



BIDDING MARKETS

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Abstract

The existence of a 'bidding market' is commonly cited as a reason to tolerate the creation or maintenance of highly concentrated markets. We discuss three erroneous arguments to that effect: the 'consultants' fallacy' that 'market power is impossible', the 'academics' fallacy' that (often) 'market power does not matter', and the 'regulators' fallacy' that 'intervention against pernicious market power is unnecessary', in markets characterized by auctions or bidding processes.

Furthermore we argue that the term 'bidding market' as it is widely used in antitrust is unhelpful or misleading. Auctions and bidding processes do have some special features—including their price formation processes, common-values behaviour, and bid-taker power—but the significance of these features has been overemphasized, and they often imply a need for stricter rather than more lenient competition policy. © Paul Klemperer, 2004, 2005

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*These views are personal and should not be attributed to the UK Competition Commission or to any individual Member other than myself. I had neither any advisory nor any decision-making role in any of the Competition Commission cases discussed below. Furthermore, although some observers thought some of the behaviour described below warranted regulatory investigation, I do not intend to suggest that any of it violates any applicable rules or laws. I am very grateful to all the consultants, academics, and regulators, who have helped and advised me on this paper. Special thanks are due to Claes Bengtsson, John Davies, Giulio Federico, Christian Kobaldt, Daniel Marszalec, Marco Pagnozzi, David Reitman, Amanda Rowlatt, Max Tse, and Mark Williams.

Contents

1. Introduction
 2. Auctions vs 'bidding markets'
 - 2.1 (Ideal) 'bidding markets'
 - 2.2 Auctions and 'bidding markets'
 3. How auctions and bidding processes are like 'ordinary' markets
 - 3.1 Dominance
 - 3.2 Coordinated effects
 - 3.3 Unilateral effects
 4. Bidding rules and procedures
 - 4.1 Price formation in auctions and bidding processes
 - Formal auctions*
 - Informal bidding processes*
 - 4.2 Ascending auctions vs sealed-bid and ordinary markets I: efficiency
 - 4.3 Ascending auctions vs sealed-bid and ordinary markets II: entry
 - 4.4 Formal rules facilitate communication
 - 4.5 Ascending auctions vs sealed-bid and ordinary markets III: collusion
 - One-off markets*
 - Market division*
 - How many bidders are enough?*
 5. Common values
 - 5.1 Common values and collusion
 - 5.2 Common values and predation
 6. Bid-taker power
 - 6.1 Tailoring the rules
 - Sealed-bid auctions*
 - Anglo-Dutch auctions*
 - Fine-Tuning ascending auctions*
 - Other new procedures*
 - Secrecy*
 - Reserve prices*
 - Discrimination*
 - Bundling and packaging*
 - Controlling resale*
 - Antitrust rules*
 - 6.2 Constraints on bid-taker power
 7. Other antitrust issues
 - Efficiencies in mergers*
 - Merger simulation*
 - Detecting collusion*
 - Enforcement*
 8. Conclusion
- References

1. Introduction

The rise of e-commerce, government privatizations, and both public and private outsourcing has greatly increased the role of auctions in the economy.¹ At the same time auctions are often regarded as ‘different’ from ordinary markets, and antitrust policy is often conspicuous by its absence.

Similarly, many market transactions, especially business-to-business, are conducted through informal bidding processes, but it is often claimed that these ‘bidding markets’ have such desirable features that ordinary competition policy concerns do not apply. Moreover, it has become commonplace for companies to contend that they compete primarily in ‘bidding markets’ and that there is therefore little need for further antitrust scrutiny.² Perhaps because of the frequency with which such arguments have been made, they seem also to have seeped into some antitrust agency thinking, and ‘the existence of a bidding market is a commonly cited reason by competition authorities to tolerate the creation or maintenance of highly concentrated markets’ (UK Office of Fair Trading 2004a, paragraph 5.33).³

Three distinct strands of thought seem to lie behind the widespread view that antitrust can safely ignore markets conducted through bidding processes:

First are the claims, heavily pushed by legal and economic consulting firms, that in ‘bidding markets’, market share does not imply market power; that the existence of two firms is enough to imply perfect competition, or even that just one firm is enough.

Second, some academic literature argues that collusion, cartels and mergers can actually be desirable in an important class of auctions.

Finally, some regulators have themselves contended that even if market power can in principle be both present and pernicious in auctions and bidding processes, there is nevertheless often no need for regulatory intervention.

This paper explores and—I hope—explodes these myths. More generally, this paper analyses the (limited) extent to which the special features of auctions and bidding processes mean that competition policy should indeed be different than in ‘ordinary’ economic markets.

We begin with the ‘consultants’ fallacy’ that (roughly) ‘market power is impossible’ in a bidding market.⁴ We discuss the characteristics that are often claimed for bidding markets, and notes that the extreme assumptions of an idealized bidding market can indeed yield the extreme conclusions that are often claimed for them. However, neither many auctions, nor many more informal bidding processes, satisfy all these extreme assumptions, and once we relax any of them we are quickly back into the familiar world of problems of dominance and unilateral and coordinated effects.

Furthermore, the characteristics of (imperfect) bidding markets that cause these problems are the standard ones that are commonplace in the checklists that competition authorities use worldwide to identify these problems in ‘ordinary markets’.

¹See *Auctions: Theory and Practice*, Klemperer (2004). Chapter 1 is an introduction to the theory of auctions. See also Klemperer (2000).

²This has been argued in at least five cases before the UK Competition Commission in the last year.

³The UK Office of Fair Trading has identified bidding markets in about one-quarter of the merger cases it has handled since it started publishing decisions in 2000.

⁴It is expressed almost this extremely in some consultants’ submissions to the competition authorities.

The ‘academics’ fallacy’ that (often) ‘market power does not matter’ in an auction⁵ starts from the fact that auctions and bidding processes are often used precisely because different market participants have different, and poor, information. In these settings each bidder has to worry about the ‘winner’s curse’ that it is more likely to win the auction when its rivals have discouraging information about the value of the prize. So bidders are more cautious than if they were more confident about their own information. In this context a cartel or merger that allows bidders access to more information reduces their winner’s curses and so, it is argued, makes them bid more aggressively. Unfortunately this analysis is incomplete: we show this so-called ‘common-value’ effect does not much affect the overall costs of collusion to the bid-taker. More generally, we emphasize that in either the ‘common values’ or the (more standard) ‘private values’ case, the clear formal rules of auctions can facilitate predation and collusion.

Furthermore, markets that operate through ‘ascending’ auctions can be both more conducive to coordinated effects and collusion, and less attractive to potential entrants (especially in the ‘common values’ case), than either markets with ‘sealed-bid’ processes or ‘ordinary’ markets. These issues have become more significant since the ease of running ascending auctions over the internet has made them far more common than previously, when it was harder to conduct them unless bidders were physically in the same location.

Finally, the ‘regulators’ fallacy’ that (put in extreme form) ‘intervention against pernicious market power is unnecessary’ contains some truth: it is based on the view that bid-takers’ power to set the rules and procedures of the auction can resolve any competitive problems.⁶ However, if the bid-taker cannot commit to its future behaviour, or is susceptible to lobbying, that can undermine its power. Moreover, the bid-taker is often severely restricted by legal and political constraints, or its own organizational structure (this is particularly likely if the bid-taker is a government agency). It is true that with enough care and determination it is usually possible to design an auction that can overcome all these problems,⁷ but it is often unrealistic to expect this to be achieved in practice. Competition policy must sometimes take the decision-making structure of other organizations as given—just as it must sometimes accept the current industrial structure. In short, we should not be overly sanguine about what bid-taker power can achieve.

Section 2 gives a typical definition of an ideal ‘bidding market’, but shows that auctions and bidding processes are often far from this ideal, and section 3 argues that the resulting competition problems are therefore essentially the same as those of ‘ordinary’ markets. The remainder of the paper discusses the limited differences. Section 4 outlines the special price-formation process in auctions and bidding processes, and shows how their clearly defined rules often facilitate anti-competitive behaviour, especially in ascending auctions. Section 5 demonstrates that cartels and mergers are probably no less damaging to bid-takers in ‘common-value’ auctions than ordinarily, while the predatory and entry deterring possibilities are greater, so the existence of common values is probably an argument for tougher rather than more lenient competition policy. Section 6 shows how bid-takers’ monopsonistic power to set the rules of bidding contests can in principle mitigate the competition

⁵Of course, none of my academic colleagues would dream of expressing this statement without hedging it around with many qualifications; the danger is that the qualifications get lost as the ideas enter the policy arena.

⁶This is the fallacy that is least easy to pin on any one group. But I have heard it more often in debates about public policy (albeit from policy-makers pushing for less regulation) than either from advocates in specific cases, or in more academic fora. Perhaps it should be called the ‘deregulator’s fallacy’. Certainly, as will become clear, I exempt my colleagues at the UK Competition Commission from this error.

⁷The UK 3G auction (that Ken Binmore and I designed) overcame challenges of most of these kinds, but that auction design process lasted over two years and was for an auction worth billions of pounds (see Binmore and Klempner (2002)).

problems, but why this power is often much less effective in practice. Section 7 briefly discusses a number of special topics, and section 8 concludes.

2. Auctions vs ‘bidding markets’

We begin by discussing the features that are often associated with ‘bidding markets’, and the extent to which they are found in auctions and bidding processes.

2.1 (Ideal) ‘bidding markets’

While the term ‘bidding market’ is frequently used informally, there seems to be no agreed definition of one.⁸ However, Patterson and Shapiro (2001) write ‘the [European] Commission described a true bidding market as one where ‘tenders take place infrequently, while the value of each individual contract is usually very significant. Contracts are typically awarded to a single successful bidder (so-called “winner-takes-all” principle),’ and although it can be debated whether the European Commission actually intended this to be a general definition of a ‘bidding market’, this is certainly a common interpretation.⁹ That is, the term is associated with contests where:

- (1) Competition is ‘winner take all’, so each supplier either wins all or none of the order. There is therefore no smooth trade-off between the price offered and the quantity sold.¹⁰ (This is the last part of the European Commission’s definition quoted above.)
- (2) Competition is ‘lumpy’. That is, each contest is large relative to a supplier’s total sales in a period, so that there is an element of ‘bet your company’ in any contest. (Or, in the European Commission’s definition quoted above, ‘the value of each individual contract is usually very significant’.)
- (3) ‘Competition begins afresh for each contract, and for each customer’. That is, if there is any repetition of a contest, there is no ‘lock-in’ by which the outcome of one contest importantly determines another. (This corresponds roughly to the part of the European Commission’s definition quoted above ‘tenders take place infrequently’, together with its statement elsewhere that ‘in bidding markets, market shares may not be informative of the likely competitive impact of a merger’.^{11 12})

Sometimes a fourth characteristic is assumed either implicitly or explicitly:

- (4*) Entry of new suppliers into the market is easy.¹³

⁸I will use the term ‘market’ in an informal economic sense. I am not intending to delimit formal antitrust markets. See footnote 23.

⁹Patterson and Shapiro have quoted the European Commission’s statement from Pirelli/BICC merger (European Commission, 2000). Shapiro had left his position as chief economist at the US Department of Justice at the time of writing.

¹⁰Or quantity bought, if the contestants are potential buyers. Whether the bidders are suppliers competing to sell, or purchasers competing to buy, makes no difference to the economic analysis.

¹¹Draft notice on horizontal mergers (European Commission, 2002 para 14).

¹²It fits even more closely with parties’ arguments I have seen (but not accepted) at the UK Competition Commission that, for example, ‘in a pure bidding market, the obstacles to switching from one supplier to another are low, and every tender is a new contest to be won solely on the merits of the bid’. In publicly-available testimony in another case (in which I was not involved) before the Competition Commission, Arcelor said ‘the supply of steel sheet piling in the UK has ... the characteristics of a ‘bidding market’ [that] there are no switching costs between piling from different manufacturers; and most orders are tendered for, project-by-project so that, in consequence, market shares in this case do not offer any significant indication of market power.’ See UK Competition Commission (2005, para 6.48). Similarly, Owen (2004) writes “A bidding market is one in which the competitive significance of each firm, ... , is not correlated with its past success and not limited by its current capacity”.

¹³Typical parties’ arguments I have seen (and rejected) at the UK Competition Commission include that ‘because a market is a bidding market it is easy for non-incumbents to win contracts—most or all sales could easily be lost to a competitor in the next round—so existing market shares are of little relevance’. For example, in publicly-available testimony of a case (in which I had no involvement) before the Competition Commission, Dräger submitted that ‘The existence of a bidding market makes the

Finally, users of the term 'bidding market' typically implicitly or explicitly assume:

(5) A 'bidding system' or 'bidding process' is involved.¹⁴

Note that assumption (5) is a description of the price-formation process whereas assumptions (1) to (4*) reflect deeper structural features of the market.¹⁵

The kind of example often offered as a prototypical bidding market is a large, indivisible, defence contract for a major weapons system (though this would probably not satisfy the additional assumption (4*)). At the opposite extreme, competition between supermarkets for consumers exhibits none of these features. Of course, many markets lie between the extremes.

