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THE ROLE OF AUCTION DESIGN IN AWARDING SPECTRUM CONCESSIONS: TURKISH GSM EXPERIENCE

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Abstract

Auctions play an important role in economics. In their most basic form, they are one of the ways in which various commodities, financial assets and concession rights are allocated to individuals and firms, particularly in a market-oriented setting. An auction is a market institution with an explicit set of rules determining resource allocation and prices on the basis of bids from the market participants. Since some products such as spectrum concessions have no standard value, auctions provide one way approaching the question of price formation of these products.

This paper explores the details of Turkish GSM 1800 MHz auction held in April, 2000 within auction theory and competition policies framework. According to the findings of this study, since the auction design inappropriately dealt with market conditions, Is-Tim, winning bidders of one of two spectrums on offer, was able to make a high bid by deriving the price of first license, the reserve price of second one, up to excessive level, so other bidders were not able to afford to bid over this price at second round. First finding of this study is that Is-Tim is either predatory pricer or winner's curse both of which undermines general economic efficiency. As a result by not selling second license, Turkish GSM market has been unnecessarily concentrated; Turkish Treasury has obtained less revenue than it would; and the liability of TT owner of third license at the *extremely high* winning price of the first license, has soared more than what it otherwise would be by possibly undermining the market value of TT.

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The essence of ultimate decision remains impenetrable to the observer

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–often, indeed, to the decider himself..... There will always be the dark and tangled stretches in the decision-making process- mysterious even to those who may be most intimately involved.

John Fitzgerald Kennedy

I have come across men of letters who have written history without taking part in public affairs, and politicians who have concerned themselves with producing events without thinking about them. I have observed that the first are always inclined to find general causes, whereas the second, living in the midst of disconnected daily facts, are prone to imagine that everything is attributable to particular incidents, and that wires they pull are the same as those that move the world. It is to be presumed that both are equally deceived.

Alexis de Tocqueville

1. Introduction

In recent years, many governments around the world have been trying to attract private capital and firms to manage infrastructure services such as energy, transportation and telecommunications. Governments have liberalized these markets by either directly selling public properties or awarding concessions¹ and then introducing competition policies. However, both directly selling public assets and awarding concessions to private firms in the provision of infrastructure services have long been a controversial issue. During the last decade, focus of the debate has shifted from whether or not to award to how to do it best.

Some have argued that awarding a concession is a procedure, not much different from one used, say, in equipment procurement. For them, auction rules used for standard procurement operations are equally applicable in awarding concession cases. For others, however, French type of concession awarding process or so called *beauty contest*, where the conceding authority has a broad range of discretionary power, is the best way to go about it, since concession contracts involve quite relation-specific investments, and the development of

¹ In the paper, concession will be called as the transfer of property rights of governments for limited time. In the economics literature, the word "*franchise*" tends to be used for the concept (for detail discussion on characteristics of concession, see Emek, 2000 and Klein 1996).

effective long-term contractual relationships between parties. In such situations, the argument goes, the conceding authority needs such a discretionary power both to make appropriate adjustment to the contracts as the need arises due to changes in conditions that cannot easily be foreseen and assessed beforehand, and to curb opportunistic behaviors on the part of private contractors. Auction theory, by and large, appears to support the former view. It maintains that the conceding authority is likely get best possible deals from firms through setting up clear bidding rules instead of negotiating.

What really matters in awarding a concession is to calculate the value of it, because it has no standard market valuation. Since information is very important in calculating market value of concession and the computations employed therein are very complex, it is suggested that it is in the best interest of the seller to devote resources to expanding market through auctions rather than to collecting information for making complex calculations required to figure out the best mechanism.

On the other hand, the expected return from an efficient auction for awarding concessions is not only revenue maximization but also optimal uses of national resources, efficient market configuration, and effective competition in providing infrastructure services. The auction mechanism used in awarding concessions for spectrum rights provides the competition *for* market and produces an impact on market structure. Thus, the competition policies such as collusion, predatory pricing and winner's curse are deeply supposed to be taken into consideration in auction designing.

First GSM concessions (900 MHz) in Turkey were awarded to Telsim and Turkcell in 1993. Second step in GSM concessions (1800 MHz) has been taken in April 2000 by using a sequential first-priced sealed bid auction to award three concession contracts. In the end, the government has only been able to award two of three concessions one of which has gone

to Is Bankasi-Telecom Italia consortium (Is-Tim). The other one has been awarded to Turk Telekom (TT) at winning price of first license.

In this study, main features of this auction will be explored by using auction theory and competition policies framework. According to the findings of this study, since the auction design inappropriately dealt with market conditions, Is-Tim, winning bidders of one of two spectrums on offer, was able to make a high bid by deriving the price of first license, the reserve price of second one, up to excessive level, so other bidders were not able to afford to bid over this price at second round. As a result by not selling second license, Turkish GSM market has been unnecessarily concentrated; Turkish Treasury has obtained less revenue than it would; and the liability of TT owner of third license at the *extremely high* winning price of the first license, has soared more than what it otherwise would be by possibly undermining the market value of TT.

The remainder of the paper is organized as follows: Section two discusses the advantages and disadvantages of both negotiation and auction mechanisms. The third section deals with auction formats and characteristics. Then, competition policies in auction theory will be analyzed in the fourth section. In the fifth and sixth sections, respectively, developments in Turkish cellular markets and specifications of GSM 1800 MHz license auction will be reviewed. In the seventh section, the outcomes of the auction will be discussed in terms of both theoretical dimension and empirical findings. The paper concludes with a set of suggestions for policy and research regarding efficient auction designs for 3G license concession.

