Efficient, competitive, and informed markets: Australian Corporations Law and auctions.

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This is work in progress.

CONTENTS

1. Introduction

Section 731 of the Corporations Law requires the Australian Securities Commission (ASC) to "take account of the desirability of ensuring that the acquisition of shares in companies takes place in an *efficient, competitive,* and *informed market*" [my emphasis]. It also requires the ASC to have regard to the need to ensure:

a. "that the shareholders and directors of a company know the identity of any person who proposes to acquire a substantial interest in the company;

b. that the shareholders and directors have a reasonable time in which to consider any proposal under which a person would acquire a substantial interest in the company;

c. that the shareholders and directors of a company are supplied with sufficient information to enable them to assess the merits of any proposal under which a person would acquire a substantial interest in the company; and

d. that, as far as practicable, all shareholders of a company have equal opportunities to participate in any benefits accruing to shareholders under any proposal under which a person would acquire a substantial interest in the company."

The ASC, however, is not required "to exercise any of its powers in a particular way in a particular case".

It is my purpose in this paper to examine a particular case: the approved exemptions given by the ASC in late 1994 for Colonial Mutual Assurance Society Limited (CML) to sell its 51.05% share in Australian Agricultural Company Limited (AAC) by sealed-bid takeover offer (Bice 1995). There can be no doubt that this parcel is a "substantial interest" in AAC.

The paper examines the literature on open-bid and sealed-bid auctions, in order to discuss the role of large shareholders, the use of two-tier auctions to reduce the winner's curse effect (which is not dissimilar to the two-stage sealed-bid auction under review here), and the social effects of costly bidding and defensive actions.

1.1 Procedure

We compare the characteristics of sealed auctions (closed tender auctions) to open English auctions for the sale of the substantial interests in the ownerships of Australian corporation in general, and the 51.05% of the AAC, in particular.

More precisely, I examine the efficiency and competitiveness of these two forms of auctions, and also consider the informational requirements and the seller revenue, under various assumptions about the bidders' valuations of the target firm, and the risk profiles of the bidders.

We argue that the ASC-approved closed tender process would have resulted in a less informed market than would an open auction, and that sub-sections (a) and (c) of Section 731 of the Corporations Law are not

satisfied.[1] As an economist, I believe that, as well as resulting in an uninformed market ignorant of the bids and the identities of the bidders, the ASC-approved process could not result in an efficient and competitive market either. As I see it, the issue of *efficiency* is crucial, as I shall explain. I shall also discuss the issue of *competition* in auctions.

This is Part One. Part Two introduces the definitions and concepts, including open and closed auctions, common and private and affiliated values, risk profiles, bidding strategies, competition, efficiency, and the winner's curse. Part Three continues the comparisons of open and closed auctions begun in Part Two, with respect to efficiency, competition, and seller revenue.

2. Definitions and Concepts

2.1 Auctions

Auctions resolve two uncertainties: first, they determine who the new owner—the successful bidder—of the asset being sold is, and, second, they determine the price at which the asset is exchanged. We are considering auctions for a single object, the CML 51.05% parcel of AAC.

There are several ways to classify auctions: we discuss whether the auction is open or closed, and whether the valuations of the item being auctioned are independently private or commonly held or affiliated (which is similar, but not identical, to correlated values).

2.1.1 Institutional Rules: Open or Closed Auctions can be classified according to the different institutional rules governing the exchange or conveyance. Since Vickrey (1961), these rules have been known to be important, because they can affect bidding incentives, and so the terms, the efficiency, and the competitiveness of the conveyance. The two we consider here are:

1. the closed tender, or *sealed-bid* or written bid auction, in which each bidder makes only one bid, in confidence. The highest bidder is awarded the asset at a price equal to the amount of his high bid.

2. the *open*, ascending-bid English auction, in which bids are common knowledge and ascend, as the latest bid is the highest so far, until no further bids are made, and the asset is sold to the highest bidder at a price equal to the highest bid. This English, open-bid auction can occur over a short time in one place, or can be held more slowly without the necessary presence of the bidders, so long as bids rise and all bids may be known (and usually bidders' identities too).

In the public takeover process under the Corporations Law, there is additional information: the Part A statement informs the market about each bidder and his intentions in the bidding, and the Part B statement in response from the target firm provides such information as the target firm's

1. Since my focus is information and efficiency, I do not address sub-sections (b) and (d) further.

directors' recommendations and often an expert evaluation of the target firm.

We are here considering an auction for a parcel of shares, the 51.05% of AAC owned by CML. The ASC's exemption would have allowed CML to use a closed tender or sealed-bid auction, in which the highest bidder is awarded the parcel at a price equal to the amount bid. How can we compare the general performance of the two auctions? The main purpose of this paper is to examine how the two forms of auction differ in terms of efficiency, competition, and information.

