Strategic value of Vendor Due Diligence

Grazyna Wiejak-Roy*

May 24, 2021

Abstract

In the light of ever growing complexity of real estate transactions, the need for vendors and buyers to better understand the role of vendor due diligence (VDD) is imperative. The purpose of this paper is twofold: firstly, it provides a detailed literature review regarding the role of VDD from both the vendor's and buyers' perspectives. Secondly, it analyses the value of VDD over and above the buyer's due diligence in real estate transactions by proposing a theoretical model involving two-stage auctions. The model suggested is able to accommodate the feature that even though the VDD is broadly increasing informational efficiency in the market, its value is limited when the vendors already have sound understanding of their assets and the buyers' pre-transaction information about the asset is already high. Though the real estate market is considered here, the theoretical model we propose is applicable to any other complex asset transaction decision that support endogenous information disclosure considerations using VDD.

Keywords: Complex assets, private information, two-stage auctions, due diligence.

JEL Codes: D44, D82, L21, L85, R30.

1 Introduction

Vendor due diligence (VDD) is frequently recommended by transaction advisors as an addition to buyer's due diligence (henceforth BDD) in transactions of real

---

estate (high value non-homogeneous complex assets).[1] Such real estate transactions require substantial time and costs to reasonably investigate each opportunity and make informed sale-purchase decisions. However, investigations may also include vendor's investigations of the asset with the aim to strategically release some information about the asset to inform the potential buyers via VDD.

What is the value of VDD over BDD and why is it that sometimes VDD is exercised, while on other occasions it is not? The real estate literature has not paid enough attention to this question. In this regard, our paper attempts to (a) bring out the various issues regarding BDD and VDD in the real estate market, and (b) to propose a theoretical structure involving two stage auctions that will help in understanding the usefulness of VDD over and above BDD. To the best of our knowledge, this paper is the first to systematically investigate VDD's applications in the real estate sector within the framework of the two-stage auction model with strategic dissemination of information.

Section 2 reviews the literature on real estate VDD. Section 3 presents a theoretical model of a two-stage auction with VDD and discusses equilibrium usage of VDD and its impact on the transaction and the welfare of the vendor and the bidders. This is followed by a review of the literature on auctions with two-stage bidding that is closely related to VDD. Section 4 provides concluding remarks and practical implications for vendors and buyers.

2   Due Diligence in real estate transactions

2.1   Features of BDD

In the real estate market longer transaction periods and costs are typically associated with: more complex real estate assets, e.g. shopping centres vs. standard retail units (Devaney and Scofield (2015), McNamara (1998), and Bond et al. (2004)), portfolio transactions vs single asset deals (Devaney and Scofield (2015), assets that do not provide freehold ownership (Devaney and Scofield (2015), atypical assets (Haurin et al. (2010)), and share deals vs. assets deals (Ishaak et al. (2019)).

---

[1]VDD, in the corporate world, is also frequently referred to as sell-side due diligence (McDonald and Lam (2014); Israel (2017), Newman (2013), Bromberg et al. (2014)) or seller due diligence (McDonald and Lam (2014)), or less frequently as advance due diligence (Olson and Bergamini (2003), Olson and Bergamini (2014)), or defensive due diligence (Cohen et al. (2010)). More confusingly, the term reverse due diligence is also used at times to refer to VDD (Caruso (2012)).

These complexities result in large real estate transactions being commonly conducted via a two-stage auction (Foley (2003), Lu and Ye (2018)). In the first stage the bidders submit their indicative bids based on information about the asset. An "indicative bid" is a term generally used to mean any activity at an early stage that is undertaken by the buyer that signals credibly to the vendor the commitment and willingness on the buyers' part to buy the asset. The indicative bids are made based on information acquired about the asset through publicly available market data and information memorandum confidentially disclosed by the vendor. Following this, the vendor selects the bidders, who are then confidentially granted access to substantial information, which then leads to the final bids made in the second stage.

Historically, the access to such confidential information has been complex and costly to both the vendor and bidders. The current virtual data rooms, for example, are reducing these complexities. With the increasing business expectations of transparency and increased accountability of business leaders, this ease of access to data is critical for the improvement of transaction efficiency.