Clearly these assumptions neatly lead to the conclusion that there are few antitrust problems in bidding markets:

With two identical firms, characteristics (1) to (3) perfectly fit a once-and-for-all, Bertrand (price-setting), competition for a single consumer who accepts the lowest offered price. Such a competition is, of course, also equivalent to the standard Bertrand competition in a homogenous-product market with many consumers that is described in elementary text-books.

It is straightforward that the existence of two identical firms is indeed sufficient for perfect competition (assuming constant marginal costs and no capacity constraints), and that historic market shares imply neither future success nor market power.¹⁶

If we add the 'easy entry' assumption, (4*), we have described a perfectly contestable market (as described by Baumol, Panzar, and Willig (1982)), and in this case it follows that an optimal outcome is obtained even when only one firm is actually present.

Thus, using (1) to (3), or (1) to (4*) to define a bidding market, it makes sense that 'the existence of a bidding market is a commonly cited reason by competition authorities to tolerate the creation or maintenance of highly concentrated markets' (UK Office of Fair Trading (2004a, para 5.33)).

2.2 Auctions and 'bidding markets'

The question, of course, is the extent to which the real markets that are described as 'bidding markets' in practice actually correspond to the idealized markets described by (1) to (3) or (1) to (4*). In fact, as we now discuss, many markets associated with

relevance of historic market shares questionable ... The sales process allows competitors to showcase their products on an equal footing with established players. ... Purchases are made by tender process and as such all potential competitors have the chance to offer a contract to supply ...'. See UK Competition Commission (2004b).

¹⁴For example, Lexecon (2003) writes '... In many industries, firms purchase services or products through a bidding system ... The 'all or nothing' characteristic of such markets implies ... in particular when the size of the tender is high relative to the size of the bidder and when new tenders are infrequent ...', thus combining (5) with statements with the flavour of (1), (2), and (3), respectively.

¹⁵The other assumptions can also depend on the details of price formation. For example, (4*) (like the theory of contestability) may partly depend on incumbents' prices responding only slowly to new entry.

¹⁶To take just one example of the use of this logic, in one recently completed case at the UK Competition Commission, one of the merging parties submitted that 'the CLSM/MPR and MPLSM sectors should be characterised as bidding markets. As a result, a competition assessment based on the analysis of market shares is not useful for assessing the level of competition in these markets, as market shares are not indicative of market power ... any increase of share resulting from the merger is irrelevant due to the existence of the bidding market.' See UK Competition Commission (2004a).

The UK Office of Fair Trading (2004b) is correct to write in its current guideline on the assessment of market power 'if competition at the bidding stage is effective, ... currently higher market share would not necessarily reflect market power.' The European Commission (2002) was treading more dangerous ground when it wrote that 'in bidding markets, market shares may not be informative of the likely competitive impact of a merger'—the problem of course comes when the UK Office of Fair Trading's qualifying statement, or the EC's 'may', is omitted.

bidding systems or auctions (ie markets satisfying (5)) violate at least one of (1) to (3), while (4*) may very often not be satisfied and, in particular, may apply only rarely when (1) and (2) also apply.

First, many formal auction processes are multi-unit auctions with several winners, so violate the 'winner take all' condition (1). In particular, in a uniform-price auction, or in a simultaneous-ascending auction for multiple homogenous units, all bidders receive (essentially) the same price and any bidder who lowers his quantity offer can improve his terms of trade (and the terms of trade for all winners). These auctions are common for, eg electricity, financial securities and radiospectrum though some of them—for example a one-off sale of radiospectrum by the government—may well satisfy conditions (2) and (3).

Furthermore even many *single*-unit sealed-bid auctions effectively violate condition (1): if a bidder cannot predict the required level of a winning bid (perhaps because the bidder doesn't know its opponents' costs, or perhaps because bidders' products or services are differentiated so that it is not clear how the bid-taker will respond to any given price difference) then the bidder faces a trade-off between the price and the *expected* quantity sold. If bidders are risk-neutral, the effects on price-setting behaviour and the incentives to exploit market power are identical to the case in which there is a smooth trade-off between price and actual quantity. And even if bidders are risk-averse there is no fundamental difference.¹⁷

Transactions in many industries are characterized by more or less formal bidding processes that may perhaps satisfy (1) and (3) but not the 'lumpy competition' assumption, (2). For example, the supply of consulting, architectural, building, or other professional services, or contracts to supply retailers, or the supply of steel pilings (as in the UK Competition Commission's recent investigation of Arcelor/Corus) might all be characterized by many small essentially independent contracts and so fail (at least) criterion (2).

On the other hand, a contract to supply information technology to a large public health authority such as the UK National Health Service, or competition for a rail or bus franchise, or to run the UK National Lottery, might satisfy (1) and (2), but not (3), because whichever company wins the current contract will have a significant advantage in winning a subsequent competition when the current technology needs updating or the current franchise expires. The winning bidder may also have an advantage in similar contests in other jurisdictions.

Indeed, the 'every competition begins afresh' condition (3) is quite likely not to apply if there is repetition of an auction or bidding process, especially if (1) and (2) do apply. The reasons for holding an auction include that there is poor information about the right price, in which case the winner of the first contract learns valuable information about how to bid in future, which makes entering to compete with him very dangerous—see our discussion on 'common values' in section 5 below. If (1) applies, so there is only one winner, that single winner may gain a learning-by-doing advantage. And if (1) and (2) both apply, this may be because of economics of scale deriving from sunk costs, again, contradicting (3).

Many auctions fail the 'easy entry' assumption, (4*). Of course, many auctions that fail (3), eg because of lock-in, fail (4*) for the same reasons. More important, satisfying (1) to (3) is likely to be associated with new entry being hard, ie assumption (4*) failing, for several reasons: first, the investment and organization required to

¹⁷That is, there is still a smooth tradeoff between price and the bidtaker's expected utility.

credibly demonstrate to a bid-taker the ability to enter the market on the large ‘lumpy competition’ scale implied by (2), is likely to require at least some sunk costs. If it is efficient to have a single winner, as suggested by (1), the economies of scale this implies may derive from sunk costs that again make entry hard. The very fact that there will be only a single winner blocks small-scale entry that an incumbent might otherwise accommodate, and guarantees any potential entrant a fierce reception. More generally, if (1) to (3) apply so competition would be very fierce with two or more firms, then entry is not very attractive to a second firm even if a single incumbent is currently earning substantial rents. So relatively small barriers to entry may successfully deter entry, and assumption (4*) fails more easily than if (1) to (3) did not hold.

Some auctions may satisfy *none* of our criteria. For example, the repeated auctions that characterize many modern electricity wholesale markets clearly violate (1), (2) and (4*), and also—because of the effects of the frequent repetition on bidders’ strategic behaviour—often violate (3). The same may apply to some financial-securities auctions.

Indeed whether or not the detailed process of price formation is an auction—ie (5) holds—may be a completely academic point. For example, airline tickets are sold both through traditional non-auction retail routes, and through priceline.com’s auction procedure in which each consumer first enters details of a proposed itinerary and airlines then bid electronically to offer the best schedule and fare.¹⁸ But, although airlines nominally bid for each customer individually in priceline’s auction, they must in practice have pre-specified rules that automatically determine their responses to particular requested itineraries, just as in their traditional retailing.¹⁹ Furthermore this market (whether run using a formal bidding process or not) seems little different from our example of supermarket pricing which exemplified the *opposite* of a bidding market and satisfies *none* of (1) to (4*): setting a slightly higher fare for a particular offering slightly reduces an airline’s sales in just the same way as it would slightly reduce a supermarket’s sales;²⁰ no single transaction is significant; previous sales affect the likelihood of future sales (if only because of the existence of frequent-flyer programmes, etc.); and, contrary to views expressed in the 1980s, it is now generally accepted that there are substantial sunk costs of entering the air travel market.

In short, just like ‘ordinary’ economic markets, auction markets cover a wide spectrum from being close to the ideal ‘bidding market’ described above, to being very far away from it.

So using the term ‘bidding market’ as it is now widely used, to mean either ‘Bertrand market’ (restricting to assumptions (1) to (3)), or ‘contestable market’ (if the ‘easy entry’ assumption (4*) is added), seems, at best, unnecessary, since the terms ‘Bertrand market’ and ‘contestable market’ are perfectly adequate. More often—and one fears this is why the ‘bidding market’ term is so often used by antitrust advocates—the confusion between assumptions (1) to (4*) about the market structure, and assumption (5) about details of the price formation process, is positively misleading. As we now discuss (in section 3), and as should come as no surprise, auctions and bidding processes are beset by the same range of competitive problems as ‘ordinary’ economic markets.

¹⁸There are other services in which airlines simply compete to offer the lowest fare, and Priceline is also famous for a ‘name your price’ service.

¹⁹Considering the retail and auction segments as different, or as different markets, might make sense if the different sales routes accessed different customers, but not because of any difference in the price-formation process.

²⁰As noted above, even if there is only one or a small number of passengers on a particular route, a slight increase in fare slightly reduces the probability of making a sale.

Nevertheless, so called ‘bidding market’ issues often arise particularly starkly in auctions. While an auction process is neither necessary nor sufficient for a ‘bidding market’, markets with one or more of the ideal characteristics we described are very often organized using a more or less formal bidding process or auction. (The reason is that a large transaction size (cf (2)), poor information about the ‘right’ price—more likely for a ‘one-off’ contest (cf (3)), or for an idiosyncratic transaction that is likely to be efficiently handled by just one winner (cf (1)), or poor information even about who the bidders are (cf (4*)), all make an auction relatively more efficient and posted prices relatively less efficient.)

Furthermore, there are several ways in which the antitrust of auctions and bidding processes can be a little different from usual, and sections 4 to 7 of this essay will consider these.

Thus the remainder of this essay focuses on (all) those markets that satisfy assumption (5), ie involve a ‘bidding system’ or a ‘bidding process’.²¹

3. How auctions and bidding processes are like ‘ordinary’ markets

The competition problems of auctions are broadly the same as those of ‘ordinary’ economic markets. Statements such as ‘in bidding markets ... competition can be as vigorous with two firms as with three or more’ (Lexecon (1995))—cited approvingly in the South African Competition Tribunal’s recent decision permitting a ‘three-to-two’ merger²²—depend on the two firms being genuinely identical and genuinely competing, just as in an ‘ordinary’ (non-auction) market. If one firm is advantaged, eg by lower costs or reputation, it has market power; if firms are differentiated, both have market power; and even if they are identical, they can jointly exercise market power if they can coordinate. With more firms there are generally fewer problems, but problems are more likely if some or all of (1) to (4*) fail—all just as usual.²³

3.1 Dominance

As discussed above, especially when contracts are large and specialized, the winner of the current contract will often have a substantial advantage at the re-contracting stage, and new entry is likely to be hard and unattractive (ie (3) and (4*) are likely to fail). For example, after being the winner among eight bidders of the contest for the

²¹I am reluctant to engage in further semantic issues by defining ‘bidding systems’ or ‘bidding processes’, but their important characteristic is ‘customer-by-customer pricing’ by contrast with an ordinary retail market in which a seller makes the same offer to many buyers. That is, when ‘bidders’ are sellers, each bidder generally treats each buyer separately and so makes a separate offer (or no offer) to each buyer. (Conversely, bidders who are buyers each make a separate offer to any seller they deal with.) The offer may be a price, or may include other dimensions. The offer may be improved, or refined, during the bidding process, perhaps in response to discussions or negotiations with the bid-taker (though a formal definition would probably exclude full-blown one-on-one bargaining in a bilateral monopoly). Assuming bidders are sellers, the buyer may be the final customer, or may (eg in an electricity pool) represent several final customers. However, as discussed above, the buyer may split her purchases between several bidders (contradicting (1)), may be one of many buyers (contradicting (2)) and may have substantial costs of switching sellers (contradicting (3)), and there may be significant costs of developing the capability to approach her with a credible bid (contradicting (4)).

²²The merger of Murray & Roberts Ltd and The Cementation Company Ltd—see Competition Tribunal South Africa (2004).