2.1.2 Common Value or Private Values or Affiliated Values The essence of any auction is asymmetric information: bidders value the item for sale differently, but no-one knows exactly how high anyone else values it. The uncertainty about the bidders' valuations can arise in two distinct ways—which affect bidding behaviour, as discussed below. These two ways need not be mutually exclusive—both effects can occur simultaneously—but it is helpful to consider them separately.

The second classification is the extent to which bidders have *private values* or *common value* for the asset being auctioned.

1. If a bidder can take special advantage of the asset being auctioned, then he may value it more than does someone who is only considering, say, its resale value. This idiosyncratic or *private value* may be for sentimental reasons or for reasons related to the bidder's existing assets, which may be complemented by the target firm's assets. For instance, the owner of a hamburger chain may value a beef property more highly than does a media company looking to diversify.

   With true, unaffiliated, private values, knowledge of others' valuations will not change any bidder's valuation, in principle.

2. *Common value* is related to market or resale value: the value of the asset to the bidder when the asset has no special appeal or complementarities for the bidder. In this case, bidders' valuations differ because they have access to different information about the asset's unique or true value: each bidder must guess this value, but does not know the other bidders' estimates. For instance, oil companies may have different information about a particular tenement and so value it differently, although its value in the hands of any of them would be the same.

   With true, common values, each bidder's signal or value is a sample estimate of the true common value, so knowledge of others' values will lead to any bidder's revising his, in general.

There is an intermediate category which includes the common-value auction as an extreme case: the *affliated*-value auction, in which bidders' values are more than correlated, but their values may differ. We discuss this further below.

For a small parcel of shares of AAC, the share-market price at any instant provides a common value. Before takeover speculation began, the share-market price (necessary for a less-than-controlling unit share) would have under-estimated the value of the 51.05% parcel being auctioned here,

since the parcel represents a controlling interest. None the less, the value of the parcel may still have strong common-value elements among the potential bidders.

2.1.3 Takeovers and Value Different types of takeovers exemplify the distinction between private values and common value. In a "synergistic" takeover the bidding firm perceives specific gains to be realised by combining with the target firm: from merging the marketing or research-and-development facilities of the two firms, or exploiting its increased market power, or creating tax advantages for the combined firm that are not available to the two firms separately, or tying in a supplier upstream or a customer downstream. This is an instance of private values: because the synergies vary from bidder to bidder, so do the potential bidders' estimates of the improvement of the target's profits they could achieve. Thus the potential bidders' values of the target also vary.

In a "disciplinary" takeover the bidding firm expects that by reorganising or changing the target firm's management, the target's profit and share price will rise. This is an instance of common value: nothing peculiar to the bidder creates the takeover opportunity, and so any competent managerial team could generate improved performance. Since information is hard and costly to acquire, however, there is no unanimity among bidders before the target is actually taken over about its profit potential.

The existence of traders with private information complicates the question of how share-trading mechanisms should be designed. In the absence of any private information about future payoffs, competition leads to efficiency, as in standard theory. But when there is private information the design of markets becomes more complicated since different market mechanisms have different informational characteristics. Even the intuition that competition leads to efficiency may not hold: it is possible for the market to close down completely—a trade halt (Glosten 1992).

2.2 Bidding Strategies

2.2.1 Bidding Strategies in Open Ascending (or English) Auctions First, assume private values only, so that no bidders learn anything about their own valuation of the asset from the identities of the other bidders or their bids (this will occur when there is no resale value, no substitutes about which others have private information about how much others admire the item). Then each bidder's dominant strategy is to bid no more than his (private) valuation, in which case the asset is sold to the bidder who values it most highly, and the price is the second highest bidder's valuation (or just above). For this reason, English auctions are known as *second-price* auctions (SPA).

Alternatively, assume that the bidders are speculators whose sole reason for buying the asset is to resell it later for a profit. All bidders, therefore, are trying to guess the same number: the future value of the asset, perhaps suitably improved. Based on their different information, their values will differ. This is the common-value case. Since the open-bidding process provides bidders with information of others' estimates of the common value, each bidder's dominant strategy is to bid no more than his valuation, as

above, with the proviso that each bidder will revise his estimate of the common value as he observes his rivals' bidding behaviour, which may reveal their estimates.

2.2.2 Bidding Strategies in Closed Tenders In a closed auction with private values there are two risks to be balanced, and three to be balanced with common value:

1. Bidding low risks bidding less than some other bidder and so losing a profitable opportunity.
2. Bidding high risks bidding much above the next highest bidder and so paying more than necessary to win.
3. With common value, there is also the risk of paying more than the item turns out to be worth, the "winner's curse.".