A substantial volume of BDD is conducted for a complex real estate asset for which the publicly available information is often biased. BDD is well discussed in the two-stage auction literature, where the information acquisition is treated as costly entry (Bergemann and Valimaki (2006)). Lu and Ye (2018) note that the optimal mechanism design is challenging in such cases, as the parties to the transaction "must balance information acquisition at the entry stage and information elicitation in the final stage, which are interdependent".

2.2 Features of VDD

2.2.1 How does VDD work in the real estate market?

Transaction advisors such as Deloitte (McDonald and Lam (2014)), EY (Scott et al. (2014)) or Grant Thornton (Cohen et al. (2010)) strongly promote VDD as a useful tool to improve transaction efficiency. This is because the BDD process requires expert knowledge and coordination of multiple external parties (commercial, legal, financial, tax, technical and environmental advisors) to interpret the data and inform the bid price. Moreover, the data is typically provided on a disclaimer basis wherein the vendor and their advisors do not effectively hold duty of care to the potential bidders and their advisors. Finally, some real estate may exhibit unique characteristics, which may prompt the bidders to perceive these to have a high degree of risk.

Hence, VDD forms an essential part of preparation of the vendor for sale, for the cases when specific non-standard data on complex real estate assets is assembled, analysed and interpreted by third party specialist experts. The vendor commissions this specialist vendor due diligence report (VDD report), which is then released to the prospective buyers. VDD is a relatively new phenomenon which originated from the UK and grew out of the vendors' market in the late 1990s (Howson (2017), Dickens (2015)) in response to the vendors' frustrations around inefficiencies in transactions (e.g., repetitive time consuming presentations to prospective buyers distracting managers from their operations, time and effort spent by the managers responding to the bidders' queries, time and expert knowledge required to come up with solutions to specific issues identified by the bidders and the lack of certainty around control over costs of sale and final price).

While the value of BDD from the information cost perspective is well established, there is little research to justify VDD in the real estate transactions. This paper bridges this gap by evaluating the strategic value of VDD in the informationally complex asset real estate transactions on the basis of practical industry observations and through the usage of a theoretical decision and information transfer model.

We also introduce the real estate audience to the literature on selling mechanisms and auctions with sequential information flow. In our proposed theoretical setup, the vendor may strategically decide the precise design of the VDD disclosure policy through a public announcement. If he can commit to adhering to the disclosure policy, this would be in the realm of games of persuasion (Milgrom (1981), Grossman (1981), Shin (1994)). An alternative setup would be one wherein "cheap talk" messages (Crawford and Sobel (1982)) in the form of public disclosure policies are announced which the vendor is not obligated to adhere to. In a mechanism design framework, we may then proceed to investigate under which kind of disclosure policy and subsequent auction design can the expected revenue of the vendor be maximised.

This would naturally depend on a host of parameters such as: the cost of acquiring private information for the bidders; the signal precisions with which the vendor and the buyers may acquire information regarding the value of the asset; the cost of the vendor to engage in VDD, etc. If there indeed exist separating equilibria where credible information regarding underlying asset quality is generated from the VDD policy the vendor cannot commit to adhere to, it must be that the no-mimicking incentive compatibility constraints are satisfied. These would ensure that the vendors do not have any incentive to misreport by unilaterally deviating from the publicly announced VDD disclosure policy. These aspects of the

4

equilibria, and their repercussions on the aggregate information generated via the VDD and private information of the buyers are discussed in details in Section 3.2.

The purpose of a VDD report is to provide disclosure of material issues to potential buyers. Hence, the scope of the VDD report needs to give assurance to the prospective buyers so that they can be reasonably satisfied that there is no need to undertake additional BDD (Potter (2011), Kruse and Toor (2016)).

On the other hand, as the scope of the VDD report is based on instructions from the vendor and or their transaction advisors, "it may not necessarily deal with each prospective buyers' primary concerns" (Kruse and Toor (2016)). Matters subject to VDD in real estate transactions typically relate to non-standard parameters of the asset or the transaction and may include specific technical, environmental, legal, commercial, tax of financial matters.

