Spectrum Auctions in Turkey: Recent Developmentsand aCriticalAssessment

Abstract

This paper aims to provide a snapshot of the Turkish mobile market and evaluation of the auction process in GSM market. Turkey with a mobile coverage rate of 99.65% provided by more than 90 thousand base station sites constitutes a good example for GSM market in Europe. This rate is among the best coverage rates throughout Europe. Examples from other countries are also presented as a way of comparison and reaching conclusions for policy makers and practitioners. The use of auctions to enhance allocative efficiency of a scarce resource such as telecom spectrum is vital. However, the desired efficiencies shall not be realized unless the auction design and spectrum management policies are both optimal. Thus, a model of spectrum auctions is developed for the purpose of this study as a contribution to the literature.

Keywords: Spectrum auctions, communication, mobile market.

Introduction

Auctions have also been used by governments throughout history. In addition to auctioningoff treasury bonds, in the last decade governments started to sell air waves (3G technology). For instance, the British 3G telecom licenses generated Euro 36 billion in what British economists called “the biggest auction ever,” and where several game theorists played an important role in designing and testing the auction format before its final implementation. In fact, the specific design of 3G auctions created a great controversy in most European countries during the 1990s since, as the following figure from McKinsey (2002) shows, countries with similar population collected enormously different revenues from the sale, thus suggesting that some countries (such as Germany and the UK) better understood bidders’ strategic incentives when participating in these auctions, while others essentially overlooked these issues, e.g., Netherlands or Italy. (An Introduction to Auction Theory for Undergraduate Students)

The development of telecommunications in any country is hinged on the availability ofspectrum and its allotment to the service providers. Globally, various methods have beenadopted for allotment of this scarce resource. Some of the methods employed in allocationof spectrum are; Administrative Process, Lottery, First Come First Serve (FCFS), and Auctions.

Administrative process, also known as “beauty contests”, has been adopted by many Asiancountries such as Japan, Singapore, South Korea and Hong Kong. In this system thegovernment invites proposals from the aspirants and evaluation is done against broadly setout multiple criteria, subsuming therein policy objectives of the government. The governmentshave adopted various evaluation criteria for assessment of offers, which may include economicfeasibility of the proposal, effect on telecom industry, concentration of market power, etc. Butweights of these criteria being subjective and internal to the licenser, the process may leadto allotment of one of the most valuable public resource to a service provider who may notbe the most deserving and competent candidate to roll-out the intended services. Moreover,assessment of bids takes exceedingly long time as the criteria of evaluation are not preciselyspecified against which the applicants can submit their proposals.

The disadvantages of this procedure were attempted to be overcome by adopting a lotterysystem in some of the countries including the USA. Though, the time taken to selecta successful applicant is reduced, but, this option may result in selection of an applicanthaving no relation with the competencies required to deliver the intended services. Moreover,this procedure also promotes participation by applicants who are only interested in makingprofits by reselling the acquired licenses. The advantage of quick selection is nullifiedby disadvantages of non-serious applicants getting selected, besides huge loss of potentialrevenue to the government and delay introduced in acquisition of licenses by capable firmsto roll out the services.

Some countries introduced the procedure of First Come First Serve (FCFS) for allotmentof spectrum licenses. The FCFS ostensibly purports to overcome the arbitrariness of lotterysystem, but practically it is equally random in manifestation. What is meant by ‘first come’can be camouflaged to favor some bidders. In India, in recent past, this system had beenadopted in allotment of 2G spectrum licenses by the government. The entire allocation of2G spectrum through this method has been at the center of controversy and the issue hasgone to litigation leading to possibility of cancellation of awarded

licenses. This method hasproved to be a failure if seen from the perspective of a credible policy regime.A fairer and transparent way of allotment of spectrum licenses by way of auctioning wasfirst used by New Zealand government in the year 1990 followed by various others. Thismethod has been used successfully towards realizing considerable revenue for the government and making the telecom market competitive in price and offerings. Spectrum Auctions hasbeen the most preferred method in majority of 2G and 3G spectrum allocations across theworld(Analysis of the 3G and BWA Auctions in India).