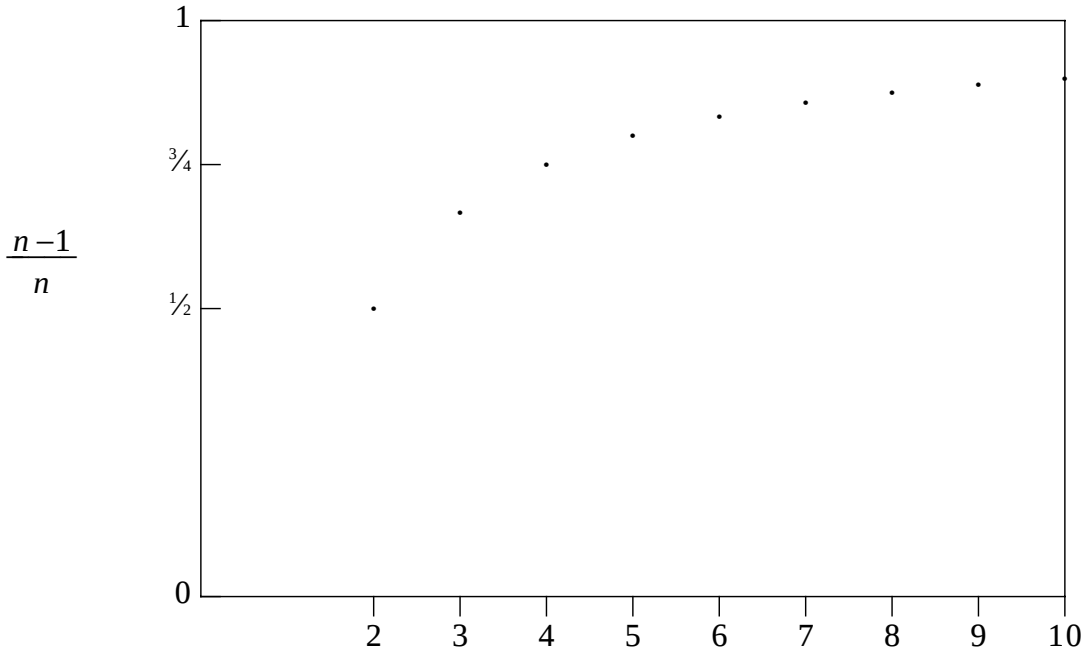
It is not true to conclude, therefore, that a risk-averse bidder in a closed tender will always bid low: bidding low is risky too, it is not necessarily playing safe.

Assume bidders have private values only. If any bidder assumes his valuation is the highest, this assumption is costless: losing bidders pay nothing. (Once, that is, the costs of preparing the bid have been sunk.) In the first-price sealed-bid auction (FPA), each bidder independently submits a single bid without seeing others' bids, and the object is sold to the bidder who makes the highest bid. The winner pays his bid: that is, the price is the highest, or *first price*.

The bidder does not know exactly how far below his the next-highest valuation is, but, if he knows the number and identity of competitors (or expectations of these), then he can estimate what the second-highest valuation is likely to be. Following this process, he may submit a bid equal to this estimated second highest valuation. A rule of thumb developed by McMillan (1992) for estimating the next highest valuation when the other bidders' values are believed to be from a single uniform distribution is to reduce one's bid by a half of the range of possible values (which equals one's value less one's estimate of the lowest valuation of one's competitors) when there are two bidders, by a third when three, by a quarter when four, and so on. As the number of bidders rises, each bid approaches the bidder's own valuation, as seen in the graph below.

2.3 Revenue Equivalence

There has been a concentrated effort to analyse auctions over the past twenty odd years. In fact, William Vickrey (1961) was the first to use game theory to analyse auctions, and Vickrey was the first to sketch and partly prove the significant result about the equivalence in expected revenue of different auctions — the Revenue Equivalence Theorem — which states, broadly, that when each of a given number of risk-neutral potential buyers of an object have a privately known signal, independently drawn from a common, strictly increasing, atomless distribution, then any auction mechanism in which (a) the object always goes to the buyer with the highest signal, and (b) any bidder



with the lowest-feasible signal expects zero surplus, yields the same expected payment as a function of his signal. (See Klemperer 1999 for an extended review and simple proof.)