In the US and Canada due to professional indemnity insurance regulations, the VDD report is issued to the prospective buyer on a non-reliance (or hold harmless) basis, where the third party expert disclaims liability to prospective buyers for decisions made subject to the VDD report (Bromberg et al. (2014), Potter (2011), Kruse and Toor (2016)). In contrast to that, in Europe, VDD reports are more frequently issued subject to reliance letters, based on which the expert has effectively duty of care to the potential buyer (Bromberg et al. (2014)). Either way, the bidders effectively become recipients and ultimate users of the VDD report i.e. they are the clients of the expert preparing such a report.

Confidence of the prospective buyer over the independence of the expert VDD report is critical (Rankine et al. (2003), Narwe and Nagel (2005), Kruse and Toor (2016), Howson (2017), and Swan (2017)). Assuming that the reputation of the expert is a reasonable proxy to assess the reliability of the VDD report, the potential buyers should be confident of the reputation and integrity of the firm which carried out the work so that the VDD report may be perceived by them as an objective evaluation of the particular issues (Caruso (2012), and Rankine et al. (2003)). The challenge is that a prospective buyer may be reluctant to rely on the contents of the VDD report, as they are prepared by the vendor's experts, rather than by the buyers' own or preferred experts (Potter (2011)). Hence, one cannot assume that a bidder will fully follow the VDD report and not seek to hire their own advisers to undertake a full-scope BDD (Kruse and Toor (2016)).

2.2.2 Advantages of VDD from the Vendor's Perspective

The advantages of VDD to the vendor may include increased transaction transparency and value, improved control over negotiations, and accelerated transac-

tion process.

Increased transparency: VDD provides an opportunity for increased transparency as it allows the vendor to provide more information about the asset and to fully explain issues that could be perceived by bidders as weaknesses and reduce the bid price (Howson (2017)). It also assists the vendor in anticipating issues which are likely to be identified during the BDD. VDD increases the credibility of the data that has been verified by external experts, enhances trust and proves the vendor's commitment to close the transaction (Tschani (2009) and Bromberg et al. (2014)).

VDD also provides an opportunity to supply more detailed private information which the bidders would not be able to obtain otherwise within the transaction time-frame, e.g. tax rulings to support share deals or certain legal information subject to gate-keeping by relevant authorities (Johnston and Leshinsky (2018), Scott et al. (2014)). VDD that focusses on potential deal breakers can reduce the amount of confidential data that at a later stage would have to be disclosed to prospective buyers who would end up not buying the asset. Hence, VDD helps the vendor to differentiate between committed buyers and those who may be taking advantage of a competitor (Bromberg et al. (2014)).

Enhanced transaction value: VDD can lead to enhanced transaction value by proactively identifying and disclosing issues in advance, and if required demonstrating corrective action plans to mitigate risks (Caruso, (2012)). The enhancement is also achieved by avoiding value leakage during the BDD (Martin et al. (2007)). A VDD reduces the costs of initial BDD for prospective buyers as they would no longer need to incur advisory fees to gain an understanding of the issue. Through an early referral of sensitive areas and increasing the credibility of the vendor, VDD can keep prospective buyers in the process for longer, which may increase the competitive tension and thus help to improve sale terms for the vendor (Potter (2011)). As prospective buyers typically focus on negative bid adjustments, VDD has a potential to steer the buyers towards the benefits that the asset offers and create more space for positive adjustments (Israel (2017) and Orton (2018)). In addition, VDD can also be used to hide or derail the buyers (Howson (2017)).

Improved control over negotiations: VDD reduces number of bidders' staff and advisors involved in analysing data and therefore reduces the risk of information leakage (Potter (2011)). VDD allows surprises to be avoided with the identification of potential buyers' concerns, and helps to provide the required responses and

develop an appropriate negotiation strategy (Brady (2011), Cohen et al. (2015), and Israel (2017)). VDD also reduces distractions from ongoing business management during the BDD process (Israel (2017)).

Accelerated transaction process: VDD reduces time required by the prospective buyers to analyse information during the exclusivity period (Potter (2011), Swan (2017)), and also reduces time spent to respond to the queries of prospective buyers (Israel (2017), Potter (2011)). Moreover, VDD may speed up the sale process by minimizing re-trade and improving closing probability (McDonald and Lam (2014), Israel (2017), Martin et al. (2007), Scott et al. (2014)).

2.2.3 Disadvantages of VDD from the Vendor's Perspective

Potential disadvantages of VDD for the vendor include increased transaction preparation time and upfront costs, impact of matters subject to VDD on the sale price, risk of disclosing private information to uninterested parties, of not being able to reduce number and complexity of bidders' queries and of the risk of not achieving tangible benefits of VDD in terms of improved sale terms.