Literature Review

The issue of determining the best way of licensing has been discussed extensively in literature. As a result of these discussions, the auction method in the licensing of electromagnetic spectrum has started to be widely used. The arguments on the allocation methods such as auction and beauty contests have focused more on auction methods lately.

The auctions are considered as games by the economists, thus being studied mostly by the game theorists. After the studies in this field have reached a critical mass, auction theory has emerged as a sub-field of game theory. French (2009) has expressed that in spite of such a wide range of services that can be offered by the 3N mobile communication technology, the lack of a killer application is a major barrier in front of the expansion of the technology. GSM is still in fact the leading technology in terms of mobile services [10]. A supporting data of this view is the fact that the rate of revenue generated by Vodafone through 3N mobile communication service is 6% after acquiring the license in 2001 [9].

Another problem with 3N telecommunication service is due to the allocation of licenses to the firms before the 3N mobile communication devices were available in the market. Although countries such as Finland have considered that early allocation of the licenses would increase the speed and spread of technology, this has not happened. On the contrary, the phones using 3N mobile communication technology have started to be sold few years later than the allocation of licenses. As a result of all these, the commercial use has started in 2004 [10].

As a result of these developments, it would be wrong to tie the problems with the 3N communication service license process experienced in Europe with the auction method. Such problems are more related to 3N mobile communication technology itself. Telecom FL in Lichtenstein refusing to use its license for 3N due to the heavy license conditions although it was awarded at no charge [20] and only three out of four licenses being sold in license beauty contests in Luxembourg [11] are the supporting experiences for this later argument.

Similarly, the new entrants Mobilcom and Quam in Germany have decided not to build network, very much like companies in Italy, Austria, Sweden, and Portugal [11]. The new entrants withdrawing from the market supports the arguments of Bijwaard et al. [2].The authors have argued that the firms entering the market early end up advantageous.

Turkish Case

National Market Structure

As of 2013, three mobile operators, Turkcell, Vodafone (formerly Telsim), and Avea (after the merger of Aycell and Aria) operate in Turkish mobile telecommunications market. There are more than 69 million mobile subscribers corresponding to 90.9% penetration rate. Mobile penetration rate exceeds 100% when 0-9 year's old population are excluded. Number of 3G subscribers has reached to 49.3 million. Turkcell has 50.53%, Vodafone has 28.61% and Avea has 20.86% market share according to the number of subscribers. (ICTA, 2014).