For the symmetric independent private values (SIPV) with risk neutral agents, in a single-unit auction where the bidders' unknown valuations are iid and continuous random variables uniformly distributed on the support [0,1] and the seller's own valuation and minimum bid are zero, Wolfstetter (1999) shows that the unique equilibrium bid functions $b^*:[0,1]\to\mathbb{R}_+$ are:

$$b^*(v) = v \quad \text{English auction}$$

$$b^*(v) = \frac{n-1}{n}\,v \quad \text{Dutch auction}$$

where there are $n > 1$ potential buyers. In both auctions the expected price is

$$\bar{p}(n) = \frac{n-1}{n+1}.$$

In the Dutch (first-price) auction the random equilibrium price P_D is equal to the highest bid, which can be written as $b^*(V_{(n)})$. where $V_{(n)}$ denotes the highest order statistic of the entire sample of n valuations. Therefore, by a known result on order statistics,

$$\begin{aligned}\bar{p}(n) &= E\left[b^*(V_{(n)})\right] \\ &= \frac{n-1}{n} E\left[V_{(n)}\right] \\ &= \frac{n-1}{n+1}.\end{aligned}$$

In an English (second-price) auction, truthful bidding, $b(v) \equiv v$, is a weakly dominant strategy. Eliminating weakly dominated strategies, the bidder with the highest valuation wins and pays a price equal to the second highest valuation. The random equilibrium price P_E is equal to the order statistic $V_{(n-1)}$ of the given sample of n valuations. And the expected price is

$$\bar{p}(n) = E\left[V_{(n-1)}\right] = \frac{n-1}{n+1}$$

Note that the result applies to both private-value models (in which a bidder's value depends only on his signal), and to more general common-value models, provided bidders' received signals are independent. The result relies on three assumptions: (1) risk neutrality, (2) independent private information, and (3) that buyers' private values as signals are drawn from a common distribution (symmetry).

Thus the English open ascending-bid and the first-price sealed-bid auctions, as well as many others (the Dutch descending open-bid, the second-price sealed-bid or Vickrey auction, and "all-pay" auctions) yield the same expected revenue, when the three assumptions hold.

Bulow and Klemperer (1996), following earlier work by Myerson and Bulow and Roberts, show that, under the assumptions of the Revenue Equivalence Theorem, the expected revenues from an auction equal the expected marginal revenue of the winning bidder, where when the bidders have independent private values (IPV). A bidder's "marginal revenue" is defined as the marginal revenue, at the bidder's value, of a firm whose demand curve is constructed from an arbitrarily large number of bidders whose values are independently drawn from the value distribution.

So in an optimal auction the object is allocated to the bidder with the highest marginal revenue, and so an auctioneer should not sell at a price below a reserve price set equal to the value to the auctioneer of retaining the unit. If the auctioneer is simply maximising revenue, then the reserve price should be set to zero.

When bidders are symmetric, that is, when their signals are drawn from a common distribution, any standard auction sells to the bidder with the highest signal, so, under reasonable assumptions, the winning bidder has the highest marginal revenue, and all the standard auctions are optimal if the seller imposes the optimal reserve price. (See Klemperer 1999 for elaboration on this.)

There are two important assumptions underlying the Revenue Equivalence Theorem, which can be relaxed: the assumption of a fixed, exogenous number of bidders (whose number and identities are common knowledge to all bidders and the seller), and the assumption of risk-neutrality. We shall consider the first assumption later.

2.3.1 Risk-Averse Bidders Although the expectations of the two random prices, P_D and P_E, are equal, they differ in their risk characteristics. Wolfstetter (1999) shows that P_D second-order stochastically dominates P_E, so that all risk-averse sellers unanimously prefer the Dutch first-price auction to the English second-price auction.

When we relax the assumption of risk-neutrality, a risk-neutral seller facing risk-averse bidders prefers the first-price auction (FPA), such as the sealed-bid, to the second-price auction (SPA), such as the English auction. When a risk-averse seller faces risk-neutral bidders, he prefers the FPA to the SPA, as mentioned above. But, although the FPA leads to higher prices with risk-averse buyers (which might suggest that bidders would prefer SPA), the FPA prices are less risky (Klemperer 1999). Matthews (1987) shows that buyers with constant absolute risk aversion (CARA) are indifferent between FPA and SPA, and with increasing absolute risk aversion (IARA) tend to prefer FPA.

2.4 Competition in Auctions

Define the degree of *competition* by the number of bidders in an auction. In an open auction competition is measured by the number of parties willing to bid before they observe the first open bid. (This is known as the number of potential bidders, an upper limit on the expected number of bidders; see Levin & Smith 1994.) I believe that the number of bidders is affected adversely by the amount of uncertainty in the auction, which in turn is affected by the type of auction structure: open or closed. In general, competition matters.

In closed tender auctions, as discussed above, if the number of bidders is small (as it might be in conditions of complete confidentiality, when not even the number of competing bidders is known), then the winning bidder will, on average, earn a large amount of "profit". If the number of bidders is higher, then the winning bid is higher, and the profit built into the bids is lower, on average. This is explored by Wilson (1977), Milgrom (1981), and McMillan (1992).

