctions score high on the efficiency, non-discrimination and transparency of the assignment procedure (Kruse, 2004). On average, they raise larger public revenues than beauty contests do and have no negative and perhaps even a positive effect on the speed of technology diffusion (Zaber & Sirbu, 2012). Moreover, they are generally claimed to promote efficient use and assignment of spectrum, for in a well-designed auction, licences are won by the most efficient operators that can create most value by using them (Bohlin, Madden, & Morey, 2010; Cave et al., 2007; Hazlett & Muñoz, 2009).

Much less research has been done on the economics and pricing of licence renewal or extension, despite the fact that certain circumstances can render renewal or extension of licences preferable – or even necessary to new assignment in an auction. Generally, licence renewal can be beneficial from the perspective of ensuring certainty for incumbents and thus encourage investment (Guermazi & Neto, 2005). However, this may be detrimental to competition and innovation in the market if it entails that new players cannot enter. On the other hand, renewal might be opted for to encourage incumbents to invest in new technologies or standards (Kerste, Poort, & van Eijk, 2012), thus actually promoting or speeding up innovation.

Licence extension for a shorter period can be desirable to match the licence periods of various spectrum bands, which can then be combined in a multiband business case. In such cases, auctioning separate licences for the short time required to match licence periods is no option, since no other operator would be able to build a business case on such a short licence period. A temporary extension can also be required to allow for an orderly transition without any disruptions for subscribers, if there is too little time between the expiration of licences and the start of newly auctioned licences. Since mobile network operators (MNOs) base their investments in grids and base stations on the spectrum allocated to them (Lundborg, Reichl, & Ruhle, 2012), they may need time to make the transition from their old licences to the new ones. This was the background for the Dutch case described in Section 5.

If renewal or extension is opted for, spectrum fees have to be set administratively. The relevant question is how to do this. In Europe, the regulatory context for frequency distribution and the renewal of licences for frequency use have been laid down in the Framework Directive (2002/21/EC) and are further addressed in the Authorization Directive (2002/20/EC). These directives do not include any specific provisions with regard to licence renewal or extension, but there are some general criteria that can be considered applicable to licence renewal or extension, especially when it comes to imposing fees. According to consideration 32 of the preamble of the Authorization Directive, fees may be imposed to ensure optimum use of spectrum but should not hinder the development of innovative services and competition in the market. Hence, revenue maximization can be no objective in itself, and fees should be no higher than what is necessary for efficient assignment and use of spectrum.

On the other hand, setting licence fees too low could involve impermissible state aid under European law, as it could entail a waiver of state resources (in this case spectrum) to the selective benefit of current licensees. General criteria should be used to find out if state aid is provided for a renewal. These criteria can be largely derived from Article 107 of the EC Treaty and case law of the Court of Justice. For instance, allegations that licence fees for the fourth French 3G operator Free Mobile had been set too low, led to state aid investigations, after which the European Commission ruled that the procedure did not involve state aid (Hocepiéd & Held, 2011).

To be in conformity with the criteria above that follow from the European Regulatory Framework, the methodology presented in this paper takes the opportunity costs of the extension for the incumbent as a benchmark. In Section 3, it is argued that this methodology promotes optimal assignment and use of spectrum. Conceptually, this methodology relates to Administrative Incentive Pricing (AIP), which was developed by NERA/Smith for the UK Radiocommunications Agency (Marks, Viehoff, Saadat, & Webb, 1996). AIP was formally introduced in 1998 and was evaluated and revised by Ofcom in 2009–2010 (Ofcom, 2009, 2010a). It is used to set fees for both commercial and public spectrum “to reflect the opportunity cost of spectrum denied to other uses and users, rather than just the costs of managing the radio spectrum” (Ofcom, 2009, p. 1). This encourages spectrum users to use spectrum more efficiently and release it wherever they can.² Along similar lines,

¹ See for instance Klempere (2004) for an introductory overview, or Chapter 5 in Cave, Doyle and Webb (2007) for a basic assessment of the pros and cons of various spectrum auction formats.

² Licences that were awarded in a commercial setting (such as on auction) and could be traded, were initially exempted from AIP. For such spectrum, the market mechanism was believed to provide sufficient incentives for efficiency. Ofcom focused on costs to calculate fees, which resulted in fees that were not in line with commercial values on which market parties would base auction bids. After a government directive in 2010 requiring “Ofcom to revise the fees payable for licences to use radio spectrum in the 900 MHz and 1800 MHz bands so that they reflect full market value” (Ofcom, 2013, p. 3), this was changed, and fees in these two spectrum bands were based on a range of evidence, particularly including results of the UK 4G auction and foreign auction results. Note that this use of auction results is still in line with the opportunity cost approach that underlies AIP and the methodology presented in this paper.

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