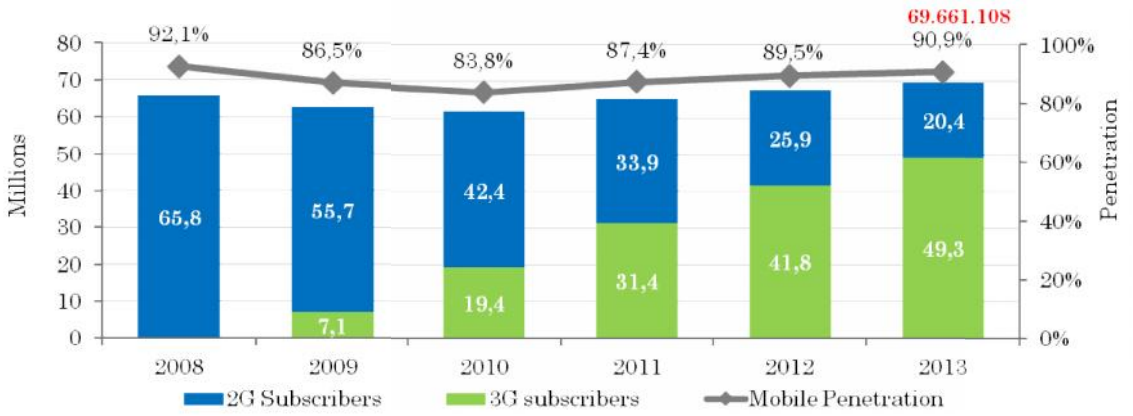

Figure 1: Number of Mobile Subscribers and Penetration Rate

Process of 2G Auction

Second generation (2G) mobile services were launched in 1994, and the two incumbent firms Turkcell and Telsim formed a duopoly until two new operators entered in 2001. This duopoly phase has been critical for the current state of the sector, as Turkcell acquired a major share of the market. The advantages of Turkcell vis a vis its rival Telsim have mainly been attributed to the different business strategies and to the lack of fortune of Telsim's management.

The expertise and managerial experiences of Sonera as international partner of Turkcell appeared to be more helpful for Turkcell's success than Telsim's foreign partners which mainly supplied the necessary infrastructure. Effectively, Turkcell launched services three months before Telsim and enjoyed first mover advantages.

Furthermore, the operations of Telsim were suspended between November 1995 and June1996 due to managerial fraud. The incidents created negative expectations about Telsim'slong-run success, and the market started tipping faster towards Turkcell.

In 1998, it has become effective that with the license agreements, revenue sharing agreements will be effective for 25 years and Ministry of Transportation and related firms will be the contact points. Within the framework of the agreement, Telsim and Turkcell have become the owners of both the licenses and the infrastructures that they are operating by paying 500 million USD each. This step has resulted in increased investments by the operators and expanded service area, thus increased mobile subscribers and mobile penetration rates [1].

Another key development in the Turkish mobile market has occurred in 1999. Two of the three new licenses are decided to be sold to the new firms through auctions and the third one to Turk Telekom. However, the auction method that was used in these sales is exposed to heavy critics by the economists. Atiyas and Dogan (2005) have discussed that either the government was not aware of the tradeoff between generating revenue and encouraging the competition in the auctions or prioritized the revenue. Binmore and Klemperer (2002) has claimed that the design of the auction was not successful and suggested that the GSM auction in Turkey should be carefully designed and exposed to the experimental tests.

Certain design mistakes have been made in that auction which was claimed to be a failure by Binmore and Klemperer (2002). The auction was decided to be executed according to the State Bidding Law. Thus, it was required to have consecutive sealed tender auctions rather than a simultaneous one for the licenses. More critically, the price of the first license was determined to the minimum value of the second license.

In the first auction that took place in April, 2000, Is-Tim which is a consortium of Is Bank and Telekom Italia has offered an unexpectedly high amount of 2.525 billion USD and gained the license. The closest bid was 1.35 billion USD. However, no firm has participated in the second auction where the minimum value was determined to be 2.526 billion USD and the second license could not be sold. The high bid given by the Is-Tim in this auction has resulted in preventing a potential competition.

The bidding strategy of Is-Tim was considered to be destructive by Klemperer (2004). According to the author, with the help of auction rules, by giving such a high offer Is-Tim wanted to guarantee that no

other firm enters the GSM market. Atiyas and Dogan (2007) on the other hand, claims that Is-Tim has not in fact given a strategic offer, rather it has estimated the value of the license higher than it should be. Their offer almost meeting the total of the second and third highest bids support this later opinion. While the second license could not be sold, the third license was sold to Turk Telekom with the price that Is-Tim has paid. Following the auction, Is-Tim and Turk Telekom have started their operations in 2001 under the brands of Aria and Aycell, respectively. Later on, due to not being able to reach an agreement with the established operators on the issue of roaming, TIM has considered withdrawing from the Turkish market but then Aria and Aycell have merged on the brand of Avea.
It was aimed to have five firms competing in the GSM market where currently only two firms are operating but this was not accomplished because of the auction and three firms have ended up in operating in the market. Emek (2002) argues that Aria-Aycell merger and the license not being sold at the auction have resulted in an unnecessary condensation in the GSM market.