In open English auctions, the simple rule "stay in the bidding until the price (or highest bid) reaches your own valuation" means that the winner must earn a "profit", since he pays less than his valuation. What are the determinants of the second-highest valuation and thus of the price? The greater the number of bidders, the closer the second-highest valuation is, on average, to the highest valuation (which may also be higher as the number of bidders rises). Thus increasing the number of bidders in an open auction on average increases the price.

The closeness of the bidding is also affected by the degree of dispersion of the bidders' valuations: the greater the dispersion, the larger, on average, the difference between the highest and the second-highest valuations. If there is wide disagreement about the asset's worth, the winning price will probably be lower. This is an argument for the seller informing the potential bidders about the value of the target asset, as usually happens in a Part B statement, under the Corporations Law. But, as Klemperer (1999) outlines, in pure-common-value auctions (but not in private-value auctions) expected

seller revenues can be decreasing in the number of bidders.

2.4.1 Endogenising the Number of Potential Bidders The question of how the type of auction mechanism affects the seller's expected revenue runs through the auction literature. The expected revenue equivalence has been established for a variety of auction forms, with risk-neutral bidders, independent privately know values, and for the case of a fixed number of bidders (Engelbrecht-Wiggans 1991).

But what if the mechanism (the auction form) itself might affect who bids, the number and identity of potential bidders? A stated reserve price might deter potential bidders, as might the existence of costs to enter the auction. But French and McCormick (1984) argue that in the case of sunk costs, for instance, of the bid preparations, each bidder will often pay less for the asset being auctioned than he thinks it is worth — even when there is vigorous competition, so that the successful bidder's expected profit equals the sum of his competitors' sunk costs, which are then paid by the asset owner, the seller, via the lower winning bid.

Indeed, with endogenous entry, additional entering firms will drive out all expected profits for the bidder, so the seller's expected revenue becomes a measure of the total social welfare. Levin and Smith (1994) model such entry as a mixed strategy, above a certain number of potential bidders. They show that, with risk-neutral bidders, revenue equivalence survives the induced entry of bidders. They also include coordination cost increasing in the number of potential bidders, and show that more bidders is not necessarily better: there is an optimal "thickness" of the auction as reflected in the number of potential bidders.

McAfee and McMillan (1987) model bidders entering an auction on bearing an entry cost, such as the cost of preparing a bid. With risk-neutral bidders, and bidders' private valuations drawn independently from the same distribution, they argue that a first-price sealed-bid auction with a reserve (which may equal zero, but should equal the seller's own valuation) attracts the optimal number of bidders — an optimal auction.

There appears to be no formal modelling of the case in which risk-averse potential bidders are, as I assert, deterred from bidding by the perceived risk which flows from their lack of information of numbers and identities of other potential bidders. Matthews (1987) discusses the conditions under which risk-averse bidders with private values might prefer a SPA to a FPA with revelation of the number (but not the identities, which anyway are irrelevant in a symmetrical, private-value auction) of potential bidders to a FPA with no such revelations, such as the ASC approved for the auction under discussion. Preferred auction mechanisms should be more popular (attractive to potential

bidders) than other mechanisms.

2.5 Efficiency in Auctions

Characterise an auction as being *efficient* if and only if there is no opportunity for arbitrage: no improvement can be made to the satisfaction of one or more persons without making at least one person worse off.[2] For efficiency, the purchaser must be the person who values the asset most highly, for, if not, then that person could offer more than the winning bid and both parties would be made better off by the exchange. It is *not* necessary for efficiency that the buyer's price equals his valuation; that is, it is not necessary that the seller revenue be maximised. An auction is efficient so long as the highest valuer becomes the new owner, even if the price being paid is less than the valuation.

Indeed, when the high valuer is the high bidder, and hence the new owner, there is no possibility for arbitrage so long as the price paid was at least as high as the second highest valuer's valuation: as we see below, this will happen in the case of English open bidding, but may not in sealed bidding.

Efficiency can be measured as the sum of the gain to the buyer and the seller revenue: this is a maximum when no arbitrage is possible. With this definition of efficiency, it is not necessary for efficiency that revenue be maximised, although on the face of it such maximisation would be sufficient, since if revenue is maximised, it cannot be the case that there exists the possibility of arbitrage, in which an unsuccessful bidder who values the asset more than does the new owner would thus be willing and able to pay more than did the new owner.

When we allow endogenous entry of potential bidders, the seller's payoff will equal the auction's efficiency, since the bidders will enter until their expected payoff is zero.