²³The claim that one firm is enough for an optimal outcome is as highly sensitive as usual to (generally implausible) assumptions of speedy, costless, entry. As we noted above in our discussion of airline-ticket sales, whether or not the detailed process of price formation is an auction is sometimes completely unimportant. On the other hand, simplistically-measured past market shares may reflect market power even less accurately in auction markets than usual. Most obviously, if a ‘market’ consists of only a single winner-take-all contract, even symmetrically placed firms have ex-post shares of 0 per cent or 100 per cent (and it would be ridiculous to argue all possible mergers are therefore irrelevant). Measures of firms’ capabilities and capacities, perhaps summarized by their estimated ex-ante probabilities of winning a contest, or average shares over a longer history may be helpful. (Also if each bidding contest is, technically, a separate antitrust market, then ‘multi-market contact’ effects between these ‘separate’ markets supporting predation or collusion are particularly likely (Bernheim and Whinston (1990)).)

seven-year monopoly franchise to run the UK National Lottery when it was founded in 1994, Camelot had developed substantial learning-by-doing and reputation advantages by the time of the subsequent contest in 2000. Not surprisingly there was far less competition (just two bids) in the second contest.²⁴

This is just the standard problem of competition in markets with ‘switching costs’ as elaborated by eg Klemperer (1995), Farrell and Klemperer (forthcoming), Klemperer (forthcoming a). As those papers emphasize, this does not necessarily mean competition is weak or inefficient overall—the reduced second-stage competition can be compensated for by correspondingly fiercer first-stage competition that reflects the (quasi) rents that the first-stage winner expects to earn at the second-stage.²⁵ However, as those papers also explain, the resulting bargain-then-ripoff offers that the buyer (or bid-taker) receives often do create inefficiencies, and make competition more fragile—for example, making predatory behaviour easier and more tempting. In the second National Lottery competition, the first-stage winner (Camelot) brought substantial public relations, legal, and other resources to bear in defeating its sole challenger (Virgin’s People’s Lottery), including successfully overturning the government’s initial decision to award the second franchise to the challenger,²⁶ and the experience of this has certainly had a chilling effect on the possibility of serious challenges emerging to contest the award of the third franchise due in 2006.²⁷

A distinction from the standard analysis of ‘switching cost’ markets is that the bid-taker may have more control over the auction process than buyers have over the rules of competition in an ordinary market. However, this distinction is less important than it might seem, as we discuss later (section 6). The main message is that the ordinary economics of dominance applies.²⁸

3.2 Coordinated effects

Where entry is hard (ie (4*) fails), and especially when bidding is not winner-takes-all (ie (1) also fails), coordinated effects (ie tacit collusion) can emerge as easily in auctions and bidding processes as in ‘ordinary’ economic markets.²⁹ The standard kinds of repeated-game analysis apply, and the standard checklists of factors that competition authorities use worldwide remain appropriate for predicting the likely emergence of coordinated effects. The UK Competition Commission, for example, cites all of the following as facilitating coordination: few firms, high degree of market transparency, high frequency of firms’ interactions,³⁰ predictability of demand and costs, low likelihood of disruptive innovation, similarity of firms, lack of serious financial constraints on firms, long-term commitment of firms to the market, standardization of the product, inability of buyers to self-supply and difficulty of entry by new firms.

²⁴Arguably the surprise was that there was a second bidder at all.

²⁵So policy must consider whether observed current rents merely reflect a competitive return on past investments.

²⁶I am not suggesting that Camelot’s behaviour was in any way improper or that it contravened any laws or regulations.

²⁷Lock-in effects have been found to be important in what were claimed to be bidding markets in several recent cases before the UK Competition Commission.

²⁸In some cases a lock over the market may be jointly held by several firms. (This could perhaps be described as a case of ‘joint dominance’, though the term is usually used in the context of concerns about collusion rather than exclusion.) For example, when in 2000 the Netherlands auctioned five 3G mobile-phone licenses it was very hard for any other bidder to compete with the five incumbent mobile-phone operators in the market, and the only new entrant that dared to bid was swiftly eliminated by what many described as predatory behaviour, so the auction raised less than one-third of what the winners valued the licences at. (See sections 5.2 and 6.2 below, and Klemperer (2002b, 2003a) for more details; in principle, the government’s control of the sales process should have allowed it to mitigate the problems; in practice, it exacerbated them.)

²⁹Explicit collusion is also common in auction markets. For example, according to McMillan (1991), two-thirds of the criminal cases brought by the US Department of Justice’s Antitrust Division during 1981 to 1988 involved bid-rigging by construction firms.

³⁰This feature is not explicitly in the UK Competition Commission’s list, but is implicit in its (and other agencies’) guidelines.

It is no surprise, therefore, that the UK electricity (auction) market which satisfied almost the Competition Commission's entire checklist³¹ is suspected of having fallen prey to coordinated effects in the late 1990s.³² It may be that the specific auction rules contributed to the problems (see Klemperer (1999b, 2002a, 2003b)), and it was partly in response to this concern that the UK regulator introduced New Electricity Trading Arrangements (NETA) in 2001. However, it is clear that even with a more 'ordinary' economic price-formation process the electricity market would be very vulnerable to coordinated effects as long as it satisfied so much of the Competition Commission's checklist. Indeed, a common view is that the post-NETA fall in prices is much more due to the substantial reduction in market concentration that occurred around the same time than to the change in the market rules (see eg Newbery, 2004). That is, the standard factors facilitating collusion mattered; replacing an auction by a more 'ordinary' price-setting process did not much matter.

We will discuss below some special issues about how the details of auction-market rules can facilitate coordinated effects (and explicit collusion), in particular through creating the standard checklist conditions of market transparency, high frequency of firms' interactions, and difficult entry. But the main message is that the fundamental issues are no different than in 'ordinary' markets.

3.3 Unilateral effects

Just as for ordinary markets, several of the most important factors supporting coordinated effects including, especially, high concentration, lack of buyer power and difficulty of entry, also facilitate standard unilateral effects (ie monopolistic supply reduction or monopsonistic demand reduction).

Thus, for example, while the extent to which electricity markets have suffered from coordinated effects can be debated, there is a broad array of evidence that they have at least suffered from the unilateral exercise of market power (see eg Wolfram (1998) on the UK electricity market, and Borenstein et al (2002), Joskow and Kahn (2002), and Wolak (2003) on the Californian market³³).

To take another example, Cramton (2002) writes that in the 1994 US Nationwide Narrowband spectrum auction, 'The largest bidder, PageNet [which he advised] reduced its demand from three of the large licences to two, at a point when prices were still well below its marginal valuation for the third unit. [It] felt that if it continued to demand a third licence, it would drive up the prices on all the others to disadvantageously high levels.' This seems to have been unilateral behaviour, rather than (attempted) coordinated behaviour, since there is no suggestion or evidence that the bidder expected any other bidder to behave more co-operatively in response to its demand reduction, nor that any other bidder did so.³⁴ Cramton also provides

³¹There were exceptions. For example, the firms were not all similar (though the relevant firms—ie the firms that had flexible capacity (not Nuclear Electric)—arguably were similar).

³²Sweeting (2004) finds that generator behaviour after 1996 was inconsistent with static Nash equilibrium and consistent with tacit collusion, Macatangay (2002) finds evidence of coordinated bidding patterns in 1996 to 1997, and Evans and Green (2003) also seems to support suspicions about coordinated effects. Similar suspicions have been voiced about the Spanish electricity market. See eg Fabra and Toro (forthcoming).

³³Tapes of telephone conversations obtained in the FBI's investigation of Enron show the extreme way in which that company unilaterally exercised market power to raise prices, including arranging to shut down a power plant supplying energy to California on January 17, 2001 when blackouts affected up to a 0.5 million consumers (see Egan (2005)).

More generally, 'The many investigations of the causes of the California Electricity Crisis currently underway have not uncovered evidence that suggests suppliers coordinated their actions to raise prices in California' (Wolak (2003)), suggesting that the significant market power effects that many studies have found for California in 2000 to 2001 were unilateral effects.

³⁴On the contrary, if there was any response, it seems to have been to try to persuade the largest bidder to reduce its demand further without any recompense. See also Cramton (1995).

evidence of unilateral effects in the subsequent 1995 to 1996 ‘CBlock’ US spectrum auction.

As usual, while auction-market rules may sometimes exacerbate some of the standard conditions supporting unilateral effects (for example, by making entry hard—see sections 4.3–4.4) the fundamental principles are the same as in ‘ordinary’ markets.³⁵

4. Bidding rules and procedures

Both the formalization of a bidding process into an auction with a small number of clearly defined rules, and those rules themselves, sometimes facilitate predatory and/or collusive strategies, especially in ascending auction processes, as we now discuss.

4.1 Price formation in auctions and bidding processes

Formal auctions

When formal auction procedures are used, two basic designs of auction, and variants of these designs, are most common. The first basic design is the ascending auction, in which the price is raised successively until only one bidder remains, and that bidder wins the object at the final price she bid, as is common in sales of art and antiques.³⁶ The other standard design is the first-price sealed-bid or ‘pay your bid’ auction, in which each bidder independently submits a single bid without seeing others’ bids, the object is sold to the bidder who makes the highest bid, and the winner pays her bid, as is common in sales of oil or mineral rights, or in bidding for procurement contracts (although in the latter cases it is the low- rather than high-bidder who is the winner).

Informal bidding processes

In more informal bidding processes, it may be unclear how best to think of the ‘auction’. If a seller conducts parallel negotiations with two or more potential buyers simultaneously, this is probably in effect a standard ascending auction. But even in a so-called (first-price) sealed-bid auction, if the bidders repeatedly interact with the bid taker, asking ‘what kind of bid is likely to be successful?’, the process can mimic what an economist would call an ascending auction. Furthermore, bidders may not believe a nominally ‘sealed-bid’ process will end when the bids are opened: it is always in the bid taker’s interest to entertain further bids, and shareholders might sue him if he turns down a subsequent improved bid; disappointed bidders who would like a further bid may also bring legal proceedings.³⁷ Even if the bid taker originally attempted to precommit to not accepting further bids, reasons can usually be found why the original bidding failed to satisfy some rule, or why the situation has changed so

³⁵See Klemperer (2006) for further discussion.

³⁶Of course, this design becomes a descending one when the bidders are sellers. In this case the price is lowered until only one bidder remains and that bidder wins the object at the final price bid. For simplicity, we will continue to refer to such an auction as an ascending auction.

³⁷For example, the government commission’s original 2000 decision to award the UK National Lottery to a new-entrant bidder was overturned by a legal challenge from the incumbent which then won the contract after improving the terms of its offer. See section 3.1.

See also the discussion of the proposed Manchester United/BSkyB combination in section 6.2.

additional bids are needed.³⁸ And if bidders expect the process will later turn into an ascending auction, they will bid as if it was an ascending auction in the first place.

On the other hand, superficially ascending processes may really be sealed bid. When bidding for a house you may not know whether you'll get another chance to bid.³⁹ When buying a car, you can in principle go back and forth between dealers soliciting improved offers, but in practice a dealer may refuse to put its offer in writing and so prevent you from credibly communicating it to a competitor; if so you are in effect running a sealed-bid contest. Sometimes when companies put themselves up for sale it is understood that there will be a series of rounds (even though these may all be called 'final'), with the investment bankers talking up the price between rounds, but if there is no hard information about competitors' bids until after a deal is sealed, only the final round really counts.⁴⁰

Bidding is closer to sealed-bidding if bidders are differentiated and the criteria for evaluating bids are not fully transparent, so that bidders would not necessarily know whose bid would win even if they were fully informed about others' offers.

Note that sealed-bidding corresponds to standard Bertrand price-setting. With perfect information, the sealed-bid process corresponds to Bertrand competition in a market in which all consumers make the same choice between firms. And, as noted above, with imperfect information about rivals' costs or about the bid-taker's preferences, bidders making sealed bids face a trade-off between the price and their *expected* sales that is similar to the price-quantity trade-off firms face in standard differentiated-products Bertrand competition (and also similar to the similar trade-off in Cournot competition).

Unfortunately, though our understanding of whether particular informal industrial bidding processes are best thought of as ascending or sealed-bid is often poor,⁴¹ the distinction is also often crucial as we now discuss.

4.2 Ascending auctions vs sealed-bid and ordinary markets I: efficiency

A key distinction between ascending and sealed-bid auctions for a single fixed prize is that the efficient bidder generally wins an ascending auction, because if a high-valuation bidder is initially outbid it can always raise its bid later. By contrast, a sealed-bid auction may be efficient when bidders are symmetric, but is not generally efficient.⁴² The reason is that bidders cannot revise their initial bids, and a bidder with

³⁸For example, in the sale of RJR-Nabisco there were several successive rounds of supposedly-final sealed-bids: after the first set of 'final' sealed-bids had been opened (and revealed to all), an extension was arranged to allow a bidder time to clarify some details of its offer prior to a second 'final' round of sealed-bids; one of the losers in this second round then submitted and made public a further, unsolicited, higher bid to pressure the board into reopening the sale, and yet more bids then followed as the process degenerated into something more closely resembling an ascending auction (see Burrough and Helyar (1990, pp 415–6, 479–502)).

³⁹Agents may have little incentive to extend the process, preferring to manage the matching of buyers and sellers than to maximize price on any one transaction (in the UK agents typically receive 1.5 per cent of the transaction price and it can be hard to arrange higher-powered incentives), or a competing bidder may credibly make a take-it-or-leave-it offer (which seems more common in the real world than the current theoretical literature can easily explain).

⁴⁰As a demonstration of this, I have heard of sales in which the winner's final bid exceeded its initial bid, and its initial bid exceeded all subsequent competitive bids.