Evaluation of 2G Auction Process

GSM auction has played a significant role in shaping the GSM market in Turkey. The mistake in this auction however, has been the rule of defining the price reached in the first auction to be the minimum value in the second one. It is not realistic to expect the price go up in the second auction. Moreover, determining the price in this way conflicts with the idea of using the auction in determining the market clearance price. This rule helps with determining the number of license to be sold by the market. Klemperer (2002) argues that leaving this decision to the market benefits the agents in the market that does not favor the competition.

Process of 3G Auction

3N mobile communication service authorization process in Turkey has started in 2007 and with great challenges. Avea and Vodafone have not participated in the first auction asserting that the number portability regulations are not in place yet. Turkcell 3N as the only operator attending the auction has obtained the mobile communication service license but the auction was cancelled by Information Technologies Agency (BTK) due to the lack of competition requirements [6].
All three operators have attended the next auction in 2008 after the regulation on number portability and they have raced for the asymmetric four authorizations with different bandwidth. For every type of license,separated consecutive auctions are organized. Each auction is composed of two stages.
In the first auction for A type of license taken place within this context, Vodafone has seen to be the firm with the highest bid during the sealed tender stage. During the second stage, Avea has increased the highest bid of 298 million euros to 318, which is further increased by Turkcell to be 328 million euros. Vodafone had to withdraw from the auction at this stage as a result of failing to increase this amount, thus leaving two bidders for the A type license.
In the next round, the firms have proposed using the same strategy they applied in the previous round. Following the 358 million Euro offer of Turkcell, the auction has ended and Turkcell has received the A type license.

Table 1: A TypeLicenseAuction (MillionEuro)

Tur	Avea	Turkcell	Vodafone
Sealed Tender	285	287	298
Oral (1.Round)	318	328	Withdrawn
Oral (2.Round)	348	358	
Oral (3.Round)	Withdrawn	358	

(Source: BTK)

Turkcell has not participated in B type license auction since each operator was allowed to participate in only one. In this context, first the sealed bids of Avea and Vodafone were opened and 250 million euro offers by both of the operators have been observed. Both operators have declared that they would not be participating in the second round, thus the winner of B license has been determined to be Vodafone through drawing lots.
C type license auction has resulted with the minimum amount since Avea was the only participant. D type license on the other hand, could not be sold due to the lack of demand. Overall data of the auction is presented in the table below:

Table 2: Turkey 3N Auction

License Type	Bandwith (Mhz)	Minimum Amount (MillionEuro)	Mhz (Million Euro)	Winner	Final Offer (MillionEuro)	Mhz(Million Euro)
A	2x20=40	285	7,12	Turkcell	358	8,95
B	2x15+5=35	249	7,11	Vodafone	250	7,14
C	2x15=30	214	7,13	Avea	214	7,13
D	2x10+5=25	178	7,12	--	--	--
Total	130	926	--	--	822	--

(Source: BTK)

Evaluation of 3G Auction Process

3N auction of Turkey has taken place during a period of global crises which has deeply affected the economy. Obtaining total revenue of 822 million Euros and 115 euro auction revenue per capita from an auction in such a recession period can be considered as a success. However, this success cannot be related to the design of auction because there was hardly a competition in the Turkish 3N auction thus the firms did not give competitive offers. The high revenue obtained is more related to the optimally determined amount of minimum value. Determining a lower minimum amount could be resulted in lower total revenue while a higher amount could cause the established firms give up their licenses like in the French 3N auction.

The most important reason in the failure of auction design is the low participation rate. According to Ersen (2009), some rules in the auction specifications have had a negative impact on this. Applying the criteria such as network coverage and network enhancement speed to the new entrants and established firms in the same way have resulted in low participation. From the experiences in EU countries, it can be observed that many incentives are offered to the new entrants in the market. The fact that no new entrants have participated in the auction and D type license could not be sold can be evaluated in this framework.

Proposed Spectrum Auction Model

For a successful auction, the goals need to be clearly defined first [4]. In designing the auction, the economic environment needs to be taken into account along with the goals. An auction design that fits all does not exist after all [14, 3].