2. Auctions versus Beauty Contest, or Negotiation

Beauty Contest in the cellular phone markets, *generally speaking*, refers to an award system where the award is made based on the judges opinion of the bidders planned services, prices and rollout speed. Put it this way, the winners of the spectrum concessions will be

chosen by beauty contest according to who would guarantee the lowest cost to consumers, invest the most in infrastructure, stimulate creativity, and so on. In other words, the exact details of so called beauty contest will differ in each case and country. Main feature of this method in awarding spectrum concessions is to provide the conceding authority with an extensive discretion to negotiate with bidders and make appropriate adjustments in concession contract in the name of social welfare. On the other hand, the main opposition arising from this side against auction mechanism is that the auction mechanism to award spectrum concession could give an unnecessarily high bid prices and the cost of spectrum concessions will be passed on to consumers from operators in the form of higher prices.

A key point of beauty contest is to improve the bargaining power of the conceding authority to obtain any efficient outcome. However, by setting up clear, fair, competitive, and credible bidding rules instead of negotiating, the conceding authority could get the most optimal deals from firms, in terms of not only the government revenue but also social welfare. The auction theory² and country practices, by and large support this view. As noted in Table:1, 21 countries have chosen the *auction mechanisms*, and while 14 countries have preferred employing *beauty contest* to award third-generation (3G) licenses.

Klemperer (2000b, and 2000c) reports that "while the exact details of the auction's design will be crucial to its success, choosing an auction over beauty contest to allocate mobile services will give better outcome". Firstly, a well-designed auction is the most likely method of allocating resources to those who can use them most valuably. Secondly, even if governments had access to good information to allocate spectrum concessions to very right firms under optimal conditions, allocation by bureaucrats leads the perception -if not the reality- of favoritism and corruption. Thirdly, an auction can raise sums of money valued under market conditions to support public finance. A beauty contest, by contrast, can give away valuable assets at a fraction of what they are worth. Fourthly, like any other companies

² See, Bulow, and Klemperer, 1996; Klemperer, 2000b; Milgrom, 1989. Especially, Bulow, and Klemperer (1996) demonstrates the advantages of auctions over negotiations in terms of the efficient outcomes.

telecom companies will charge the prices that maximizes profits, independent from what spectrum cost them in the past. So, there is no absolute validity of that firm's costs in the auction will be passed to consumers through in the form of higher prices. Finally, how can a concessionaire guarantee the lowest price to consumers during in the face of uncertainty of long-future in especially developing countries that have long had an economy with a high inflationary and unstable macro economic environment.

Klemperer (2001) reports that "efficiency was the main concern of the UK government for selling 3G licenses". Government's stated objectives were to:

- (a) utilize the available UMTS spectrum with optimum efficiency;
- (b) promote effective and sustainable competition for the provision of mobile phone services;
- (c) and subject to the above objectives, design an auction which is best judged to realize the full economic value to consumers, industry and the taxpayer of the spectrum.³

Competition should be provided by both attracting more bidders and not allowing cell-phone market to be unnecessarily concentrated. Auction should be held via simple understandable, non-discriminatory and transparent rules to address former aim. To achieve second aim, no bidder should be permitted to hold more than one license and available all spectrum licenses should be utilized.

Efficiency should be understood that licenses will go to the hands of bidder with best business plans. Since a bidder with a better business plan will generally value a license more,

³ So, the auction employed by UK government has ever generated the biggest revenue (600 Euros per capita) around Europe by selling 3G licenses.

this aim roughly reduces to seeking to maximize the sum of the valuations of the bidders who are awarded licenses. Thus, government will earn more revenue as a result of efficient auction outcome.

3. Types of Auctions

As an allocative mechanism of single unit objects, four basic types of auction are used (Figure:1): ascending-bid auction (also called open, oral, or English Auction), descending-bid auction (also called Dutch auction), the first-price sealed-bid auction (also called discriminatory auction in multiple units), and the second-price sealed-bid auction (also called Vickrey auction, and uniform-price auction in multiple units).

As shown in Table:2, price is successively raised until only one bidder remains in the ascending-bid auction, and that bidder wins the object at the final price. In ascending bid auction bidders are able to reassess bids according to new information arising from other declared bids during the bidding process.

As oppose to the ascending-bid auction, in descending bid-auction, the auction starts at a very high and then price is continuously lowered until only one bidder remains, and that bidder wins the object at the final price.

In the first-price sealed-bid auction, each bidder independently submits their own bid, and winning bidder pays his or her own bid. In both descending and first-price sealed bid auctions, bidders do not have a chance to access to new information to reassess bids during bidding process, because they can learn other bids at very last moment which is too late to reassess bids.

In the second-price sealed-bid auction, each bidder independently submits their own bid, and winning bidder pays next highest bid. The main aim of this method is to encourage bidders to bid high by not taking others' evaluations into account in common value auctions.

Auction types above almost focus on the sale of a single indivisible unit. In recent years, auction literature pay attention to the sale of multiple units, such as treasury bills and spectrum rights (Ausubel, 1999; Back and Zender, 1993; Klemperer, 1999; McMillan, 1994; Milgrom, 1998).

In a simultaneous auction, each bidder offers a schedule specifying for each possible fraction of the item. After bids are taken and sorted from high to low, auctioned items are awarded at the highest bid prices until supply is exhausted.

Sequential auctions, are generally employed when no buyer is interested in or allowed to more than one unit. Each part of homogeneous units is sequentially auctioned, and the winning price of first unit becomes a base (reserve price) for next round.

4. Competition Policies in Auction Design

Following the analysis provided by Klemperer (2001) and within the aim of this study, competition policies oriented pitfalls in auction design can be collected under four headings among other things.