⁴¹Interestingly, when reviewing the recent merger between Oracle and PeopleSoft, the US Department of Justice and the European Commission came to quite different views on whether the bidding process was best described as an ascending auction or as a sealed-bid auction. It seems the two authorities (which both originally opposed the transaction) had differing views on whether buyers could be believed when they told competing bidders what the other bidder(s) had offered. So the US Department of Justice (which felt buyers could credibly report bidders' offers) did modelling based on the assumption that sales were ascending auctions, while the European Commission (which felt buyers couldn't do this) looked at studies that modelled the sales processes as sealed-bid auctions. (See European Commission, 2004; US et al. v Oracle Corporation.)

⁴²In reality the strategic uncertainty induced by a sealed-bid auction means that it may not be efficient even with symmetric bidders. This probably does not affect our argument.

a lower valuation may therefore win at a price that a bidder with a higher valuation could have beaten but did not because it was hoping to win more cheaply. Likewise 'ordinary' economic markets that are not 'winner-take-all' are typically inefficient, because less efficient firms typically make some sales.

Thus, for example, a merger that makes an industry asymmetric may be less socially desirable if prices are set in sealed-bid auctions or in 'ordinary' economic markets, than if prices are set in ascending auctions.⁴³ However, a regulator who (like most antitrust regulators) cares about consumer welfare rather than efficiency may have the opposite preferences, since bid-taker surplus is the same under the two auctions if bidders are symmetric but is often higher in a sealed-bid auction if bidders are asymmetric (see Maskin and Riley (2000)). (Put differently, efficiency savings of asymmetry-creating mergers are more likely to be passed through to bid-takers in the sealed-bid case.) Furthermore if the auction reveals information that improves the efficiency of the sealed-bid auction (perhaps merely by sharing information between the merging partners), both efficiency-maximising and consumer surplus-maximising regulators may be more enthusiastic about mergers when prices are set in sealed-bid auctions than when they are set in ascending auctions.

However, one suspects that these direct efficiency effects on the relative attractiveness of mergers in different auction regimes, and further results that can be developed along these lines,⁴⁴ are much less important than the indirect effects to which we now turn.

4.3 Ascending auctions vs sealed-bid and ordinary markets II: entry

Because ascending auctions are always won by the strongest party, it is also often known who that winner will be. There is then no incentive for any other bidders to turn up—a disastrous outcome for the bid-taker, especially if he does not have the ability to set a reserve price (perhaps because he lacks the information).

Klemperer (2002a) provides several examples of this—for example, Glaxo's 1995 takeover of Wellcome without serious competition, and for literally billions of dollars less than its valuation, after the largest shareholder in the target company had made commitments that forced the sales process to be essentially an ascending auction. By contrast, entry is more attractive into a sealed-bid auction in which there is usually some uncertainty about who the winner will be,⁴⁵ or into an 'ordinary' economic market in which a slightly-inferior firm may win an only slightly-inferior market share.⁴⁶ Klemperer (1999a,b, 2002a, 2003a) and Bulow and Klemperer (1996) argue that this is a crucial issue in auction design—see also section 6.1.

Furthermore, since entry into an ascending auction can be deterred by even a small disadvantage, entry deterring and predatory strategies of reducing one's own costs, or raising rivals' costs, or making threatening statements, can all be far more profitable than in a sealed-bid auction, or in an 'ordinary' economic market. Indeed a

Pure common value auctions are an exception, since any allocation is efficient. See section 5.

⁴³In this discussion we assume mergers do not affect the price-formation process.

⁴⁴Marshall et al (1994), Dalkir, Logan and Masson (2000) and Tschantz, Crooke and Froeb (2000) make detailed comparisons of the price effects of mergers in sealed-bid and ascending auctions, assuming particular functional forms for distributions of valuations. However, the results are sensitive to the functional forms assumed. Changing the functional forms can reverse the relative magnitudes of the price effects of mergers in sealed-bid and ascending auctions. So the suggestion (Froeb and Shor (2000)) that we use the magnitude of the effect in an ascending auction as an upper bound for the magnitude of the effect in a sealed-bid auction may be risky.

⁴⁵But sealed-bid auctions may discourage potential bidders who have only small amounts to trade, because such bidders need better information about their rivals to bid intelligently than they would need in ascending or uniform-price auctions, and the costs of obtaining good information might not be worth their paying (see Klemperer (2002a)).

⁴⁶As in, for example, a Cournot market, or a Bertrand market with heterogeneous consumers without price discrimination.

common tactic for an incumbent or otherwise advantaged firm is to attempt to (re)structure the bidding process as an ascending auction.^{47,48}

4.4 Formal rules facilitate communication

One of the biggest problems faced by firms who wish to collude or predate is how to signal their intentions to rivals when ordinary communication is illegal. Unfortunately for regulators, the formal rules of auctions often solve firms' problem by defining a 'language' that bidders can use to communicate with each other. Klemperer (2002a) gives many examples, including a multi-license US spectrum auction in 1996 to 1997, in which US West was competing vigorously with McLeod for lot number 378—a license in Rochester, Minnesota. Although most bids in the auction had been in exact thousands of dollars, US West bid \$313,378 and \$62,378 for two licenses in Iowa in which it had earlier shown no interest, overbidding McLeod, who had seemed to be the uncontested high-bidder for these licenses. McLeod got the point that it was being punished for competing in Rochester, and dropped out of that market. Since McLeod made subsequent higher bids on the Iowa licenses, the 'punishment' bids cost US West nothing (see Cramton and Schwartz, 2000).⁴⁹

Thus clear rules permit clear communication, and so facilitate both predatory and collusive behaviour.

Furthermore, auctions like the one described provide a rich enough vocabulary to communicate without providing too much. A simple single (sealed) bid auction would have made the behaviour described impossible; an ascending auction with fixed increments (eg each new bid must be exactly 10 per cent higher than the bid it is beating) would have made it very hard.⁵⁰ On the other hand an 'ordinary' market with many different strategies available to firms may yield too rich a vocabulary for clear communication. For example, it is very hard for consumer-goods retailers who are selling hundreds of products, many of which are at least slightly differentiated from their rivals' products, and who can also follow different strategies in advertising, service quality etc, to communicate suggestions about how to coordinate prices or divide markets, and to monitor whether their rivals are sticking to tacit agreements, without breaking the laws prohibiting explicit communication.⁵¹

Although the problems are worst for ascending auctions they are not restricted to them. For example, in repeated sealed-bid auctions the clearly defined history of past behaviour may allow enough communication to permit coordinated pricing.^{52,53}

⁴⁷For example, governments are often lobbied heavily for ascending auction processes for this reason. The 2001 Hong Kong 3G auction is just one example in which the government disastrously gave in to this lobbying (see section 6.2).

⁴⁸Note, therefore, that the US Robinson-Patman Act that outlaws price discrimination where this 'reduces competition', and is generally thought to be intended to protect weaker competitors, is less well designed for this purpose than often assumed. The exemption in the Act that allows a firm (eg a large firm or an incumbent) that has previously made sales at a higher price to discount its price to meet the price of a competitor (eg a small firm or new entrant), but not to beat the competitor's price, essentially permits the large firm to compete in an ascending auction contest, but would rule out its participation in a sealed-bid contest (or at least put the large firm in a very weak position since it could not take the risk of beating its rival by more than a trivial margin). If the Act really wished to encourage smaller firms, it should instead make ascending auctions hard for larger firms to participate in, but encourage 'sealed-bid' sales processes that favour weaker firms.

⁴⁹For another example of bidders using their bids to signal to each other see footnote 54.

⁵⁰It might still have been possible for US West to signal the same message by overbidding on the Iowa licenses whenever McLeod bid on Rochester. But it would certainly have been harder for US West to be confident its message was understood; perhaps McLeod would have pretended not to understand and, without common knowledge that its message was understood, US West might have given up trying to communicate in this way.

⁵¹Note that communication is made harder when firms have incentive to feign at least partial misunderstanding of their rivals. This is often the case (and was certainly the case in the US West/McLeod example discussed above).

⁵²For example, the kind of price coordination that has been alleged about some concentrated electricity markets might perhaps arise in any repeated single-bid auction, including pay-your-bid and uniform price auctions.

Thus a key distinction between a bidding process with formal rules and an 'ordinary' market is that the formality of the rules itself makes market behaviour much more transparent, and so much more vulnerable to competition problems.

4.5 *Ascending auctions vs sealed-bid and ordinary markets III: collusion*

One-off markets

Where ascending auctions clearly allow more strategic behaviour than single-bid auctions or ordinary markets is in 'one-off' markets that will never be repeated. Because an ascending auction turns a one-off market into a multi-stage game, it permits complex interactions and communications between bidders that would be impossible in a one-shot game. A good example is the behaviour in Iowa described in the previous subsection; see Klemperer (2002a) for more examples.⁵⁴

It is important to observe, however, that the reason ascending auctions encourage anti-competitive behaviour is that they create the standard conditions that facilitate it. This is clearly seen in that they provide easy answers to the four problems that firms must solve in order to support collusion in an ordinary industrial market—these problems are listed in, for example, the European Commission's current (2004) merger guidelines, and in standard industrial organization textbooks:

- (1) How can firms reach agreement on a division of the market?
- (2) How can they monitor adherence to the agreement?
- (3) How can they credibly punish any observed deviation from the agreement?
- (4) How can they deter non-participants in the agreement from entering the industry?

In terms of the checklist of section 3.2, ascending auctions make the market very transparent helping to solve problems (1) and (2) much more effectively than in an 'ordinary' industrial market whose definition may not be obvious, so in which efficient agreements are unclear, and in which defection is often ambiguous and slow to observe. Ascending auctions enormously increase the frequency of interaction,⁵⁵ so bids can be used to signal proposals about how to divide the 'pie', to signal agreement with others' proposals, and to quickly and easily punish defectors, helping to solve problems (1) and (3) (especially since punishing a defector by raising price only on objects it will win, as in Iowa—see section 4.4—is costless to the punisher). And ascending auctions help deter entry, solving problem (4) (see section 4.3).⁵⁶

To a limited extent similar strategic behaviour is possible in other auctions and 'ordinary' one-off markets. For example, by offering 'meet the competition' clauses (MCCs) or 'we will never be undersold' promises which guarantee rebates to any customer who finds a better price at a rival, firms can sustain collusive prices in a one-shot game—in effect MCCs introduce a dynamic component into the game by

⁵³Fabra (2003) argues that collusion is easier in repeated uniform-price multi-unit auctions than in repeated discriminatory multi-unit auctions. See also footnote 61.

⁵⁴[Another favourite example of bidders' ability to 'collude' in a 'one-off' ascending auction was provided by the 1999 German DCS-1800 auction: ten blocks of spectrum were sold, with the rule that any new bid on a block had to exceed the previous high bid by at least 10 per cent. There were just two credible bidders: the two largest German mobile-phone companies, T-Mobile and Mannesman; and Mannesman's first bids were DM18.18 million per megahertz on blocks one to five and DM20 million per MHz on blocks six to ten. T-Mobile—who bid even less in the first round—later said 'There were no agreements with Mannesman. But [we] interpreted Mannesman's first bid as an offer.' (Stuewe, 1999, p.13). The point is that 18.18 plus a 10 per cent raise equals 20.00. Clearly T-Mobile understood that if it bid DM20 million per MHz on blocks one to five, but did not bid again on blocks six to ten, the two companies would then live and let live with neither company challenging the other on the other's half. Exactly that happened. So the auction closed after just two rounds with each of the bidders acquiring half the blocks for the same low price, which was a small fraction of the valuations that the bidders actually placed on the blocks.

⁵⁵And so also mean that simply being in the one-off market is as good as a 'long-term commitment', in terms of the checklist of section 3.2.

⁵⁶At a more formal level, Grimm, Riedel and Wolfstetter (2002) argue that the rules of ascending auctions turn the outcomes of one-shot oligopolistic games that we call 'collusive' into non-cooperative Nash equilibria of repeated oligopoly games. Grimm et al demonstrate this point in the context of the 1999 German DCS-1800 auction described in footnote 54.

promising a reaction in the event an opponent deviates from a tacitly-understood agreement. However, MCCs cannot help firms signal or negotiate what that agreement might be (at least in a one-off context). And a MCC is also risky if you may face an opponent who has very low costs.

Likewise in uniform-price multi-unit auctions (in which all the units are sold at the (same) price that equates supply and demand), bidders can in principle achieve collusive prices as an ‘implicitly collusive’ equilibrium by choosing bids that would result in very competitive outcomes in the out-of-equilibrium event that the opponents fail to cooperate in the collusion.⁵⁷ Again, however, it is unclear how in a one-off market bidders can agree what the collusive shares should be, and the strategy is very vulnerable to opponents’ mistakes in understanding these shares or to additional bidders entering unexpectedly. So the existence of these equilibria in theoretical models is probably more relevant in practice to assisting collusion in repeated markets than to allowing it in actual one-off markets.⁵⁸

However, the greater danger of collusion in one-off ascending auction markets can also be exaggerated. Coordinated effects are harder with more firms, or less similar firms (see section 3.2), and bidders often seem more imaginative in their attempts to signal than in their understanding of others’ signals—as usual, something is much more obvious after it has been explained.^{59,60} Even with ascending auctions, it is much harder to build up mutual understanding in a one-off market than in a regularly repeated one. Finally, as we discuss in section 6.1, even minor modifications to an ascending auction’s rules can often reduce the risk of collusion.