2.5.1 Auction Structure and Efficiency How can the structure of the auction affect its efficiency? Vickrey (1961) demonstrated that the Dutch open-outcry descending price auction (not to be confused with the finance trade's "Dutch" auction—see below) and the sealed bid auction are identical: the only real choice is a bidder has is to select his "bid" price. That is, the winner at the winner's price shall be the same for a sealed bid auction or a Dutch auction.[3]

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2. This definition is equivalent to Malkiel's (1992): a capital market is said to be efficient if it fully and correctly reflects all relevant information in determining security prices. Formally, the market is said to be efficient with respect to some information set if security prices would be unaffected by revealing that information to all participants. Efficiency with respect to an information set implies that it is impossible to make economic profits by trading on the basis of that information set: no arbitrage.
3. Experiment evidence suggests that for small stakes lab. experiments, the prices paid in a Dutch auction are less than those paid in a sealed bid auction (Cox et al. 1983). This is explained by Milgrom (1989) as possibly due to lack of planning in the laboratory Dutch auctions, or not wanting to end the anticipation of awarding the "mine", or possibly subjects not maximising expected utility.

In an English auction with private values or common value, each bidder's dominant strategy is to bid up to his valuation, in which case the asset is sold to the bidder who values it most highly, and the price is the second highest bidder's valuation (or just above). This is efficient: there is no opportunity for arbitrage.

To what extent might a closed bidding process result in inefficiences? Given the lack of information about others' bids and hence others' valuations in a closed auction, there is no guarantee that:

1. the winner is the bidder who values the asset most highly, or
2. the price is greater than the second-highest valuation.

Thus there is no guarantee in a closed auction that the process results in an efficient outcome. This is true especially if the market is not informed, in the absence of Part A and Part B statements. In the case in question, if the 51.05% CML parcel is sold to a buyer at a price less than another party would have paid, then an arbitrage opportunity exists. In this case, the selling mechanism has resulted in an inefficient allocation.

In a closed auction, those bidders who are not deterred by the lack of information are trying to balance the risk of paying too much against the risk of paying too little. There is a further element which may result in inefficiencies in a sealed-bid auction: the possibility with common value that the winning bidder may find that he has paid too high for the asset: the winner's curse.

2.6 The Winner's Curse

The "winner's curse" hypothesis may explain the observation that target shareholders do well from takeovers, especially when made by takeover offers in which the high bidder gains control at the high bid for the target shares (Roll 1986). In any auction mechanism, where the value of the asset is uncertain but will turn out to be the same for all bidders, the party who overestimates the value of the asset is likely to outbid all others and take possession. But such winners are then "cursed" by having paid more for the asset than its true value. Unless this adverse selection process is accounted for in the bidding, it will result in winning bids that produce below-normal or even negative returns to the buyer (Levis 1992).

Varaiya (1988) predicts that the size of the winner's curse effect in takeovers will be greater (1) the greater the divergence of opinion among bidders with respect to the size of the takeover gains, (2) the greater the degree of competition for control of the target firm, and (3) the greater the pre-acquisition profitability of the winning bidder.

I believe that the lack of information of others' bids (and the absence of Part A and Part B statements) in the closed tender process which the ASC approved for the sale of the CML parcel would have increased the likelihood of the winner's curse for any level of Varaiya's factors (1), (2), and (3). An open auction, on the other hand, would reduce the likelihood of the winner's curse.

As discussed in Part 3 below, I believe that open auctions will, in general, result in higher seller revenue than will closed tender auctions. This can be reconciled with the argument that open auctions also reduce the likelihood of the winner's curse by the observation that, in an open auction, bidders and potential bidders are better informed than in a closed tender. The resulting lower uncertainty faced by bidders in the open auction will lead to more competition: a greater number of bidders. With private values (such as a synergistic takeover), more bidders will increase the range of bidders' valuations of the target, and so can increase the seller revenue (the price) without increasing the winner's curse effect.

2.6.1 Public Policy Implications of the Winner's Curse What are the implications of the winner's curse for public policy? Assume that public policy will measure the allocation of resources through auctions by the efficiency of the auction, without concern for the seller revenue or the net position of the highest bidder after ownership has been transferred, except in cases of the social costs discussed next.

As far as the target shareholders are concerned, such premiums are a good thing. On the face of it, it's just an issue of the distribution of any synergistic gains from gaining control of the target firm between the winning bidder and the selling shareholders (here, CML and the rest of the AAC shareholders). But, as the evidence of the excesses of the capital markets in the 1980s reveals, if buyers pay too much for assets, then the social costs may be not insignificant.[4]

This is not to argue against takeovers, since they—or their prospect—provide an important discipline for managerial performance: if this is poor, then a takeover may result in better management of the assets. Nor should policy prohibit buyers from making mistakes and paying too much for their assets. But when there are social costs, there is a rôle for government policy to encourage efficient behaviour in the market for corporate control. On efficiency grounds, any bidding for control should be fully informed, and an open takeover auction (such as the U.S. Williams Act[5] requires) means that the potential inefficiences of the winner's curse are less likely to occur.