- a) Collusion,
- b) Entry deterrence,
- c) Predatory pricing.
- d) Winner's Curse

4.1. Collusion

Ascending and the second-price sealed bid auctions are more vulnerable than descending and the first-price sealed bid auction to collusion, especially "tacit" collusion⁴, because a cartel can easily punish the member breaking co-operation agreement in former group auction than in later group (Cramton, and Schwartz, 2000; Graham, and Marshall, 1987; Klemperer, 1999, and 2001; Milgrom, 1989).

Collusion agreement can be made both explicitly and implicitly. While explicit collusion agreements put restriction on the number of rivals, under implicit agreement the restriction is put on the price during auction process. In ascending auction, since bids made by rivals are observable to others, and bidding is a continuous process, if a cartel member exceeds pre-determined low collusion price, other members of cartel in response to this action can increase their bids as well. As a result, in ascending auctions the cartel members do not have incentive to break up co-operation agreement, since s/he does not benefit from this behavior.

By the same token, in second-price bid auction, since the owner of highest evaluation already submits her or his own bid and pays next highest bid, breaking cartel agreement and going beyond pre-determined low cartel price are not beneficial to any cartel member.

By contrast to former group auctions, in descending and first-price sealed bid auctions, since every bidder submits her or his *final* and *best* bid and can learn rival bids only at very last moment, they do not have a device to punish co-operation breaking member.

⁴ Explicit collusion is also a big concern in terms of the efficiency of auction. However, as Klemperer (2001) and OECD (1999) argue it should be a greater concern for the Competition Authorities to investigate under existing law.

4.2. Entry Deterrence

Klemperer (2001) argues that "as an auction with too few bidders will be both unprofitable for the auctioneer, and potentially inefficient, the major concern of an auction designer should be to attract more bidders to auction". Ascending auctions are often particularly poor in this respect as well.

It could strongly be presumed that a bidder which values the winning the most will be eventual winner, because even if it is outbid at an early stage it can and will eventually top any opposition. This strong presumption causes some bidder to deter the entry, or depress the bidding of rivals. Although an advantaged bidder will most probably win a sealed-bid auction, the outcome is less certain than in ascending auction because each bidder must make a single "*best and final*" offer in the face of uncertainty about its rivals' bid. So, since weaker firms have at least some chance of victory in a sealed-bid auction and potential entrants will likely be more willing to enter it than ascending auction (Klemperer, 2001).

4.3. Predatory Pricing

Predatory pricing is a deliberate strategy, usually by a dominant firm, of driving competitors out of the market by setting very low prices or selling below the firm's incremental costs of producing the output (often equated for practical purposes with average variable costs). Once the predator has successfully driven out competitors and deterred entry of new firms, it can raise prices and earn higher prices.

McMillan (1994) argues that "a bidder may try to derive prices for the early items up to excessive levels so the winners will be unable to afford to compete for the later items" in sequential auctions with homogenous multiple items being auctioned. Since simultaneous auctions allocate multiple items at the price offered by each winning bidder, no bidder does have incentive to raise her or his bid excessively high.

4.4. Winner's Curse

When the item being bid for has a common value the phenomenon dramatically named the winner's curse can arise (Klemperer, 1999; McAfee, and McMillan, 1987). Winner's curse in auctions occurs, when the winning bidder's estimation and bid go too much beyond the market consensus on the value of auctioned item. That's why, in many auctions, other rivals' perceptions about the auctioned item are quite informative to others.

If all bidders share the same information about the auctioned item, they would equally value it. The more a bidder's information about the item differentiates from other's, the more her or his estimation about item value will deviate. For this reason, bidders would like to protect themselves by bidding conservatively and prudently.

Since, bidders can observe others' valuation in ascending auctions and can not in sealed-bid auction, buyers may find it prudent to stay with, or exit an ascending price auction at more or less than their pre-auction estimate of value (Klemperer, 1999). However, the same opportunity is not valid in sealed-price auctions. Milgrom, and Weber (1982) demonstrates that expected revenue from auction is more in ascending and second-price auction, respectively than in sealed bid auction.

4. 5. Protecting Competition While Designing Auctions

The issues above are the pitfalls arising from auction design in the context of auction format. However an auction designer could deal with the aforementioned problems via different devices.

The main reason of using auction mechanism to sell an asset is information asymmetries about the value of asset being considered to sell, on one hand between seller and rivals; on the other hand between rivals.

When a seller is skeptical about the collusion between bidders, it can put a reasonably high reserve price to push bids up. However, unreasonably determined high reserve price will not attract new entrants willing to join the auction.

As mentioned above, attracting more bidders to auction will increase competition. McAfee, and McMillan (1987) argue that "increasing the number of bidders, so competition, increases the revenue of the seller on the average".

In addition to increasing competition, Mcmillan (1994) argues that "the government can increase its revenue by publicizing any available information that affects the licenses' assessed value: providing assurances about future regulatory developments, or announcing how much new spectrum will be allocated to telecommunications in the future".

5. The Developments in Turkish Cellular Phone Market

5.1. Initial Stage

In May 1993, TT awarded two 15-year contracts -not licenses- to build and operate cellular network based on the European GSM standard. Turkcell, a private-sector consortium including Telecom Finland, Turkey's Cukurova Holding, and Ericsson; and Telsim led by the Rumeli group, were chosen after an international tender. The contracts were built on a compound of revenue-sharing and build-operate-transfer (BOT) models. According to the initial agreements, the two consortia would be permitted to buy outright licenses for US\$ 500 million at each in April 1998. Turkcell and Telsim were granted 25-year licenses as a result of their capital investment, but were required to pay US\$ 500 million each as a license fee to the Treasury.⁵

5.2. Later stage

⁵ For initial stage developments, mainly benefited from MEC, 2001.