Market division

Bidding processes may also facilitate collusive market division by turning a one-shot game for a whole market into a long series of individual customer-specific contests.⁶¹ Especially when all bids are observable, this may make it much easier to segment the market, eg allocating customers geographically, though firms may, to some extent, be able to achieve similar segmentation in an ‘ordinary’ market through price-discrimination.

How many bidders are enough?

It is often asked, ‘How many bidders are enough to make a market competitive?’ The answer is no clearer than in an ‘ordinary’ market, but experience suggests that (contrary to the simple theory of ‘bidding markets’—see section 2.1) one more bidder than the number of prizes is *not* enough in an ascending auction, even in a one-off auction in which bidders can win at most one prize each (so there is no question of colluding to divide the prizes). For example, in the year 2000, Netherlands’ 3G (ascending) auction in which six bidders competed for five licenses, the auction

⁵⁷For example, if two buyers each bid very high prices for less than half the available quantity, but low prices for half or more, then each buyer receives half the quantity at the low price, and both players would be worse off if either player deviated to bid more aggressively for more than half the quantity.

⁵⁸Sade, Schnitzlein, and Zender (2004) have found collusion to be no more common in experimental markets that use uniform-price auctions than those that use discriminatory auctions—in fact they find the contrary.

⁵⁹It is often entertaining to hear after an auction what bidders thought they were communicating. Though I’m not sure I fully believe the southern European bidding team who explained that its bid in a major auction had an obvious interpretation from the Bible, the dumbfounded and horrified reactions of the northern European consultants who had spent considerable effort trying to decode the bid at the time were a treat to behold. Culture matters.

⁶⁰Another problem is when there is more than one bidder who thinks it is, or should be, the leader coordinating the others. See Klemperer (2002d, 2003a).

⁶¹The theoretical literature on collusion in repeated auctions (Blume and Heidhues (mimeo, 2002), Aoyagi (2003), Skrzypacz and Hopenhayn (2004), McAfee and McMillan (1992)) shows how schemes such as bid-rotation (in which firms take turns to submit the winning bid) can achieve collusive outcomes in the absence of side transfers between bidders.

finished early raising less than one-third the revenue expected, after what many interpreted as predatory behaviour that eliminated a bidder (see section 5.2 and Klemperer (2002b, 2003a)). Similarly the Italian 3G (ascending) auction held just three months later, also with six bidders for five licenses, collapsed almost as soon as it had begun amid allegations of collusion and with a proportionately similar loss of government revenue (see Klemperer (2002b)).^{62,63}

5. Common values

Auctions and bidding processes are often used precisely because different participants have different, and poor, information—auctions are famously good at efficiently aggregating and using dispersed information, while with perfect information using posted prices is more straightforward. But if competitors have information or opinions about the value of winning a contract or prize that would be useful to other competitors, this creates ‘common values’. In particular, a bidder wins the prize only when it has very optimistic information about its value (indeed in symmetric equilibrium it wins the prize only when it has the highest signal)—this is the ‘winner’s curse’. Failure to take into account the bad news about others’ signals that comes with any victory would lead to the winner paying more, on average, than the prize is worth. So bidders adjust their bids downwards (in either sealed-bid or ascending auctions) to allow for the winner’s curse.

It is sometimes argued that ‘winner’s curse’ issues reduce competition problems. However, while they may perhaps mitigate the problems of collusion (this is unclear—see below), they certainly do not negate them. Indeed, overall, the existence of common values is probably an argument for *stronger* rather than weaker competition policy.

Furthermore, in many cases it is hard to distinguish whether or not an auction or market is common or private values—that is, from a given bidder’s perspective does other bidders’ private information relate to others’ valuations, or also to this bidder’s actual valuation?⁶⁴ Moreover, even if the situation is truly common values, do bidders bid as if others’ information matters to them?, or do they bid as if there were private values? If the latter, then any common value effects are even less important.

5.1 Common values and collusion

It is well understood that the more competitors a bidder faces, the greater is the winner’s curse, (ie the worse is the news from winning) and so the more the bidder must adjust his bid to account for the curse. So if a subset of bidders colludes it faces a lesser curse from winning and therefore, it is argued, it may bid more aggressively

⁶²The lost revenue was similar per head of population. The sets of bidders were different in the two auctions, and there is no suggestion that there was any important connection between these auctions (though Klemperer (2002b) argues that bidders did learn how to ‘play the game’ better through the course of the European 3G auctions more generally).

⁶³On a personal note, it has sometimes been put to me that the investment bankers who advised on the UK’s 3G auction (which I, together with Ken Binmore, designed) had no useful role. But I believe they performed (at least) a very valuable marketing job in persuading 13 bidders to compete for the UK’s five licences. Though some of the bidders seemed unlikely winners even at the time, 13 bidders were enough that neither predation nor collusion was a realistic strategy. (See Binmore and Klemperer (2002).)

⁶⁴It is often difficult to distinguish private values from common values even based on ex-post bidding data. See, for example, Laffont and Vuong (1996), and Pinkse and Tan (2005). However, there are some econometric tests, see, eg Armantier (2002), Athey and Haile (2002), Haile, Hong, and Shum (2004), Hendricks, Pinkse, and Porter (2003) and Paarsch (1992) (see also Bulow and Klemperer (2002) for some relevant theory), and some empirical literature distinguishes the different contexts. For example, Hendricks, Pinkse, and Porter provide evidence that oil and gas leases (where rivals have private information about yields) are mostly common value assets. Construction contracts (where rivals have private information about costs) are also typically thought to be largely common values. Purchases for resale may also have large common-value components.

and raise bid-taker surplus. So, it is contended, bid-takers *gain* from bidders' collusion! But although bids are adjusted less for the winner's curse, this effect is offset both by the reduced winner's curse, and by the standard loss-of-competition effects; *ceteris paribus* (absent winner's curse effects), bidders with fewer competitors bid less aggressively, and even if they bid equally aggressively, the winning bid among fewer bidders is on average less aggressive. While the details of functional forms are crucial, the simplest examples suggest mergers with common values are as anticompetitive as mergers with private values:⁶⁵

First, consider the 'maximum game' introduced by Bulow and Klemperer (2002) in which each bidder, i , initially receives a signal, t_i , and the actual common-value, v , of the single prize is the maximum of these signals, ie $v = \max_i \{t_i\}$.⁶⁶ In the symmetric equilibrium of an ascending auction, each bidder drops out at his own signal. After any mergers, a merged entity behaves as if it had a signal equal to the maximum of all its signals. Clearly revenue is unaltered unless the bidders with the two highest signals happened to merge in which case revenue falls to equal the highest signal not held by the winner. Note that the results are *identical* to those of a pure private-value model in which each bidder's actual value is t_i , and a merged entity's actual value is the maximum of the values held by its constituents.⁶⁷

A second example is provided by the 'wallet game' introduced by Bulow and Klemperer (1997) and Klemperer (1998), in which the actual common value of the single prize is the sum of all the signals, ie $v = \sum_i t_i$. Here too, it is very easy to show

that mergers that result in two firms each holding half the signals reduce bid-taker surplus,⁶⁸ and Mares and Shor (2004) extend this to show that any sequence of mergers that results in a symmetric industry structure reduces bid-taker surplus.⁶⁹ These results hold for both ascending and sealed-bid auctions.⁷⁰ Analysing mergers that yield asymmetric industry structures is much harder, but those results that are available suggest that here too mergers reduce bid-taker surplus with common values, just as with private values.⁷¹

⁶⁵Hendricks, Porter, and Tan (2003) show that joint-bidding consortia are less likely to be formed in common-values contests, since bidders who think they have good information may prefer to bid non-cooperatively than to share their possible gains with less-informed rivals. A positive interpretation of this result is that any consortium is likely to reflect strong efficiency benefits. A negative interpretation is that it may have been formed for its entry-detering effects (see below and section 5.2—Hendricks et al ignore the effects of joint-bidding on further entry). A neutral interpretation is that if we do observe a consortium, the auction is more likely to be private values than common values.

⁶⁶This model, or an approximation to it, may be appropriate when bidding for mineral rights, if a positive signal 'finding gold' makes all other prospecting results irrelevant. Harstad and Bordley (1996) and Parlour and Rajan (2005) present more complex models with very similar properties to the 'maximum game'.

⁶⁷These results extend to sealed-bid auctions for mergers that result in a symmetric industry structure (when bidders are risk-neutral and their information signals are independent), by an elementary application of the Revenue Equivalence Theorem.

⁶⁸In the symmetric equilibrium, the last bidder to drop out quits at what the actual value would be, if the actual winner's signal were in fact tied with his own. Thus, writing $t_{(i)}$ for the actual i^{th} highest signal, before any mergers the winner's profit is $t_{(1)} - t_{(2)}$ and expected auction revenue is $E[v - (t_{(1)} - t_{(2)})]$. Post-mergers, each firm's private information is represented by the sum of its

signals and each firm again bids up to what the actual value would be if its opponent were tied with it, so the winning firm's profit is the difference between the sum of its signals and the sum of its opponent's signals. Then, conditional on $t_{(1)}$ and $t_{(2)}$ being held by separate merged firms, let the sums of all the other signals held by these two merged firms be S_1 and S_2 , respectively, so expected seller revenue is $E\{v - [(t_{(1)} + S_1) - (t_{(2)} + S_2)]\} < E\{v - [(t_{(1)} + S_1) - (t_{(2)} + S_2)]\} = E\{v - (t_{(1)} - t_{(2)})\}$. Of course,

conditional on $t_{(1)}$ and $t_{(2)}$ being held by the same firm, the expected difference between the winning firm's information and the losing firm's information is even higher, so expected seller revenue is even lower.

⁶⁹Mares and Shor assume n bidders, each of which owns a single signal, merge to create n firms, each of which owns m signals.

⁷⁰The extension to sealed-bid auctions is an elementary application of the Revenue Equivalence Theorem; we assume bidders are risk-neutral, that their information signals are independent, and that they play the symmetric equilibrium in an ascending auction.

⁷¹For sealed-bid auctions, see Klemperer (forthcoming b). For ascending auctions, a general analysis is hard because there is a multiplicity of equilibria, and is hard to pick it among them after a merger that leaves bidders asymmetric. However, Pagnozzi

Of course, all these results contrast with those of Bulow and Klemperer (2002) who show that reducing the number of bidders by simply excluding some of them always raises bid-taker surplus in the 'maximum' game, and often does so in the 'wallet' game. The crucial difference is that Bulow and Klemperer assume excluding bidders also excludes their private information from being used in the bidding, whereas a consortium (joint) bidder retains and uses all the information of the constituent bidders. In common-value auctions, the bidders' rents reflect the expected difference in information between the winner and the runner up, so if reducing participation excludes particularly valuable private information it can reduce the difference between bidders' information and so increase bid-taker surplus. By contrast, joint bidding hurts the bid-taker if it increases the differences in private information available to different bidders by giving different merged bidders access to more different signals. Indeed the most profitable strategy for an uninformed bid-taker is to exclude all bidders and sell to a completely uninformed bidder who will be willing to bid the full expected value of the prize; a very unprofitable strategy is to allow all the informed bidders to combine, even if you can make them a take-it-or-leave-it offer. Nonetheless, it is not surprising that Bulow and Klemperer's (2002) work (and empirical support for it in, eg Hong and Shum (2002)) has been misinterpreted as suggesting a possible merit of joint bidding in common-value auctions.⁷²

Other previous papers also seem to have been misinterpreted as suggesting common values mean joint bidding is less damaging than usual:

Hoffman et al's (1991) and Hendricks and Porter's (1992) empirical work emphasizes that joint-bidding in common-value oil-industry auctions allows informed bidders more access to capital, so bid-takers could gain. But with private values or in 'ordinary' (non-auction) markets, also, a joint venture can be pro-competitive if it relaxes capital constraints, and Hendricks and Porter's evidence suggests joint bidding may also increase bidder rents, just as in ordinary markets, for the usual reduction of competition reasons (Hendricks and Porter, 1992 p511).

In a similar vein, de Brock and Smith (1983) present a theoretical example in which joint bidding rarely reduces the bid-taker's surplus very much, and for some parameterizations actually increases it. But in their example there are (social) efficiency gains from mergers, because bidders' improved information means oil tracts are developed more efficiently. So, again, this is nothing new. This is very similar to the standard argument that an R&D joint venture that pools information efficiently can both be socially beneficial and can benefit consumers (or benefit bid-takers in a private-values auction). Indeed in de Brock and Smith's example, mergers *a/ways* increase bidders' expected profits and, just as in 'ordinary' markets, the anti-competitive effect of increased market power can only be outweighed by the efficiency effects if the industry is sufficiently unconcentrated. (In their examples the bid-taker is always left worse off unless at least ten(!) bidders remain after the merger.)