Increased transaction preparation time: The VDD process can be disruptive to the vendor's management team (Bromberg et al. (2014), Swan (2017)), as the preparation of VDD requires time to hire external experts, time to collate and analyse data and then prepare a VDD report, and time to come up with a management strategy (Dickens (2015)). Although the overall due diligence timeline may be truncated, the VDD preparation time delays the start of the transaction process (Kruse and Toor (2016)).

Increased upfront costs: While the process as a whole gives an opportunity to save overall costs since the specific data analysis is only done once, VDD is subject to the vendor's upfront costs to cover the fees of the external advisors (Potter (2011), Bromberg et al. (2014), Dickens (2015), and Kruse and Toor (2016)).

Impact of matters subject to VDD on the sales price: VDD focusing on matters which may have a negative impact on transaction pricing provides bidders with a signal regarding the level of price discount (Dickens (2015)). Unresolved matters (e.g. pending litigations) may lead to over-discounted bids. At the same time, VDD focusing on positive matters (e.g. more profitable redevelopment potential), may not necessarily lead to a mark-up fully reflecting the upside potential.

Risk of disclosing private information to uninterested parties: As VDD deals with sensitive private information, some bidders, not interested in the particular asset, but wanting to understand their competition, may use VDD to obtain information, which may be used to the detriment of the vendor.[2]

Risk of not reducing number and complexity of bidders' queries: While VDD gives an opportunity to limit bidders' queries, the vendor may still be expected to respond to multiple, time-consuming requests (Dickens (2015)). The bidder may not wish to rely on the VDD report as a sole or primary source of information, or may not be reasonably satisfied with the VDD report. Hence, they may prefer to hire their own advisors to complete a follow-up BDD effectively defeating the purpose of the VDD report (Kruse and Toor (2016)).

Risk of no tangible benefits of VDD in terms of improved sale terms: VDD does not guarantee improved sale terms which could have been otherwise achieved if the bidders performed their own BDD (Dickens (2015)). Disclosing a VDD report at an early stage of the transaction process may allow the bidders to submit overpriced bids to obtain exclusivity for the rest of the transaction process, and use a later BDD process to negotiate a lower price (Dickens (2015)).

2.2.4 Advantages of VDD from Buyer's Perspective

From the buyers' perspective, the key advantages of VDD may include an early go / no-go decision, greater confidence in the transaction process, lower BDD costs, accelerated transaction process, and greater control over the bid pricing.

Early Go/No-go decision: A VDD report can provide guidance to the bidder on material issues at an early stage of the transaction, which allows the bidder to analyse "red flags" to speed up "Go/No-Go" decisions (Dickens (2015)). This in turn may free-up in-house staff and external consultants for the exploration of other investment opportunities.

Greater confidence in the transaction process: VDD has a potential to increase confidence that a vendor is committed to selling and can help with deal structuring and pricing decisions (Tschaani (2009), Israel (2017), Orton (2018), Dickens (2015)).

---

[2]Based on the author's professional experience.

Lower BDD costs: VDD can reduce the costs of initial BDD as otherwise the prospective buyer would need to incur significant costs to obtain private information. VDD allows the buyers to focus on confirmatory rather than comprehensive due diligence, thereby reducing the involvement of in-house staff and of external advisors (Potter (2011), Scott et al. (2014), Dickens (2015), Bromberg et al. (2014)).

Accelerated transaction process: Use of a reliable VDD report has a potential to accelerate the buy-side transaction process by strategizing the scope of BDD, and reducing the scope of external due diligence services (Bromberg et al. (2014), Potter (2011)).As multiple potential bidders are granted access to VDD reports simultaneously, the vendor can collate the queries from all the bidders and provide a single response to all of them (Dickens (2015)). This may allow bidders not only to receive responses to their own queries but also identify matters of concern that are being investigated by their competitors.

Greater control over the bid pricing: Receiving a VDD report at an early stage of the transaction process may lead the bidder to submit an overpriced bid to obtain exclusivity for the rest of the transaction process, and use a BDD process later to negotiate a lower price (Dickens (2015)).