In April 2000 third national GSM license was awarded to Is-Tim for staggering US\$ 2.525 billion plus 17 per cent in value added tax (VAT) for a total price tag of US\$ 2.954 billion. The high price Is-Tim offered caught many market players -as well as government- by surprise⁶, especially given the huge gap between its bid and next higher offer of US\$ 1.350 billion (see Table:3).

Four bidders in the second tender withdrew all from the field dramatically. Comparing the GSM license price per head of population per MHz in several emerging markets in recent years implies that Is-Tim got one of the most expensive mobile licenses purchased to date (see Figure:2).

Mr. Ersin Ozince, CEO of Is Bankasi, responded the criticisms of that the price is quite high by saying "we did good job and are still behind our bid and it is going to be a success story". Mr. Enis Oksuz, the Minister of Transportation, by supporting Mr. Ozince's remark, said that "it is a world record and those who strategically think will eventually win" (Hurriyet, 4/14/2000).

While Mr. Ozince and Mr. Oksuz are characterizing the outcome of the auction as a success story, some including Klemperer (2001) have argued it was a *failure* rather than a *success*. Is-Tim made a bid far more for the first license than it could possibly worth if it had to compete with a rival holding the second license. Moreover, MEC (2001) "argues that the initial costs of network deployment, which could run as high as US\$ 2 billion, along with the realities of a slowing rate of subscriber expansion and stiff competition from well-entrenched incumbents cast doubts over whether Is-Tim paid a reasonable price for the license".

⁶ For example, the headlines of Turkey's leading newspapers were put such as "Shock Price" (Sabah, 4/13/2000; and "Record Price" (Hürriyet, 4/15/200).

In the remainder of the study, the characteristics of the Turkish GSM 1800 MHz auction will be analyzed in the light of both the features of Turkish cellular market and auction theory and competition policies.

6. Specifications of the GSM Auction

The basic specifications of the auction held on April 3, 2000 were as follows:

- Two GSM 1800 MHz licenses were to be auctioned.
- The conceding authority was the Ministry of Transportation.
- Incumbent operators were not allowed to enter the auction.
- The auction method was a first-price sealed bid auction which was to be sequentially held.
- Depending on the discretion of the conceding authority, after opening bids taken from the bidders, the owner of the highest bid and next highest bid might be invited to a competitive negotiation.
- After completing the first round of the sequential action, the rest of bidders were going to bid in a first-price sealed bid auction with a reserve price at the winning price of the first license.
- One GSM 1800 license was to be awarded to TT (state owned telecom monopoly) at the winning price of first license.

Moreover, the most importantly the auction was held seven years after two GSM 900 MHz had been awarded and in the face of the uncertainty of when, how and how many 3G license (s) would be awarded. We will come back to these issues while analyzing the outcome of the auction. For that time, one was able to argue that, after signing a three year stand-by agreement leading to restructuring the economy, Turkish markets were going to be more stable and predictable so that an investor would be likely to aggressively bid for a GSM 1800 MHz license. However, even aggressive bidders should bid by thinking strategically as Mr. Oksuz said.⁷

Since incumbent operators were not allowed to enter the auction, and there was seemingly no advantaged firm between bidders, the auction attracted sufficiently enough bidders -five bidders for two licenses. So, it can be said that, within competition framework analyzed above, there was no entry deterrence problem. On the other had, since the auction was first-price sealed-bid one, the tacit collusion concern which is effectively enforced in ascending and second-price sealed bid auctions seems to have been mitigated. However, predatory pricing and winner's curse issues still await to be answered.

7. Is the Outcome of the Auction Really Efficient?

As mentioned above, after first round Is-Tim made a staggering bid, the rest of bidders did not show up to bid for second license. As reported above, the outcome has had even interested persons' mind confused and itself a puzzle for many. As reported by Klemperer (2001), efficiency oriented awarding (auction) policies can be summarized under three headings.

- a) realizing the full economic value to consumers, industry and the taxpayer of the spectrum,

⁷ As a matter of fact, after collapsing IMF backed Turkish economic program in February 2001, unfortunately pessimists, not optimists about the future developments of Turkish economy have won.

- b) utilizing the available spectrums with optimum efficiency,
- c) promoting effective and sustainable competition for the provision of mobile phone services.

Under this taxonomy, Turkish GSM 1800 MHz license auction does not seem to result in an efficient outcome, because mobile phone market is unnecessarily concentrated because of not selling the second license. If the license fee was unnecessarily overvalued because of the auction design, we'll show the answer is likely *yes*, TT to be privatized was given liability more than it would be which could undermine its market value. Moreover, if selling two licenses would result in higher prices than selling one, the taxpayer of the spectrum would have benefited more. Put it this way, if this argument is correct, we'll show the answer is likely *yes*, overall welfare effect of Turkish GSM 1800 MHz license auction is negative. It's been not easy to argue at least the outcome of said auction is positive in terms of efficiency concern.

7.1. Is the license Fee Really High?

First of all, as seen in Figure:2, the winning bid made by Is-Tim is really high as compared to some other emerging markets. Is-Tim's bid (US\$2.70 per pop per MHz) in Turkey, a lower-middle-income country according to World Bank statistics, much higher than those in Mexico (US\$0,20); Argentina (US\$0,25); and; Hungary (US\$ 2,40) which are upper-middle-income countries within the same concept above, and more than even the bid made by incumbent operators, Turkcell and Telsim (US\$0,25). Given the fact that Is-Tim's bid relatively high, is it worth bidding high for a GSM 1800 licenses in Turkey? To be able to answer this let's look at some features of Turkey mobile phone markets.