Perhaps there are greater information-pooling and/or capital-constraint-relaxing benefits of mergers in common-value auctions than in private-value auctions or 'ordinary' markets, because common-value issues are driven by poor and different information and so also firms may face greater risks. On the other hand, in a

(2004a) argues that the result that mergers are anti-competitive generalizes to asymmetric cases by analyzing the game as the limit of an 'almost common-value model'.

⁷²Further confusion has resulted from an influential paper by Krishna and Morgan (1997) which made valuable contributions to the study of common-value auctions, but also contended that joint bidding could benefit bid-takers in wallet-games. Unfortunately that part of their paper was flawed, and joint bidding cannot benefit bid-takers in Krishna and Morgan's model, as Mares and Shor (2004) demonstrated. Furthermore, Levin (2004) showed that in multi-unit auctions it is even more likely that joint bidding hurts the bid-taker.

common-value auction it is a matter of social indifference who wins,⁷³ whereas in ordinary markets mergers that transfer more output to lower cost firms (as is usually the case) are socially beneficial. So, on balance, efficiency benefits of mergers may be more likely in 'ordinary' markets.⁷⁴

Some other arguments also suggest joint bidding may be more deleterious in common-value than in private-value auctions: if participants underestimate the common-value effects, or otherwise fail to compensate sufficiently for them, they will lose more from the winner's curse the more bidders there are, so in practice common-value effects may exacerbate (and certainly not reduce) the costliness to bid-takers of collusion or mergers. Furthermore, the strategy of incumbents merging to strengthen themselves and prevent the entry of further rivals may be particularly effective in common-value contexts (see next sub-section).⁷⁵

Mares and Shor's (2004) experiments provide further evidence that joint bidding hurts bid-takers in common-value auctions.

Finally, and *crucially*, and far more significant than the issue of joint bidding when some competition remains, is the issue of joint bidding or collusion among *all* bidders. A very real danger is that (just as in private-value contests) the more joint bidding is permitted, the easier it is for industry-wide collusion to develop.

In sum, while these issues are still not well understood, the current evidence is that joint bidding is unlikely to be much more benign in common-value auctions than in private-value auctions or in 'ordinary' markets.

5.2 Common values and predation

With 'almost common values', that is, in common-value cases in which one bidder is slightly stronger than the other(s), the disadvantages of weaker bidders in ascending auctions that we discussed in section 4.3 are exacerbated by the winner's curse effects.

The reason is that winning against a bidder whose value of winning is greater than yours is even worse news than usual about the opponent's valuation of the prize; so you must bid extra cautiously. And because he knows you are being extra cautious, beating you is not very bad news for him about your valuation; so he need not worry much about the winner's curse and can bid more aggressively than if you and he were symmetrically placed. So the effect is self reinforcing—because the weak bidder faces a very severe winner's curse and is bidding extra cautiously, the advantaged bidder faces very little winner's curse and is bidding extra aggressively. This substantially reduces bid-taker surplus even if entry to the auction is unaffected. Moreover, since the weaker bidder's potential profits from bidding are so low, it may also be discouraged from even entering, further hurting the bid-taker.

Thus antitrust policy must be more careful than usual to protect against actions that magnify weaker bidders' disadvantages in ascending auctions. Such actions may include mergers. For example, prior to the Netherlands 3G auction in 2000 of five

⁷³Of course, this also means that if we care about social welfare rather than about bid-taker's or consumers' welfare, we should not care about mergers in pure common-value auctions.

⁷⁴In winner-take-all, sealed-bid, private-value auctions, efficiency can be increased or decreased by mergers. See section 4.2.

⁷⁵Of course, it also follows that a merger that combines two weak bidders, and thereby reduces the difference between the amount of private information available to the resulting (merged) bidder and the amount of private information available to a stronger bidder, could be particularly desirable in preventing the entry-detering and predatory possibilities discussed in the next sub-section. This parallels the result that in a 'normal market', a merger may create a more effective competitor to an otherwise-dominant firm.

licences (which, for good technological and antitrust reasons, were indivisible and had each to be won by a different firm), there were four strong incumbent 2G operators and one weaker incumbent 2G operator (Ben). There were also a number of potential entrants, of whom Deutsche Telekom (DT) was particularly strong since it was both financially unconstrained and had potential synergies with its substantial operations in neighbouring Germany. Since even the weak incumbent had some advantages, based on past sunk investments in technology, base stations, customer loyalty and brand-name recognition, there might have been a competitive auction if Ben and DT had bid independently. But after Ben merged with DT it seemed very clear who the five winners would be, and only one of the remaining potential entrants bothered to bid.⁷⁶ Furthermore, that remaining entrant only bid weakly, and gave up altogether after being discouraged by further actions that some argued were predatory and deserved government investigation. The result was a disaster for the bid-taker (the Netherlands' government) which earned less than one-third of the revenue that a well-managed process could have yielded.

The Netherlands' ascending auction design would have made it unattractive to potential entrants even absent the special common-value considerations. But the common-value issues seem to have exacerbated this problem, and they also greatly increased the disadvantages faced by the one new entrant who did bid.⁷⁷ (See Klemperer (2002b, 2003a) for further details.)

Although the most obvious advantage one bidder might have over another is a higher valuation for the prize, other possible advantages include a commitment to maintain a reputation for aggressive bidding (Bikhchandani (1988)), or a small ownership stake, or 'toehold', in the prize being competed for (which provides an incentive to push the price up further than otherwise—see Bulow, Huang, and Klemperer (1999)). Klemperer (1998) gives details and examples.⁷⁸

The UK Monopolies and Mergers Commission (MMC) took this last issue very seriously when it blocked BSkyB (the leading UK satellite television company) from acquiring Manchester United (then Europe's leading football club) in 1999.⁷⁹ The concern was that Manchester United received 7 per cent of the Premiership's television revenues which were sold as a bundle in an ascending auction. Acquiring this 7 per cent 'toehold' in the prize would have made BSkyB most likely to win the auction, and ownership of the football television rights would have reinforced BSkyB's market power in the pay-television market.⁸⁰

One argument against the MMC's decision was that if bidders behaved as if the auction was private values, the auction would have been much less affected because the logic given at the beginning of the subsection only fully applies if participants understand it and believe it. With private values, or if bidders behave as if there are private values, a small advantage of the right kind may still deter entry, but otherwise may not much affect the auction, by contrast with the common-values case, in which

⁷⁶In addition to Deutsche Telekom, Hutchison had also been considered a strong potential entrant, but it also entered a partnership with an incumbent (KPN). Other potential entrants were also co-opted into joint-ventures with incumbents, or dropped out altogether.

⁷⁷The common-value issues were sufficiently important and well-understood that they were discussed in the press in advance of the Netherlands' auction. Although this auction might have been uncompetitive even without common values, the anti-trust concern we describe below (caused by the proposed BSkyB-Manchester United merger) would probably not have been an issue at all, absent common values.

⁷⁸Levin and Kagel (2005) show that the effects can be smaller, though still important, when there are more than two bidders.

⁷⁹See MMC (MMC) (1999). Prior to 2003, the MMC (the predecessor body to the Competition Commission) could only make recommendations, so this decision was technically a recommendation, but it was accepted by the government.

⁸⁰Though the theories discussed in the MMC's decision appealed to my papers Klemperer (1998), Bulow, Huang, and Klemperer (1999), I did not discuss the case with the MMC or with any interested party before the decision (which was prior to my appointment as a Member of the Competition Commission).

not only is entry even more likely to be deterred, but a small advantage creates a much less competitive auction. However, the MMC took the view that while bidder behaviour might not be as extreme as in the theoretical models, the common-values aspect would make B SkyB's rivals at least somewhat more cautious.⁸¹ Sadly, the prominence given to my papers, Klemperer (1998), and Bulow, Huang, and Klemperer (1999), in the debate, probably made it more likely that bidders would behave according to the theory. Similarly, other advantaged firms have made a point of emphasizing the common-values theory—and their own belief in it. For example, Pacific Telephone paid an auction theorist⁸² to give seminars explaining the 'winner's curse' at industry gatherings prior to a US mobile phone license auction in which it was the advantaged incumbent.⁸³

Another argument against the MMC's decision was that the television rights did not need to be sold using an ascending auction, and 'toehold' problems are unlikely to be significant in, for example, a sealed-bid auction: we will address this argument in the next section.⁸⁴

6. Bid-taker power

An important feature of auctions and bidding processes is that the bid-taker often has far more control over the competitive process than an ordinary consumer does. Skilful use of the bid-taker's monopsonistic power to design and run the contest can mitigate the competition problems.

However, there are also many constraints and limitations on bid-takers' power. Although good auction design may be able to overcome these problems in principle, regulators must be careful not to take too rosy a view of what bid-takers can realistically achieve in practice. Indeed, where bidders can lobby against or otherwise subvert the rules and/or the bid-taker cannot precommit his future behaviour, the bid-taker's 'power' can actually work against him and aggravate the competitive problems.

6.1 Tailoring the rules

Sealed-bid auctions

It will be apparent from the previous discussion that many problems of entry deterrence, predation, and collusion can be avoided by choosing sealed-bid rather than ascending auction rules. Sealed-bid auctions may also be more profitable for bid-takers even absent these problems, especially when bidders' risk-aversion is important, as is likely in a large 'winner-take-all' 'bet-your-company' contest (ie when conditions (1) and (2) of an ideal 'bidding market' are satisfied). See, especially, sections 4.3 to 4.5 and 5.2 above, and Klemperer (1999a, 2002a) for more details.

⁸¹See MMC (1999, para 2.116).

⁸²Not me!

⁸³Conversely, one major oil company is said to have deliberately cultivated a reputation for not believing in economic theory.

⁸⁴An alternative view was that antitrust policy did not go far enough: after B SkyB was prohibited from taking over Manchester United it very quickly took small minority stakes in all of Manchester United, Manchester City, Chelsea, Leeds, and Sunderland, thus to some degree recreating the 'toehold' stake in football television revenues that had caused concern, while evading the MMC's scrutiny because the stakes were too small to qualify as mergers. (In principle the Office of Fair Trading could have taken action, but this might have been hard.) Perhaps since B SkyB already had a very strong position, it should have been prohibited from developing a toehold, but it would have helped 'level the playing field', and so been good for competition, if any of B SkyB's rivals had developed a toehold. In fact, NTL dropped a bid to acquire Newcastle but took minority stakes in Aston Villa, Leeds, Middlesbrough and Newcastle.

Anglo-Dutch auctions

Although a sealed-bid auction has many advantages, it is often socially less efficient than an ascending auction (see section 4.2). A solution to the dilemma of choosing between the ascending (often called ‘English’) and sealed-bid (or ‘Dutch’) forms is to combine the two in a hybrid, the ‘Anglo-Dutch’, which often captures the best features of both, and was first described and proposed in Klemperer (1998). Assuming, for simplicity, a single object is to be auctioned, the auctioneer begins by running an ascending auction in which price is raised continuously until all but two bidders have dropped out. These two bidders are then each required to make a final sealed-bid offer that is not lower than the current asking price, and the winner pays his bid.⁸⁵

Among its other advantages, the Anglo-Dutch auction encourages entry and discourages collusion (just like a sealed bid auction) but is more likely to sell to the highest valuer than a pure sealed-bid auction, both because it directly reduces the numbers allowed into the sealed-bid stage and also because the two finalists can learn something about each other's and the remaining bidders' perceptions of the object's value from behaviour during the ascending stage. See Klemperer (1998, 2002a) for a fuller discussion of the Anglo-Dutch auction's advantages.

It was first developed for practical use in the design of the UK 3G auction where it was proposed to use it to encourage entry in the event only four licences were available for sale, since the UK industry had exactly four strong incumbent operators. There is evidence that it might have been successful in this, but in the event a fifth license became available for sale so it was no longer appropriate to use it (see Binmore and Klemperer (2002)). However, formal Anglo-Dutch procedures have subsequently been used very successfully in auctions of electricity (see eg Woo et al (2004)) and real estate (Moreland (2004)).⁸⁶

Fine-Tuning ascending auctions

An alternative approach is to try to make the ascending auction more robust. For example, requiring bids to be ‘round’ numbers, prespecifying the exact increments, and making bids anonymous, make it harder to use bids to signal other buyers.⁸⁷ Aggregating lots into larger packages makes it harder for bidders to ‘divide the spoils’, and keeping secret the number of bidders remaining also makes collusion harder (Cramton and Schwartz, 2000; Salant, 2000). But these measures do not eliminate the risks of collusion, and do very little to mitigate the discouraging effect of ascending auctions on entry. Moreover, bidders can often adapt their behaviour to overcome such minor ‘fixes’ faster than bid-takers can develop new fixes (see also section 6.2).

Other new procedures

There has recently been enormous interest in designing new auction procedures, though there is a paucity of theory about how effective many of them are—especially

⁸⁵Many houses are sold using a similar, but less formal, process. Similarly, in WR Hambrecht's OpenBook auctions for corporate bonds, the early bidding is public and ascending but higher bidders are given an advantage in a final sealed-bid stage (although in this case all bidders are permitted to enter the final stage). The process also has some similarity to auctions on eBay which are ascending price, but with a fixed ending time so that many bidders often bid only in the last few seconds in essentially sealed-bid style.