2.2.5 Disadvantages of VDD from Buyer's Perspective

The key disadvantages of VDD for the buyers may include perception of limited buyers' control over the transaction process, lack of recommendations on contentious issues, and stronger competition.

Perception of limited buyers' control over the transaction process: With the transaction process dictated by the vendor, presence of VDD increases the buyers' perception that the sale process is fully controlled by the vendor and that the buyers are in a disadvantaged position. Moreover, VDD makes it more difficult for buyers to form their own opinions as it leads to focus on particular issues and may detract attention from other pertinent issues (Howson (2017)).

Lack of recommendations on contentious issues: VDD reports focus on facts and lack recommendations, whereas BDD reports prepared by the advisors of buyers typically include clear recommendations for the buyer. Hence, the prospective buyers may be required to hire experts (Potter (2011), Tschani (2009)) to fill this gap.

9

Stronger competition: In providing a VDD report, all potential bidders approach the transaction with the same level of knowledge, which increases the competitive tension between the bidders (Kruse and Toor (2016)).

2.2.6 Summarising Remarks

The above discussion provides evidence for VDD to be widely supported by the industry. Despite having certain disadvantages for both the vendors and the prospective buyers, VDD is promoted by transaction lead consultants. As shown above, the existing literature is scarce with most of the publications resting within the corporate domain. While the corporate publications provide clear insights into the matter, they lack academic rigour to justify the suggested net benefits of VDD. As VDD is not an all-encompassing solution to increase the market efficiency even though it may have specific advantages of its own, it does not fully replace BDD. Hence, the following section seeks to provide a formal representation of a two-stage auction using VDD to establish equilibrium usage of VDD and its impact on the transactions.

3   Theoretical model

The asset: A vendor owns an asset that she wishes to sell to a set of buyers $N = \{1, \dots, n\}$. The value θ of the asset is uncertain to all parties, and can take two values θ_l (low value) and θ_h (high value) with prior probabilities p and $1 - p$. The asset is informationally complex and so the prior probability p is close to 1/2.

Vendor due diligence and the information package: The vendor receives a private signal $s \in \{l, h\}$ about the value θ that comes with precision $\sigma \in (1/2, 1)$. This means that

$$\Pr[s = l | \theta_l] = \Pr[s = h | \theta_h] = \sigma$$

This information about the asset is based on the vendor's internal operational studies and assessments.

After observing s, the vendor has an option to hire an expert to obtain a second signal r with precision $\rho \geqslant \sigma$. Again,

$$\Pr[r = l | \theta_l] = \Pr[r = h | \theta_h] = \rho$$

In line with observations by Narwe and Nagel (2005), Howson (2017), Rankine et al. (2003) and Kruse and Toor (2016), the expert is of repute in the consultancy business. She charges an amount $C(\rho)$ to the vendor for her services. The realisation of the signal r received by the experts (and shared with the vendor) is what we call the VDD.[3]

Once the VDD is delivered, the vendor prepares a disclosure policy. A disclosure policy is a correspondence $\delta : (s, r) \to \{\varnothing\} \cup \{s\} \cup \{r\} \cup \{s, r\}$ that defines whether the vendor, after receiving the information package (r, s), discloses none of it, part of it or all of it to the buyer in the final stages of the bidding process.

Buyers private valuation: Each buyer has a private valuation of the asset given by $v_i + \theta$. In this formulation, v_i is private information and drawn iid through a distribution function F from the interval $[0, 1]$ and θ is the unobserved state of the asset in intrinsic sense that is common to all buyers. All above is common knowledge between all parties involved.

The selling process: The selling process involves multiple stages of costly VDD, costly private signals of buyers, buyer elimination, and late stage disclosure and further private information acquisition. We describe the timeline of this process below.

- **VDD decisions**: Nature determines the true value of the asset that remains uncertain to all players. The vendor receives the private signal s and then decides whether or not to exercise the option of a VDD along with a disclosure policy δ to be used in the second stage and an integer $k = 1, \ldots, n$. We assume that the pair (k, δ) is announced publicly to all buyers.

- **Early stage information acquisition by buyers**: Each buyer i can spend c_1 to acquire private information that comes as an iid signal $\alpha_i \in \{l, h\}$ with precision $\pi = \Pr[\alpha_i = l | \theta_l] = \Pr[\alpha_i = h | \theta_h]$.