Turkey's cellular phone market seemingly expands fast (Figure:3).However, this figures should cautiously be assessed. Firstly, the rate of subscriber expansion is to slow

during the coming years. Secondly, these figures seem very optimistic and show that in year 2005, 88 per cent (40 million) of Turkish population (45 million) between age 14 and 65 is going to have a cell-phone. When we look at GDP per capita (PPP) in Figure:4, Turkey with US\$ 6.300 GDP per capita (PPP) is the poorest country within OECD members. With this welfare level among other things, it would be a pretty optimistic view to expect the same developments in terms of consumer base expansion experienced by other OECD countries. Even if the figures relating to Turkish cellular market growth in Figure:3 are assumed as realistic, Figure:5 shows another aspect of telecom story. According to these figures, Turkish people *do* or *can* not seemingly pay for phone-calls as much as other OECD member country citizens do. Turkey's per capita public telecommunication revenue (fixed+mobile) is the lowest one (US\$143) within OECD countries⁸ (Figure:5). Moreover, more truth-telling story comes from Figure:6. Not surprisingly, Turkish subscribers *do* or *can* not pay much for mobile phone bills either.⁹

On the other hand, it can be reasonably argued, the increasing competition with new entrants into market prices, will cause some decline in cellular phone bills, so the revenue of cellular phone companies because of lower calling prices.

As a result of these figures, at least one certain finding can be argued that no easy money awaits in Turkish cell markets for one to invest aggressively much in sunk costs such as license fee.

7.2. The Intuition Behind Is-Tim's Strategy!

⁸ Of course these figures do not demonstrate price differences across countries.

⁹ In fact in these figures Telsim, one of two incumbent operators with 30 per cent market share in 1999, was not included. Even if we linearly increase the revenue of per subscriber by 30 per cent to US\$ 290, by thinking

At this stage, the question of why Is-Tim made a high bid is in need of being answered. Whether is Is-Tim winner's curse in the context of auction theory or predatory pricer in the context of competition policies?

Before going further, one more thing is certainly raised or concluded from even this question. Did Is-Tim gamble? Corporate governance theory dictates that in developing countries with weak bankruptcy policies¹⁰ and too big to fail doctrine, which is an implicit guarantee scheme provided by government's to those firms facing a bankruptcy risk¹¹, firms could easily take an excessive risk by creating moral hazard. Within this framework, Is-Tim's bidding strategy seems to go along with what corporate governance theory argues.¹²

By accepting at least that Is-Tim has had a risk taker strategy¹³, we should turn to aforementioned questions: why did it do so? Table:3 shows all bids made in the auction. However, before starting the analyze of the figures, we should *firstly* note that no one had known before auction, when, how and how many 3G licenses would be awarded. These uncertain future developments make bidders conservative to bid less than what they would according to auction theory.

Secondly, according to specifications of auction as mentioned above, the conceding authority had great discretion to invite the owner of the highest bid and next highest bid to an

simply to ease analysis, it is going to be just over that of Iceland (US\$ 267) and that of Portugal (US \$ 275) the statue of Turkey in ranks will not dramatically change.

¹⁰ See Atiyas, 1996.

¹¹ See Joon-Ho, and Mishkin, 2000; Mishkin, 2001.

¹² It will indeed be more transparent, if Is-Tim cries and lobbies by complaining it had invested too much in sunk cost, *before the allocation of 3G licenses*.

¹³ Indeed, bidding high in auctions dictates in auction theory that high bidding bidder is risk averse, since failing in an auction means losing some positive profit. I use the term risk taker herein to explain risks in cell-phone market rather than in auction market of awarding GSM 1800 MHz licenses.

ascending auction after opening bids taken from the bidders. According to auction theory¹⁴, this type of rules make bidders anxious to disclose their true evaluation about the auctioned object during first round, because of lack of commitment of the auctioneer (put it this way because of more discretion of the auctioneer).

Thirdly, the conceding authority put insufficiently low reserve price (US\$ 600 million) which somehow shows the auctioneer's valuation about the auctioned object; and this reserve price was corrected and supported government budget revenue estimation (US\$ 523 million) in 2000 Public Budget.

These three points (i.e. uncertainty about future developments in the cellular phone market, great discretion of auctioneer, and low reserve price), possibly made bidders conservative. Hence, it could be assumed that bidders excluding Is-Tim were most likely to be able raise their bids but not more than the highest bid by Is-Tim. The figures in Table:3 should be assessed along with these findings.

As seen in Table:3, without Is-Tim, the mean bid of remaining bidders is around US\$ 1,2 billion and second highest bid is US\$ 1,350 billion. Other than second highest bid, we still have two bids above the mean of bids of those excluding Is-Tim. According to market consensus resulting from the auction, it could be said that even if Is-Tim withdrew from an *hypothetical ascending auction*, at least two bidders were willing to purchase two licenses at second (US\$1,350 billion) and third highest (US\$1,224 billion) price the sum of which (US\$2,574 billion) is still higher than that of Is-Tim (US\$2,525 billion). One can argue that after overcoming the aforementioned obstacles and using an simultaneous ascending auction with a sufficient reserve price, second and third highest bids could have been pushed up. Of course, if Is-Tim had been sincere with its strategy, the bids could have been gone up more but still not than Is-Tim's original bid.

¹⁴ See, McAfee, and McMillan, 1987.

Having said that we have still two eager bidders willing to get two license, the intuition of Is-Tim's strategy and bid could be explained as follows: without Is-Tim, market valuation of two licenses is around US\$ 2,4 million and slightly less than that of Is-Tim. As argued by McMillan (1994), Is-Tim seemingly derived price for first license up to excessive level so the others would be unable to afford to compete for second license in sequential auction. Even if Is-Tim is not predatory pricer, it is supposed to be winner's curse given the fact that it paid too much in the light of the findings above.