⁸⁶I am aware of the formal Anglo-Dutch auction having been recently used in Florida, Texas and the Netherlands. I would be eager to hear about other practical applications.

⁸⁷See Salmon (2004) for discussion of some of these ideas.

the multi-unit ones.⁸⁸ Of particular note for resolving anti-trust concerns is Ausubel's (2004) popularization of a modification of the multi-unit ascending auction that creates a dynamic version of the Vickrey auction and so eliminates classical 'unilateral effects', that is, it eliminates bidders' incentives to scale back their demands (or supplies) in order to end the auction quickly at an uncompetitive price.⁸⁹ However, this auction can reduce bid-taker surplus so may not fit most regulators' objectives.⁹⁰ Furthermore, its relative complexity both makes it difficult to explain, and means that bidding may be affected less in practice than in theory (some experiments suggest this). Perhaps for these reasons, I am not aware of it having been applied in practice. In practical auction design, simplicity is crucial, and it is much easier to 'sell' designs that are similar to well-known institutions. (For example, the adoption of the Anglo-Dutch auction for practical use has been helped by describing it as a formalization of the informal process that is traditionally used to sell many houses.⁹¹)

Secrecy

An important aspect of sealed-bid auction rules is whether or not bids are secret. Just as in 'ordinary' markets, keeping bids secret makes it harder for bidders to coordinate their activities and makes defection from a collusive agreement harder to observe and therefore more attractive. So secrecy fights collusion between bidders. Unfortunately secrecy may also facilitate collusion between the bid-taker and one or more bidders,⁹² and the fear of this may also sometimes discourage entry.

Allowing each bidder to submit multiple sealed bids over a period of time can help frustrate collusion by making it harder for bidders to monitor each other, and keeping the number and identities of bidders secret can also make an auction more competitive (especially if bidders are risk averse) and encourage entry.⁹³

Reserve prices

A very powerful use of the bid-taker's monopoly (or monopsony) position is in setting a reserve price. Of course, it must be credible that the bid-taker will stick to the announced reserve (see section 6.2).

Discrimination

Discriminating between bidders by setting different reserve prices, or by giving bidding credits to particular bidders or particular classes of bidders, corresponds exactly to price discrimination in ordinary markets in forcing stronger bidders to bid

⁸⁸Milgrom (2004) is an excellent introduction to the state of the art in multi-unit auctions.

⁸⁹Similar unilateral effects, in which bidders reduce demands (or supplies) to make the auction price(s) less competitive for their remaining demands (or supplies), also arise in other multi-unit auctions (or sequential single-unit auctions).

⁹⁰There are also other difficulties: for example, high valuers are often required to pay less than low-valuers (which seems odd to policy makers), and it creates difficult-to-guard-against opportunities for collusion, so it is probably only useful in carefully controlled environments.

⁹¹See also footnote 85 above. By contrast, the attempt to implement a slightly novel design in Hong Kong was a disaster—see next subsection and Klemperer (2003a).

⁹²A very simple form of collusion is for the bid-taker to tell a bidder what its competitors have bid. This may be prevented by having all bids publicly opened.

⁹³For example, when Denmark ran the last of the 2000 to 2001 European 3G auctions, the government was rightly concerned whether it could attract any new entrant given that the number of licences equalled the number of incumbents—see our discussion of the Netherlands' auction in section 5.2 (and since also the telecom market had by then gone so sour). They followed all the strategies in this ('secrecy') sub-subsection, and ran a highly successful auction. See Klemperer (2002b, 2003a). McAfee and McMillan (1987, 1988) argue that the Canadian utility company Ontario Hydro benefited from keeping the number of bidders secret in auctions it ran.

more aggressively (see Bulow and Roberts (1989)). It can also encourage the entry of weaker bidders into the auction.⁹⁴

Sometimes it is possible to pay bidders to enter an auction; for example, firms' bid-preparation costs can be reimbursed,⁹⁵ or 'white knights' can be offered options to enter a takeover battle against an advantaged bidder.

Where awarding a contract means evaluating multiple criteria, for example, price and quality, it may be possible to induce more competitive bidding by precommitting to underweight or ignore one criterion. An illustration of this is that part of the power of a buying group (eg a hospital) may be that the average preference of their members (eg doctors and nurses) is closer to the average of different brands than is the preference of an individual member. Central procurement from a single vendor may therefore achieve a better price (Farrell and Klemperer, 2000).

Bundling and packaging

Another reason why procuring from a single vendor may be desirable is that it takes advantage of bidder's risk aversion. By making a contract larger, it may be possible to turn it into a 'must-win' for one or more bidders, who will then bid more competitively.⁹⁶ Bundling can also prevent both unilateral and coordinated effects (see, for example, sections 3.2-3.3 and 4.4-4.5), by making it impossible for bidders to 'divide the pie' among themselves. On the other hand, committing to divide a prize among multiple winners can sometimes attract entry of weaker bidders, and may also induce more competitive bidding by reducing winner's curses.⁹⁷

Bundling and packaging can often reduce inefficiency when complementary goods or contracts are auctioned—in the absence of bundling, some bidders may end up stuck with objects that are worth very little to them because they failed to win complementary objects (the so-called 'exposure' problem), while other bidders may fail to bid at all (or quit an ascending auction early) in fear of this.

On the other hand, bundling can also increase inefficiency while raising bid-taker surplus, in exactly the same way that bundling products, or offering non-linear pricing and quantity discounts, can raise an 'ordinary' monopolist's profits at the same time as lowering social surplus. The antitrust issues parallel issues of monopoly bundling and exclusion in 'ordinary' markets.

Bundling and packaging is especially critical when an auction creates a new market (as, for example, the 3G spectrum auctions created the 3G mobile phone markets). Allowing the industry structure to be determined in the auction (eg by selling many small blocks of spectrum, but allowing each firm to win multiple blocks) has the advantage that the outcome depends on bidders' private information, but the disadvantage that bidders' objectives are not the social objectives. So it may be better to determine the industry structure in advance (eg by fixing the number and

⁹⁴Ayres and Cramton (1996) estimate that offering 40 per cent bidding credits to 'designated bidders' (ie the bid-taker agreed to refund 40 per cent of winning bids by firms controlled by women, minorities, etc), together with favourable terms for payment by installment, actually raised the Federal Government's revenue (by \$45 million, or about 12 per cent) in the 1994 sale of regional narrowband PCS spectrum.

⁹⁵Similarly, the United Kingdom Inland Revenue (ie tax collecting authority) recently paid bidders to undertake exploratory studies about how a large IT project might be designed and managed, as a way of reducing these bidders' information disadvantages relative to the better-informed incumbent who had won the previous contract.

⁹⁶One way to make a contract larger is to aggregate several auctions that would otherwise take place at different times.

⁹⁷See sections 4.3 and 5.2, Gilbert and Klemperer (2000), and Bulow and Klemperer (2002). Using such 'split-award' auctions is just a form of offering 'second prizes' and, when it would be efficient and/or would ex-post maximize bid-taker surplus to have a single winner, can be seen as a form of discriminating in favour of weaker bidders.

sizes of licences for sale, and allowing firms to win at most one each). The choice between these approaches is a topic of active research (see, eg Hoppe, Jehiel and Moldovanu (forthcoming)), but it is not yet easy to make many general statements.

Controlling resale

Resale can render both discrimination and bundling ineffective, so in the simplest models with a fixed number of bidders who know their own current and future values, a bid-taker wants to prevent resale—exactly as a price-discriminating monopolist in an ‘ordinary’ market needs to prevent resale. However, the possibility of resale can also give arbitrageurs an incentive to participate in the auction (which increases its competitiveness),⁹⁸ and re-sale also allows bidders to respond to new information about their valuations of the assets.⁹⁹ So the effects on an auction of the knowledge that re-sale will subsequently be permitted are complex. A natural instinct is that it is likely to be broadly efficient (even though it will not always maximise bid-taker surplus) to permit the re-sale of assets such as licences in the same way, and subject to similar rules, as mergers of firms. However, more research is needed to confirm or refute this.

Antitrust rules

Finally, as must by now be clear, where bid-takers have the power (for example, when they are governments), it is important for them to ensure normal antitrust rules apply (see section 7).

6.2 Constraints on bid-taker power

Although in theory bid-takers have many instruments available to them, they also face important constraints including governmental or supragovernmental legislation or procedures, internal-organizational issues, bidders’ countervailing tactics, and the difficulty of committing their own future behaviour. Bid-takers that are government agencies are often especially severely constrained.

Most obviously, a prohibition on resale may be hard to enforce, so strategies involving discriminating between bidders and/or bundling may be ineffective.¹⁰⁰

Moreover, State Aid (and other) legislation generally prevents European governments from explicitly discriminating between bidders (eg using targeted bidding credits), and while similar ends can often be achieved using technically-neutral rules, (eg placing more weight on criteria which favour the preferred bidder(s)) this is usually less efficient. For example, in the UK 3G auction we were advised that bidding credits to encourage entry were not permissible. However, choosing auction rules that favoured entry, specifically an Anglo-Dutch auction, was possible. So was dividing the available spectrum into a large enough number of licences that one would have to be won by an entrant—in other words, running a

⁹⁸Pagnozzi (2004b) models how the bargaining in the aftermarket is itself affected by the outcome of the auction, and how the possibility of entering the resale market can both induce bidders to drop out of an auction early and give arbitrageurs a strong incentive to participate.

⁹⁹But resale does not resolve all inefficiencies, even when firms’ private objectives are the social objectives (Cai (2000), Myerson and Satterthwaite (1983), Cramton, Gibbons and Klemperer (1987)).

¹⁰⁰For example, on one occasion when the US government offered bidding credits to firms controlled by women (ie the government agreed to refund a percentage of winning bids by such firms), a female executive resigned her position at a large established firm to form a new company to bid in the auction and re-sell the rights to her original employer with—it is said—the resale terms settled in advance of her departure and a promise that she could return to her original job if her new company failed to win the auction. Such strategies obviously vitiate the point of bidding credits.

'split award' auction (in fact broader competition policy reasons dictated this choice anyway, once it became clear it was technically feasible).^{101 102}

UK Government legislation imposed other constraints on the 3G auction design that could only have been removed by parliamentary legislation—an option that was not favoured by Ministers for whom parliamentary time is a scarce resource; fortunately further legislation turned out to be unnecessary in this case. (See Binmore and Klemperer (2002).)¹⁰³

Political constraints are much broader than purely legal ones. For example, when the UK Competition Commission ruled on the proposed merger of private prison operators Falck and Wackenhut,¹⁰⁴ an important issue was whether the UK Prison Service could realistically use its monopsony power to eliminate competitive problems—for example, the political imperatives of privatization limited the scope to threaten public provision as an alternative to private procurement.

Internal-organizational issues can importantly affect behaviour in both the public and the private sector, since decision-makers' incentives are rarely perfectly aligned with their organization's. For example, managers may be much more interested in obtaining short-term cost savings than in avoiding 'lock-in' problems developing on follow-on contracts after they have moved on from their current jobs—it is very hard to structure incentives to overcome this problem. Decentralised decision-making also creates severe problems. The drug-purchasing decisions made by UK hospitals, for example, effectively determine many 'follow-on' drug purchases in the community—which are paid for by different parts of the National Health Service (NHS). It seems naïve to argue that because the NHS could in principle centralise its drug procurement, the competition authorities should not be concerned about the kind of predatory behaviour alleged in the NAPP case:¹⁰⁵ effective competition policy must sometimes take the larger organizational structure of bid-takers as given—just as it must often accept the current industrial structure.

Another constraint on bid-takers is that auction designs (especially government ones) are often susceptible to lobbying. In this context the bid-taker's ability to set and amend the rules can be a liability. I have described elsewhere how the Hong Kong 3G auction designers found their auction publicly vilified as the 'dark auction' and were forced to make a superficially small change to the rules that vitiated the point of the design and had disastrous consequences (Klemperer (2003a)). Industry lobbying also seems to have been effective in damaging the Netherlands 3G sales process—it is clear that the Netherlands' Government's choice of auction design was a very poor one for it, but a very profitable one for the incumbent operators (see section 5.2).¹⁰⁶

¹⁰¹State Aid rules create broader constraints. For example when I advised the UK on the design of the world's first auction of greenhouse gas emissions, the EU Commission insisted on rules that made a minimum number of winners sufficiently likely, and negotiating State Aid clearance was an important issue. (See Klemperer et al (forthcoming).) Nevertheless, the overall effect of State Aid legislation is probably to promote competition.

¹⁰²A Netherlands auction worth hundreds of millions of Euros famously fell foul of the EU and was—it is said—hurriedly redesigned on a Friday afternoon, with laughable results (see van Damme (1999)).