Moreover, Hausch (1986) argues that an open auction will raise more revenue for the seller, since the lower risk of a winner's curse will result in more bidders, and so greater competition. That is, an open auction may dominate a closed tender process: more efficient and more competitive, resulting in higher seller revenue. I find this convincing.

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4. Not least if the new owners are unable to service their debts from the cash flow of the newly acquired asset, even after reorganisation and realisation of any synergistic gains. At that point the new owners may start looking for short-term cash flows at the expense of long-term profits.
5. I do not claim expertise in interpreting the Williams Act. Almost all of the economic literature on auctions and bidding is American in origin, and so refers to this American Act, which I am informed is conceptually similar to Chapter 6 of the Australian Corporations Law.

3. A Comparison of Open and Closed Bidding

For the most part, the literature has been concerned to characterise the "optimal auction" from the seller's point of view. The seller usually gets to choose the method of sale, and it is in the seller's interest to maximise his revenue from the sale. The seller is generally not concerned with the issues of Section 731—an efficient, competitive, and informed market—except insofar as they increase his revenue.

3.1 Efficiency

In his survey of the research on auctions, Milgrom (1989) argues that with a sealed high-bid auction there is no assurance that the equilibrium outcome[6] will be efficient. He asserts that in any environment in which the bidders have observably different characteristics, the equilibrium outcome of a sealed high-bid auction is inefficient with some positive probability.

This can be illustrated with a very simple example of two bidders, one of whom is known to have a valuation of $101, and a second whose valuation is either $50 with a probability of 4/5, or $75 with a probability of 1/5. The first bidder knows the probability distribution of the second's valuation, but not its realisation. If the first bidder bids $51, then he will win $50 net at least 4/5 of the time, an expected return of at least $40. If he bids $62 or more, he can win no more than $39, so he will never bid $62 or more, as a risk-neutral bidder will prefer an expectation of $40 to $39. Since the first bidder never bids as much as $62, an optimising second bidder must win sometimes when his valuation is $75 (and he bids above $51). At these times the allocation is inefficient: the low-valuation bidder sometimes wins, and an arbitrage opportunity exists. Had the auction been open, the low-valuation bidder would never win, since his bids would reveal his current valuation to the high-valuer, who would then be willing to over-bid. In reality, no bidder ever has such a clear idea of his opponents' values, which means that efficiency is even less likely, given the lack of information of a sealed-bid auction.

When bidders' private valuations are independent and identically distributed, so that bidders cannot discern differences among their rivals, both the English open bid and the sealed high-bid auction are efficient.

With affiliated or correlated values, which may be common or private, Milgrom argues that although the open and sealed are equally efficient (with equal expected total surplus), the seller's expected revenue is higher in the open auction, because of the informational availability.[7]

A further source of inefficiency with the sealed-bid auction is the cost of preparing and making the bid. Closed auctions that provide large returns to

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6. A technical term, reflecting the use of game theory to derive bidders' optimal strategies.
7. Note however that Milgrom makes strong assumptions to obtain his results: symmetric bidding models, risk neutrality (with private values, risk aversion in the sealed bid auction will increase seller expected revenue), and equilibrium strategies (assume that others cannot improve their positions so long as my position is best for me).

information gathering are likely to increase bid-preparation costs. The open-bid auction economises on information, which is partly revealed through the bidding, and hence may have a higher efficiency than the sealed-bid auction.

3.1.1 Efficiency and Defence Takeovers often involve auctions, in which two or more bidders compete for a target firm. If bidders have common valuations, then a target may find that uninformed bidders are reluctant to compete against an informed one. Thus, a reluctant target may gain from restrictions on counteroffers by the informed bidder. The requirements for disclosure and delay introduced by the U.S. Williams Act of 1968 resulted in a fall in premiums paid in cash takeover offers (Hirshleifer 1992). That premiums fell is not, however, sufficient to conclude that efficiency also fell, since it may mean that the successful bidder's returns net of the cost of investigation were increasing.

This observation can be seen to reinforce the public policy provisions of Section 731. In both the U.S.A. and Australia, the takeovers law can be consistently seen as seeking the most efficient, informed, and competitive market for takeovers.

3.2 Information

Takeovers and mergers serve an important rôle in the process by which resources are efficiently allocated with a competitive economic system. For example, synergistic gains due to operating economies of scale are sufficient justification for organisational combinations, accomplished either by negotiation or by a direct offer to shareholders (takeover). In a world of perfect markets, all valuable combinations would be completed either with simple negotiations or a single bid takeover offer; the distribution of the synergistic gain between combining firms would be a function of their relative contributions to the combination and their bargaining power.