In this framework, main conclusions that can be drawn from the process of 3N mobile communication service license can be listed as follow:

- Firms need to be encouraged to attend the auction in order to increase competition. The number of firms has to be more than the number of licenses available.
- The number of licenses offered should be more than the number of established companies due to the asymmetry between the new entrants and them. Moreover, certain incentives need to be offered to the new entrants for a more fair competition.
- Certain cautions need to be taken to prevent secret agreements between the participants and communication among them.
- In license allocation, revenue maximization should not be the prior goal. A well designed auction will be ending up with optimum value of the resource when receiving economic output from the usage of a scarce resource [21]. Otherwise, it would be difficult to reach other goals such as efficiency and competition.

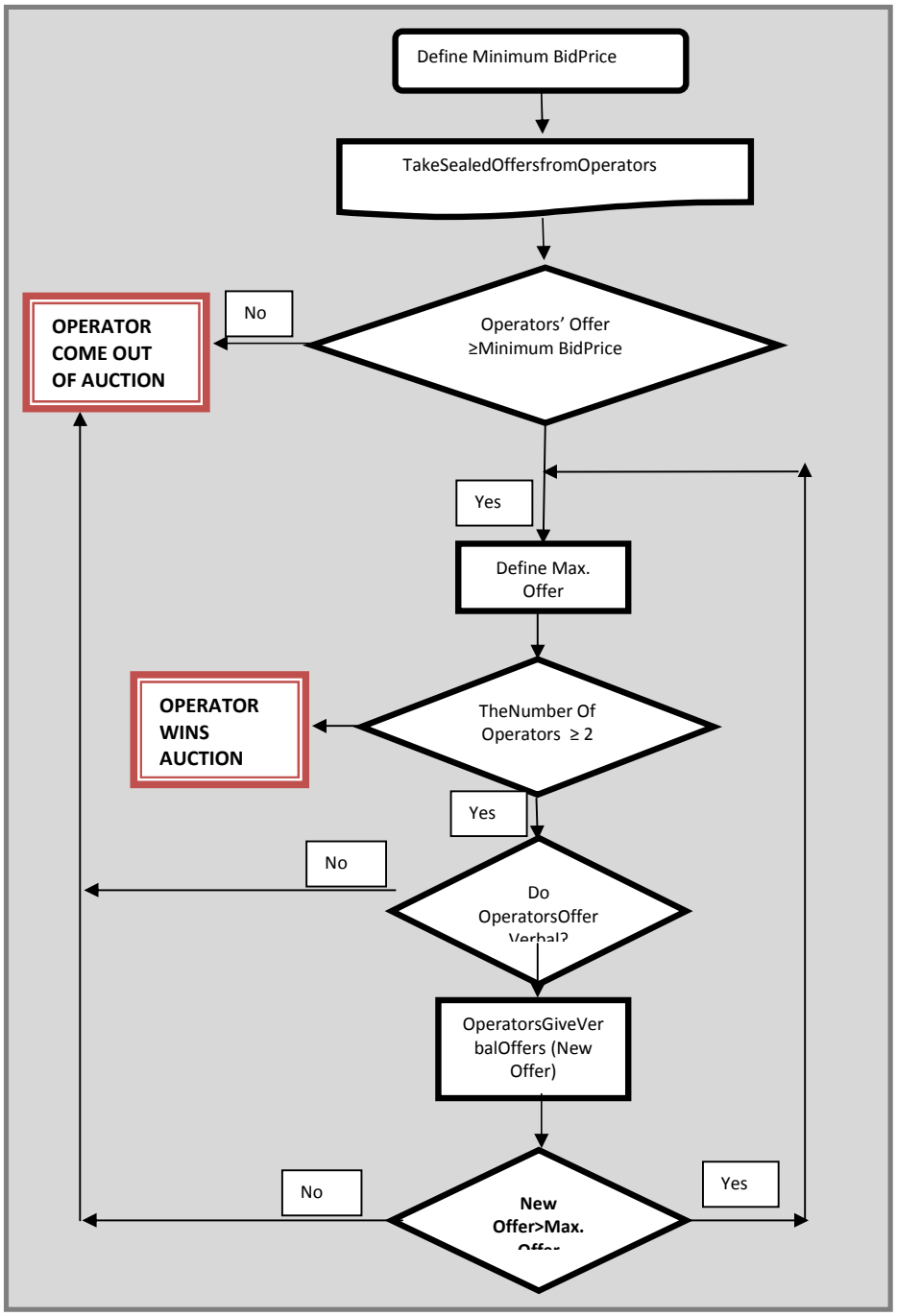

Figure 2: Process of Frequency Auction

Conclusion

Well-designed spectrum auctions can play an important role in fostering acompetitive wireless industry. Of even greater importance is the quantity ofspectrum made available for wireless services. Spectrum is an essential input.The more spectrum allocated to wireless services, the more competition can besustained. Other regulatory policies, including rulesfor interconnection, numberportability, tower sharing, and roaming, also affect the competitiveness of themarket for wireless services.

Spectrum auctions provide a fast and effective means of assigning spectrumto wireless operators. We believe that the primary objective of these auctionsshould be efficiency—putting the spectrum in the hands of those best able touse it—not raising revenue. Efficient auctions raise substantial revenues, andfocusing more on revenues likely distorts the outcome away from social welfaremaximization.

The study of various auction designs and its implication on competition in this report reaffirms the view that industrial-organization issues are more important than the informational issues on which the auction literature has mostly focused. In particular, the problems of attracting entrants and dealing with alliances and mergers are likely to remain major preoccupations of telecom-auction designers for the foreseeable future. Tackling such problems sensibly requires high-quality market research that keeps pace with developments in an industry that can change its clothes with bewildering rapidity. We also need more theoretical work on the industrial-organization implications of major auctions to make a further extensive.