GSM 1800 MHz operators have arrived much later in market than their GSM 900 MHz rivals, Turkcell and Telsim who have already signed up the "*best*" customers; and they must invest more heavily in their networks than their incumbent rivals. So, GSM 1800 MHz operators in Turkey have already had disadvantages as compared to incumbent operators. If three licenses had been sold out, there would have been three succeeded GSM 1800 MHz operators plus two incumbent operators; so, five players in the market; and stiffer competition than in a market with four players. Given the fact that no new entrant would like to compete aggressively in the market, predatory pricing to deter rivals' entrance into market during competition for market (i.e. auction) will benefit remaining market players.

Although, four operators in the market will equally benefit from getting one potential rival out of market, only Is-Tim had a means of doing this as an active bidder. As mentioned above, other market players TT, Turkcell and Telsim were not an active participant of the auction.

It should most importantly be stressed, although no one other than Is-Tim's bid preparing team can know insight of the real bidding strategy¹⁵, the intuition behind Is-Tim's

¹⁵ If IS-Tim consortia will demand supportive arrangements for itself in 3G licenses auction process, since it's had a great financial burden because of high GSM 1800 MHz license fee payment in April 2000 auction, the argument of this study will be corrected. Otherwise, we will still need to seek appropriate values of selling of spectrum rights in Turkey.

bid is supposed to be one of two evils predatory pricing and winner's curse both of which undermine total social welfare, according to analysis provided above.

In conclusion if an ascending price auction (possibly backed by a sealed bid component¹⁶ at later stage to discourage collusion and encourage new entrants) was held by the conceding authority, the outcome was going to be better in terms of efficiency. Put it this way,

- (a) public revenue from selling spectrum would be more than what it is;
- (b) one more license would be sold and market concentration would be less than what it is; and
- (c) TT would have less liability than what it has.

8. Conclusions and Lessons for Awarding Mechanism of 3G Licenses

As mentioned above the auctioning authority was the Ministry of Transportation. As indicated by Klemperer (2000b and 2000c) the one of main reasons of why the auction is chosen over beauty contest is the fear of allegations of favoritism and corruption. Indeed, right after auction outcomes had appeared, Mr. Oksuz, the Minister of Transportation said that "our honest auction argument has been corrected, and no one can accuse us of favoritism and corruption" (Hurriyet, 4/14/2000). What this statement shows is Mr. Oksuz's reasonable anxiety against potential allegation of favoritism and corruption. What else from this statement could be derived? Politicians in developing countries are under pressure while allocating public assets. That's why their main concern is the explanatory power of any outcome resulting from an awarding process rather than the correct market value of awarded asset.

¹⁶ Called as *Anglo-Dutch Auction* by Klemperer (2001) which is a combination of ascending and sealed bid auction.

What we can derive from this analysis is, if Anglo-Dutch Auction proposed by Klemperer (2001) instead of a sequential auction had been held, and two operators had been awarded at different prices (may be, the gap between the prices would be huge at sealed bid stage), Minister as a vote-maximization politician would have been likely to have a hard time to explain why winning prices are so different from each other. That's why, as argued by Joskow (1998), commercial public assets in infrastructure sectors should be managed by independent, expert, transparent and accountable regulators.

Second lesson from Turkish GSM 1800 MHz license auction is that, the conceding authority should publicize any available information that affects the licenses' assessed value: providing assurances about future regulatory developments, or announcing how much new spectrum will be allocated to telecommunications in the future. No one still¹⁷ knows about when, how and how many 3G license(s) will be awarded, and what the future structure of TT state owned monopoly and the owner of a GSM 1800 MHz license is going to be. In this regard, 3G related policies should be made clear and public as soon as possible. To lower market concentration, which has unnecessarily been increased as a result of the GSM 1800 MHz auction, and promote competition in 3G auctions, as done in many countries (see Table:1) the number of licenses to be auctioned should be assigned more (at least five) than the number of incumbent operators (four).

Thirdly, the conceding authority should assess well what, when and to whom it sells. After collecting and analyzing the information dealing with these concerns, the conceding authority should determine correct auction format and put a reasonable reserve price. On the other hand, new regulator, The Telecommunication Authority should make the future regulatory rules clear and publicize them.

Finally, and the most importantly, the gambling (i.e. taking excessive risk) via moral hazard should not be costless. That's why, Turkish Bankruptcy Law should be improved and

¹⁷ When this study is written.

efficiently enforced. Following this, the implicit government guarantee schemes arising from so called too big to fail doctrine should not be resorted to bail out insolvent firms.