¹⁰³The Freedom of Information Act is a very recent piece of UK Government legislation that weakens bid-takers' power, by making it hard or impossible to keep auction outcomes secret (see section 6.1).

¹⁰⁴See UK Competition Commission (2002).

¹⁰⁵NAPP Pharmaceutical Holdings Ltd was able to preclude entry into the hospital market for sustained release morphine products. Sales to hospitals led to 'follow on' community sales where NAPP's prices were more than ten times higher. See Farrell and Klemperer (forthcoming). In principle the problems could probably have been resolved if purchases for hospitals and the community were made simultaneously by a single organization.

¹⁰⁶The industry also lobbied effectively against a better (ie earlier) timing for the auction, which might have made the flawed design less vulnerable. (The first European auction was always likely to attract the most potential entrants—see Klemperer (2002b, 2003a)—and the Netherlands' industry lobbying helped ensure that the UK won the race to be first by a clear margin.)

The UK design team had a happier experience when proposing two alternative similar designs meant that lobbyists for the incumbent operators (who hated both designs) concentrated much of their energy on the choice between them. Perhaps as a result, and even though (it is rumoured) they spent considerably more money in a few weeks lobbying against the designs than the UK Government spent on economic advice, modelling, and testing, over the whole two-and-a-half year process, our proposal that (either) one of the designs would be used survived their onslaught. (We graciously acceded to the lobbyists' choice between the two designs—as we anticipated, they preferred the same design that we did.) It was unsurprising that the incumbents spent so much money on lobbying, since a design that was different from either of the two we proposed could easily have saved them £15 billion.

Bidders are powerful in other ways too. For example, they may be able to subvert an auction if the bid-taker cannot commit to keeping information about bids secret. For example, a concern about the proposed BSKyB/Manchester United combination discussed above (section 5.2) was that the risk of information leaking through Manchester United to BSKyB would leave the Premier League (of which Manchester United is one member) unable to negotiate effectively with broadcasters.

Even bigger problems can arise if bidders refuse to accept the outcome of an auction, and the bid-taker cannot precommit to sticking to it (perhaps because shareholders, or more senior managers, or political masters cannot be precommitted, or because of legal constraints). As discussed above (section 4.1) this turns a so-called 'sealed-bid' auction into an ascending auction.¹⁰⁷ Thus, for example, although as we discussed in section 5.2 the Premier League could in principle have alleviated any 'toehold' problems by using a sealed-bid auction, the MMC took the view that the Premier League would be unable to stop the sales process degenerating into an ascending auction if that were in BSKyB's interest. This would be especially true after a BSKyB/Manchester United combination, since Manchester United could then help undermine the bidding process,¹⁰⁸ but the MMC noted that even on previous occasions, when no such combination existed, 'Although the sale of Premier League rights ... had the appearance of a sealed-bid auction, the reality was rather different'.¹⁰⁹

7. Other antitrust issues

Efficiencies in mergers

In 'ordinary' markets mergers often generate efficiencies through the transfer of more of the industry's output to a lower-cost firm, even if the merger does not reduce the component businesses' costs. In a 'winner-take-all' market efficiencies, if any, are of a different kind; a merger increases efficiency only if it increases the chance of the most efficient bidder winning. So, for example, in a private-values ascending auction there are no social efficiencies from merging, and in other kinds of auctions any

¹⁰⁷This has often been a problem in the sale of companies—including of Glaxo (see section 4.3) and RJR-Nabisco (see footnote 38).

¹⁰⁸The MMC wrote 'if it looked as if [BSkyB's] bid ... was not going to be successful ... Manchester United could come to the meeting of the Premier League at which final rights bids from broadcasters were due to be considered armed with authority from BSKyB to make an improved bid on BSKyB's behalf. Even if the introduction of an improved bid at the meeting were against the Premier League's bidding rules, we see no practical way in which it could be prevented. ... We think that it would not be too difficult to [at least force] the rights auction to go to another round ... by converting a sealed bid auction into an ascending price one it would gain an additional advantage from the toehold effect' (MMC (1999, paras 2.129-2.130)).

¹⁰⁹MMC (1999, para 2.115).

merger that makes a previously-symmetric industry asymmetric usually reduces efficiency.^{110, 111}

Merger simulation

Just as there is now a significant literature on simulation of the unilateral effects of mergers in 'ordinary' markets, so there is a subliterature on simulating unilateral effects when prices are set in auctions (looking at how the static Nash equilibrium of a market is altered by a merger), see Werden and Froeb (forthcoming).

Detecting collusion

On the one hand detecting collusion in auctions is potentially problematic, because of the low quality of information that is often available—often, the reason an auction rather than a more traditional posted-price process is used is precisely because bidders have poor information, and bidders have significant private information, about costs and valuations, perhaps for an idiosyncratic transaction. On the other hand, there is often extremely good data about all bids and, especially when many similar contracts are auctioned, it is possible to test whether suspected colluders behave similarly to assumed-competitive firms and, more generally, whether firm behaviour better fits a competitive or collusive model.¹¹² The literature on the econometrics of detecting collusion in auction markets is ably summarised in Harrington (forthcoming).¹¹³

Enforcement

A main theme of this paper (and of Klemperer (2002a)) is that the key antitrust challenge is simply to recognize that the particular method of price-formation in auctions and bidding processes does not affect the fundamental principles of antitrust. Historically anti-trust agencies have largely failed to grasp this. Bidders have openly taken actions in auctions that would never have been regarded as acceptable in 'ordinary' markets.

For example, regulators did not pursue the apparent use of bids in some of the early US mobile-phone licence auctions to signal to rivals in the manner illustrated in section 4.4. (One problem is persuading courts that observed bidding is necessarily anti-competitive signaling; usually some competitive story can be concocted.) Similarly, statements that would be classed as predatory in 'ordinary' markets passed

¹¹⁰In theory symmetric models usually have efficient outcomes. In practice, outcomes are not always efficient, and a merger that created a sufficiently strong firm might improve efficiency.

¹¹¹Of course, a merger can still create efficiencies if it lowers the merged firm's costs below the minimum of either merging party's costs—for example, if it turns two small firms, who could not realistically compete independently for a contract, into a single operator with the scale to compete for the contract—but this point applies equally to 'ordinary' markets.

¹¹²The data is often better for sealed-bid auctions (since losing bids are often available) than for ascending auctions (where only the final loser's drop-out price is generally known), but on the other hand the relationship between bids and valuations or costs is much simpler in an ascending auction.

For example, Porter and Zona (1993) and Bajari and Ye (2003) examine data sets of first-price sealed-bid procurement auctions for highway construction contracts and for highway maintenance projects, respectively, while Porter and Zona (1999), Lanzillotti (1996), Scott (2000) and Pesendorfer (2000) all look at such auctions for school milk; Baldwin, Marshall and Richard (1997) and Banerji and Meenakshi (2004) look at ascending auctions of timber and wheat, respectively.

One issue is that a clever-enough collusive mechanism could, in principle, mimic what would be the competitive outcome with different costs or valuations. Another issue is that the tests in these papers may be sensitive to misspecification of, eg costs, and we have already noted that although there may be good data about bids, other data about auctions is often poor. In practice, however, these studies seem to have some success in identifying collusion; some of their results are corroborated by independent information about whether collusion was present.

¹¹³See also Porter (2004). Harrington also analyses broader implications of collusion that apply to 'ordinary' as well as auction markets.

unchallenged, and the ARCO Vice-President who originally encouraged his staff to coin the evocative term, the 'winner's curse', and discuss it at industry gatherings and so persuade competitors to bid less aggressively, actually described his strategy as 'legalized collusion'.¹¹⁴ Collusion in takeover battles for companies is legal in the USA. However, the US Department of Justice did successfully pursue a case of using bids to signal in a more recent spectrum auction,¹¹⁵ and the US competition authorities are arguably more sophisticated in their treatment of bidding markets than sometimes seems to be the case elsewhere in the world.

European antitrust has been even more feeble than in the USA. Regulators have tolerated a range of explicit collusive and predatory statements about auctions that would surely be unacceptable if made about a 'normal' economic market,¹¹⁶ and accepted joint-bidding agreements that are, in effect, open collusion.^{117, 118} It may be that the antitrust climate for auctions has toughened a little: T-Mobil was willing to explicitly confirm the way its rival and it had used bids as signals to coordinate a rapid end to a German spectrum auction in 1999, but the same firm (and its competitors) refused to confirm officially that they were signalling to rivals when apparently similar behaviour was observed in the German 3G spectrum auction a year later.¹¹⁹ However, European regulators have shown little appetite for pursuing such matters,¹²⁰ and often persist in treating auction markets more laxly than 'ordinary' economic markets. The European Commission's treatment of some recent bidding-market cases suggests some improvement in the level of its analysis. But Europe still has a long way to go in its handling of auctions and bidding processes.

8. Conclusion

Discussions of 'bidding markets' often confuse details of the price formation process (whether or not there is an auction or bidding system) with deeper structural features

¹¹⁴See American Association of Petroleum Geologists (2004), describing the process leading Atlantic Richfield Company staff to the publication of Capen, Clapp, and Campbell (1971). Of course, the line between legitimate dissemination of research results and other efficiency-enhancing information sharing on the one hand, and illegitimate behaviour on the other, is a hard one to draw. But Klemperer (2002a) suggests Pacific Telephone should perhaps have been regarded as having crossed that line with their remark prior to the main US 1995 mobile phone license auction that 'if somebody takes California away from us, they'll never make any money'—this seems to correspond to threatening that 'if anyone tries to compete with us, we'll cut the price until they lose money'. Likewise, Pacific Telephone's hiring of an auction theorist to explain the winner's curse to competitors might correspond to hiring an industrial economist to explain the theory of the difficulties of entering new markets to potential entrants.

¹¹⁵The case resulted in consent decrees against Mercury PCS II, L.L.C., Omnipoint Corporation, and 21st Century Bidding Corp. See *US v. Mercury PCS II, L.L.C.* (1998).

¹¹⁶Klemperer (2002a) cites many examples: for example, before the Austrian third-generation spectrum auction Telekom Austria, the largest incumbent and presumably the strongest among the six bidders, said it 'would be satisfied with just two of the 12 blocks of frequency on offer' and 'if the [five other bidders] behaved similarly it should be possible to get the frequencies on sensible terms', but 'it would bid for a third block if one of its rivals did' (Reuters, 31/10/2000). It seems inconceivable that a dominant firm in a 'normal' market would be allowed to make the equivalent offer and threat that it 'would be satisfied with a market share of just (one-sixth)' and 'if the other five firms also stick to (one-sixth) of the market each, it should be possible to sell at high prices', but 'it would compete aggressively for a larger share, if any of its rivals aimed for more than (1/6)'.

Similarly, during the German third-generation spectrum auction, MobilCom told a newspaper that 'should [Debitel] fail to secure a license [it could] become a 'virtual network operator' using MobilCom's network while saving on the cost of the license' (Benoît, 2000 p.28). This translates roughly to a firm in a 'normal' market saying it 'would supply a rival should it choose to exit the market', but MobilCom's remarks went unpunished.

Glaxo let it be known that it 'would almost certainly top a rival bid' (Wighton 1995b) in the takeover battle discussed in section 4.3, which would roughly translate to an incumbent firm in a 'normal' economic market saying it 'would almost certainly undercut any new entrant's price'.

¹¹⁷The 2000 to 2001 European 3G auctions provide numerous illustrations. See Klemperer (2002b).

¹¹⁸One issue is that bidders are buyers rather than sellers in many auctions, and the European Commission guidelines on cooperation agreements (European Commission, 2001) are much more tolerant of cooperation among buyers than of cooperation among sellers. This is another respect in which US antitrust seems to differ from European antitrust.

¹¹⁹The co-ordination in the 1999 German auction is described in footnote 54. On the occasion of the later 3G auction, the Financial Times reported: 'One operator has privately admitted to altering the last digit of its bid in a semi-serious attempt to signal to other participants that it was willing to accept [fewer lots to end the auction]' (Roberts and Ward, 2000, p.21), but the firms were not willing to confirm this. See Klemperer (2003a, 2002d) for more discussion of these two auctions.

¹²⁰This kind of signalling behaviour could perhaps be challenged as an abuse of 'joint dominance' under EC and UK law.

of the market. While these structural features are often associated with auction processes, they need not be. Furthermore, while these structural features would—if they obtained—lead to very optimistic conclusions about the welfare consequences of the markets, this is nothing new. And if—as is common—they do not apply, similar competition problems arise in auction markets as in ‘ordinary’ economic markets, and for similar reasons. Moreover, even where behaviour in auctions is a little different, or more extreme, than in an ‘ordinary market’—in particular, in some ‘ascending auction’ cases—these differences can usually be understood in terms of the standard principles of antitrust.

In short, the term ‘bidding market’ as it is widely used in antitrust seems unhelpful or misleading.

Auctions and bidding processes do have special features, including their special price-formation processes, common-values behaviour, and bid-taker power. However, the significance of some of these features has been greatly overemphasized, while others imply a need for stricter rather than more lenient antitrust policy.

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