- **Signaling willingness to participate through indicative bids**: All n buyers announce their willingness to participate in the auction by signaling their commitment independently and simultaneously, based on the prior information and their acquired costly stage 1 private information if any. We denote

---

[3]The expert may have incentives to misrepresent the signal r, but we assume such strategic behaviour is too risky for her business. Hence, the VDD is always truthful to the best ability of the expert and the amount C spent by the vendor on the services of the expert.

the willingness-bids of buyer i as $b_i \geqslant 0$ and assume that bidding at this stage involves a fixed cost of c. The idea is that b_i can be thought of as the number of personnel hired and the paperwork executed at this early stage in order to prepare for the forthcoming stages of the auction. Clearly, these willingness-bids (or indicative bids) have no consequences on the final prices directly but impact bidder selection as follows:

- **Selection of buyers**: For the stage 1 bidding profile $b = (b_1, \ldots, b_n)$, denote by $b(k)$ the $k - th$ highest bid. Let $N_k(b) = \{i \in N | b_i \geqslant b(k)\}$. Each bidder $i \in N_k(b)$ proceeds to the 2nd stage while all bidders $i \notin N_k(b)$ quit the game.

- At the beginning of stage 2, the vendor releases the disclosure publicly to all bidders in $N_k(b)$. Thus, the VDD is now revealed to the final set of bidders.

- **Late stage information acquisition by buyers**: Each bidder $i \in N_k(b)$ analyses the VDD and then decides whether to obtain a second stage of costly private information at cost c_2 that is again a binary signal $\beta_i \in \{l, h\}$ with precision

$$\varepsilon = \Pr[\beta_i = l | \theta_l] = \Pr[\beta_i = h | \theta_h]$$

.

- **Bidding**: With all the available information in hand, the bidders then announce their final bids denoted by $\phi_i \geqslant 0$. At the final bidding profile $\phi = (\phi_i)_{i \in N_k(b)}$, the highest bidder obtains the asset and pays a price that depends on the auction format. For example, in the first price format the highest bidder pays his bid. In the second price format, he pays the second highest bid.