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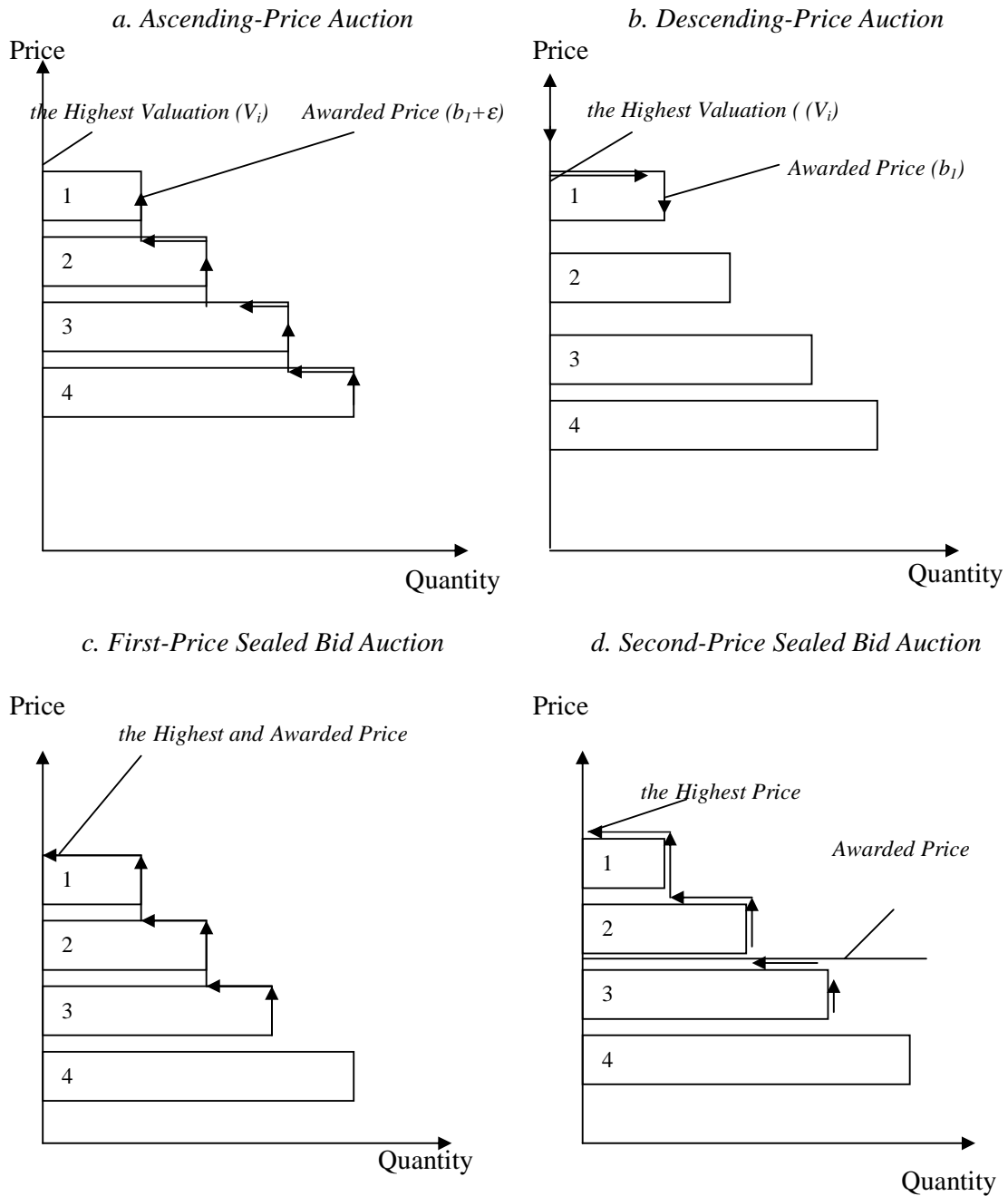
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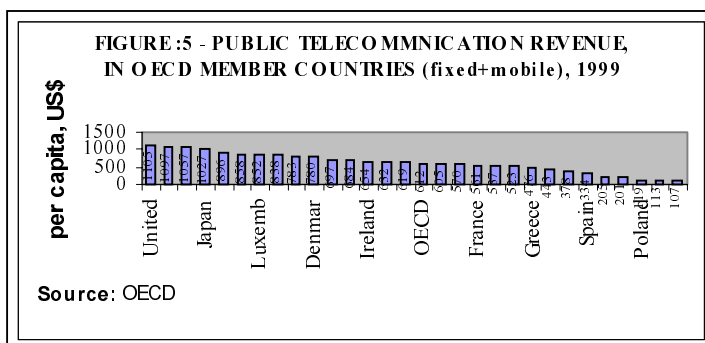
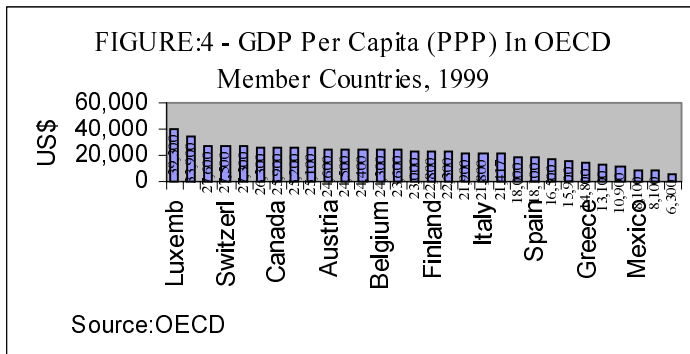
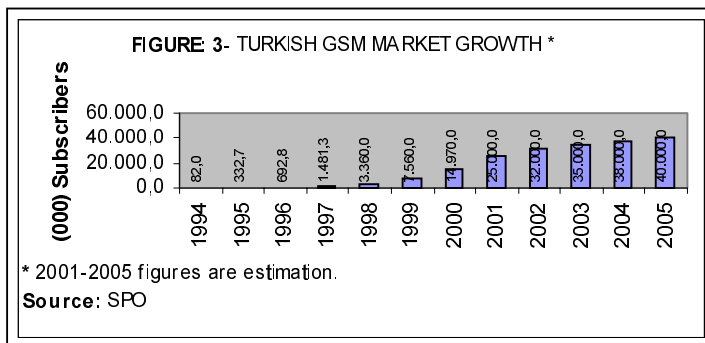
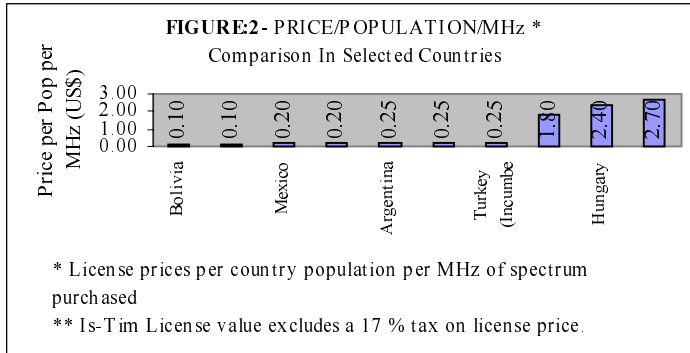
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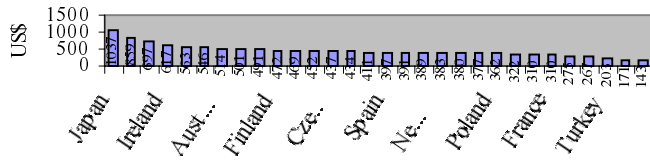
FIGURE: 1- AUCTION FORMATS