The use of auctions to enhance allocative efficiency of a scarce resource such as telecom spectrum is undisputable. However, the desired efficiencies shall not be realized unless the auction design and spectrum management policies are both optimal. The primary goals of a well-designed auction which is the life-blood of competitive culture should be price discovery and to induce truthful bidding. Efficient assignment is only possible when these pre-requisites of competitive price-determination are satisfied. Transparency is an added

benefit which auctions provide and which induces greater public-confidence in allocation procedure of what is public property.

The above were the goals of auction design, however the goals of any auction procedure is decided by the authority conducting the same. In the Indian case the objectives in the 3G auction in order of priority were (a) efficiency, (b) stimulating competition and (c) revenue generation. Having analyzed the 3G auctions in India and the recommendations for the 2G spectrum auction, we can conclude that there are many commendable features in the design opted, but also that there is considerable room for improvement in the design of the auction rules if the stated policy ends of allocative efficiency, post-auction market competitiveness and maximization of auction revenue are to be met.

A few suggestions for the upcoming auctions:

- Efficiency and competition enhancement should be given greater priority, given downstream competition is efficient and auction design induces truthful bidding, efficiency will raise revenue as by-product.
- Thus, setting optimal reserve price to maximize revenue should always be subject to efficiency and competition constraints, such that problems like entry deterrence and concentration of power can be addressed.
- The auction design should encourage entry and hence incentives to entrants in form of not so high reserve prices, setting aside spectrum for entrants, provision of network sharing and roaming should be provided.
- The current activity rule can be improved upon by replacing quantity based rule with revealed preference based rule.
- Role of secondary spectrum trading should be recognized.

Apart from the design and objectives, there are certain policy and institutional issues which command due importance. The Telecom Regulatory Authority of India, and Department of Telecommunication, should work in conjunction with the Competition Commission of India to reconcile the policies in conflict with competition, for example merger policies for consolidation of spectrum, decision of with-holding spectrum and its impact on market structure, trading of spectrum in secondary market and efficiency therein and the conflicting goals of maximizing revenue vs. efficiency.

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