But perfect markets models have not given good descriptions of observed behaviour in mergers or takeovers: sequential bidding, mistaken overbidding, managerial resistance, and only slow market price reductions following a rejected bid. Giammarino and Heinkel (1986) argue that such observed behaviour may in fact be value-maximising in an environment characterised by *asymmetric information* among the participants. "Regulatory efforts to remove the asymmetries [of information] rather than to limit behaviour might be more appropriate and efficient" (p.466). The Part B statement would help to alleviate asymmetric information in a standard takeover bid.

Consider an open-bidding auction. In some cases, the initial bidder profitably submits a high "pre-emptive" bid (known) to try to convince other potential bidders that the initial bidder's specific synergy gain is large, thus discouraging subsequent bids (Fishman 1988). This is using the open bids as signals of private information. If there are required delays, then more bidders can enter the contest, and raise the expected value of the target.

If the target has some specific information about the merger synergy, then Fishman (1988) shows that the use of shares as the medium of exchange will be attractive to a target who knows that the merger is very valuable, but

this medium also attracts more aggressive bidding competition. The initial bid is a *signal* of that bidder's possible synergy gains.

If the possible synergy gain is common to all bidders, then potential subsequent bidders learn about *their own* valuations of the merger from the publicly known initial bid. The initial bidder, who possesses potentially superior information about the target, understands that his bid is a signal to both the target and the uninformed bidder, and, in equilibrium, the informed bidder will choose a bidding strategy designed to protect that informational advantage. This situation, argue Giammarino and Heinkel (1986), leads to equilibria in which the target may rationally reject a first bid, valuable mergers may not be consummated, and the uninformed bidder may sometimes acquire the target at a cost in excess of the realised synergy gains. It may result in the phenomena listed above. In such a world, the informed bidder would welcome a closed bidding process, since the potential synergy would not be revealed by his bids or bidding.

Such a signalling phenomenon could still occur with a closed bid, if the pre-emptive bidder wanted to brief a receptive journalist. In effect, the condition of unequal or asymmetric information is not alleviated by the action of the ASC in agreeing to CML's request for a closed tender, with no requirement for a Part B statement in time to inform potential bidders. Those potential bidders who are not deterred by the lack of information may each invest to obtain more information. A Part B statement would reduce the duplication involved, and hence reduce the social cost of the auction.

3.3 Competition

It is wrong to think that the number of bidders or potential bidders is information-inelastic: given the cost of obtaining information—about the target and about the competing bidders—and given the risks of the winner's curse when there is a strong common-value element in the auction, the lack of information associated with the closed tender will militate against many bidders. This in turn will tend to reduce the highest bid and so the seller revenue.

3.4 Seller Revenue

Riley (1989) examines the conditions under which open bidding in an ascending-price, English auction and a closed tender auction generate more or less expected revenue for the seller.

Following Vickrey, Riley shows that under strict conditions[8] that each auction, under these conditions, generates equal revenue for the seller. With risk-averse bidders, however, he shows that a closed tender auction (FPA) will generate higher expected seller revenue. Intuitively, this auction

8. Two risk-neutral bidders, each of whom knows his own valuation of the asset, neither of whom knows the other's valuation, but each of whom has identical beliefs about the probability distribution of the other's valuation; this is common knowledge.

exploits risk-averse buyers' greater fear of lack of success. The risk-averse winner will not bid above his valuation, however.

Central to the Revenue Equivalence Theory is the assumption that each buyer has the same beliefs about his opponent's valuation as his opponent has about his: that there is common knowledge about beliefs. What if a bidder who obtains favourable information (through whatever means of investigation) about the target asset believes that if he has this favourable information, then his opponents are likely to too? This (or its converse with unfavourable information) is a case of correlated beliefs, which may be a more accurate reflection of the case in point. Riley shows that in this case the closed-tender auction (FPA) generates lower seller revenue than does the open, informed auction (SPA).

With both correlated beliefs and risk aversion, the expected seller revenue generated in the closed tender auction could be greater or less than that generated in the open-bid auction, depending on the relative strengths of the two effects. Note that since bidders' valuations are private, there is less likelihood of the winner's curse, which could lead to higher expected seller revenue, but may in the limit result in bids which are excessive and so reduce the efficiency of the closed tender auction compared to an open auction.

4. Conclusion

Milgrom's conclusions—with which I agree—are particularly relevant to the case at issue: the English open-bid auction generates higher receipts on average than does the closed tender auction. The open auction results in efficient reallocation of resources in a wider range of environments than does the closed auction. The open auction economises on information-gathering and bid preparation costs to a greater extent than does the closed auction.

In conclusion, open-bid auctions (such as public takeovers):

1. generate a higher value of receipts on average than do closed tender auctions,
2. lead to efficient reallocation of resources in a wider range of environments,
3. economise more on information gathering and bid preparation costs, and
4. result in a larger number of bidders than engage in closed tenders, on average; that is, open-bid auctions are more competitive.

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