Source :Feldman and Mehra (1993) is slightly revised by myself.



**FIGURE 6: CELLULAR MOBILE TELECOMMUNICATION REVENUE
PER CELLULAR MOBILE SUBSCRIBER
IN OECD MEMBER COUNTRIES, 1999 ***



* Data are missing for the following countries: Iceland (Iceland), Netherlands (Dutch), Belgium, Luxembourg (P&T), Turkey (Telsim). Telsim's share of market in 1999 is %30.

TABLE:1- THE AWARDING METHOD AND THE NUMBER OF 3G LICENSES

Auction	# of Awarded Licenses	Beauty Contest	# of Awarded Licenses
Austria ^α	6	China ^β	3
Australia ^α	6	Estonia ^β	4
Belgium ^α	4	Finland ^α	4
Canada ^α	3	France ^α	4
Czech Republic ^β	4	Iceland ^β	4
Denmark ^β	4	Ireland ^β	4
Germany ^α	6	Malaysia ^β	NA
Greece ^α	4	Luxemburg ^β	4
Hong Kong ^β	4-6	Norway ^α	4
Indonesia ^β	3-5	Portugal ^α	4
Italy ^α	5	Slovakia ^β	3
Israel ^β	4	Spain ^α	4
Jamaica ^β	2	Sweden ^α	4
New Zealand ^α	3	South Korea ^α	2-3
Taiwan ^β	5		
Singapore ^α	4		
Poland ^β	5		
UK ^α	5		
Switzerland ^α	4		
Netherlands ^α	5		
USA ^β	NA		
TOTAL:21		TOTAL: 14	
^α :12		^α :7	
^β :9		^β :7	

^α complete

^β incomplete

Source: Cellular News, and UMTS, as of June 2001.

TABLE: 2- CHARACTERISTICS OF DIFFERENT TYPES OF AUCTIONS

TYPE	RULES	STRATEGY	EXPECTED PAYOFFS
English, Ascending-Price, or Open-Bid-Auction	Seller announces initial low bid, which is progressively increased until demand falls to match the fixed amount at auction. It is important to note that bidders are able to reassess bids during the bidding process.	Bidder's strategy is a function of (a) personal valuation, (b) prior assessment of rival valuations, and (c) new information obtained from the bidding process.	Bidder's valuation of auctioned item(s) minus his or her highest bid. Payoff = (V₁-b₂) V ₁ = Winning bidder's valuation. b ₁ = Winning bid (<i>running up bid + ε</i>)
Dutch, Descending-Price, or Open-Bid Auction	Seller announces initial high bid, which is progressively lowered until demand rises to match the fixed amount at auction.	Bidder's strategy is a function of (a) personal valuation, (b) prior assessment of rival valuations, and (c) <i>no</i> new information obtained from the bidding process.	Bidder's valuation of auctioned item(s) minus his or her highest bid. Payoff = (V₁-b₂) V ₁ = Winning bidder's valuation. b ₁ = Winning bid (<i>running up bid + ε</i>)
First-Price Sealed-Bid Auction; or with Multiple Objects, Discriminatory Auction	Bidders submit written bids in ignorance of all others. Highest bidder wins the item and pays the amount bid.	Same as for Dutch auction above.	Same as for Dutch auction above.
Second-Price Sealed-Bid Auction; or with Multiple Objects, Uniform Price Auction (Vickrey Auction)	Bidders submit written bids in ignorance of all others. Highest bidder wins the item and pays the amount of the <i>second</i> highest bid.	Same as for Dutch auction above.	Bidder's valuation of auctioned item(s) minus second highest bid Payoff = (V₁-b₂) V ₁ = Winning bidder's valuation. b ₂ = Second highest bid

Source :Feldman and Mehra (1993) is slightly revised by myself.

TABLE:3- BIDS for GSM 1800 MHz LICENSE in TURKEY, US\$ *

1. Is Bankasi-Telecom Italia	2.525.000.000
2. Dogan Holding-Dogus Holding-Sabancı Holding-Spain Telefonica	1.350.000.000
3. Genpa-Atlas Yapi-Atlas Finans-Demirbank- Norway Telenor Mobile Communications	1.224.000.000
4. Koc Holding-Medya Holding-SBC Communications	1.207.000.000
5. Fiba Holding-Suzer Holding-Finansbank-Kentbank-French Telecom	1.017.000.000
Mean (including 1)	<i>1.464.600.000</i>
Mean (excluding 1)	<i>1.199.500.000</i>
6.Reserve Price announced by Ministry of Transportation	600.000.000
7. Budget Revenue Estimation by Government	523.532.799

* Figures do not include 17 per cent VAT

Source: Press Release by Ministry of Transportation

Budget revenue estimation is my own calculation.