The above sequence of activities yields a highly complex dynamic Bayesian game wherein the instruments in the hands of the vendor are the auction format, the option of using a VDD, the number k and the disclosure policy δ. The basic setup and the selling mechanism with VDD are summarised in Figure 3 below. In what follows we will provide an intuitive summary of some obtainable results that help us understand the role of VDD in buyers' equilibrium payoffs and when it is likely for the vendor to use it.
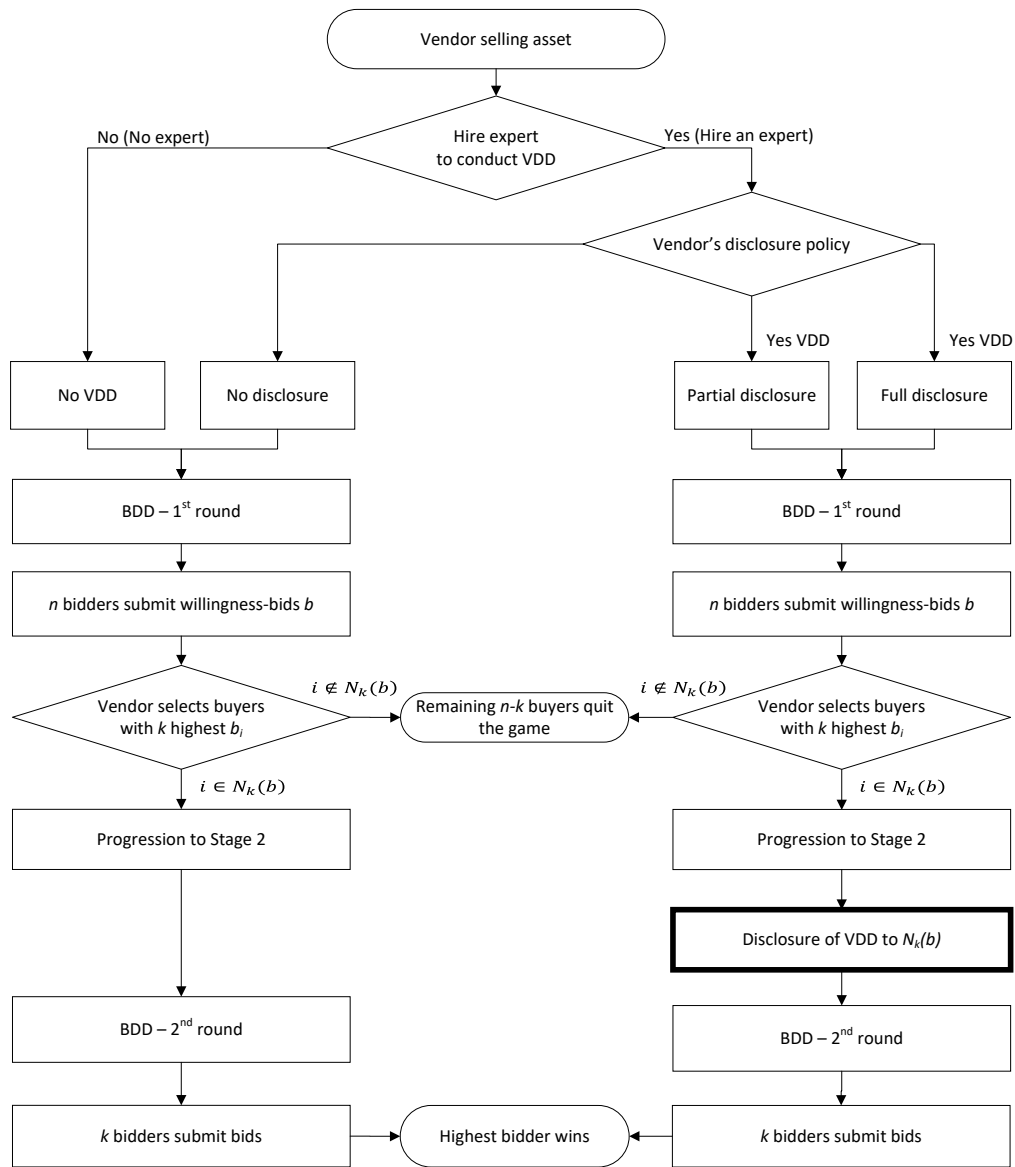
```
                        Vendor selling asset

                         Hire expert
   No (No expert)        to conduct VDD      Yes (Hire an expert)

                                        Vendor's disclosure policy

                                                      Yes VDD        Yes VDD

   No VDD    No disclosure          Partial disclosure   Full disclosure

   BDD – 1st round                        BDD – 1st round

   n bidders submit willingness-bids b    n bidders submit willingness-bids b

                    i ∉ N_k(b)                     i ∉ N_k(b)
   Vendor selects buyers   Remaining n-k buyers quit   Vendor selects buyers
   with k highest b_i      the game                    with k highest b_i

        i ∈ N_k(b)                              i ∈ N_k(b)

   Progression to Stage 2                Progression to Stage 2

                                         Disclosure of VDD to N_k(b)

   BDD – 2nd round                       BDD – 2nd round

   k bidders submit bids   Highest bidder wins   k bidders submit bids
```

13

Figure 1: Selling mechanism with VDD

3.1 Analysis of equilibrium usage of VDD and its impact

3.1.1 Important parameters of the selling mechanism

Central to our analytical discussion will be the role of VDD. The key features of the theoretical model that will play a role in determining the usefulness of VDD can be listed as follows:

- The prior information about the quality of the asset, summarised by the probability p

- Vendor's existing private information through the signal s with precision σ

- VDD signal r with precision ρ that can be purchased by the vendor at price $C(\rho)$ by hiring an expert

- The late stage disclosure policy δ

- The integer k that identifies the first stage indicative bidders who move to the second stage

- Buyer i's first costly private signal α_i with precision π and cost c_1

- Fixed cost c of first-stage bidding

- second stage buyer i's second costly private signal β_i with precision ε and cost c_2

3.1.2 Different theoretical possibilities

An early commitment on part of the vendor to provide a VDD report to late stage buyers can act as a signal that the vendor's private information about the asset is favourable (that is, the vendor's original private signal s about the value of the asset is h). If transmitted credibly, such a message might incentivise more buyers to invest and signal aggressively in the first stage through indicative bidding as they can afford to do so without having to spend on c_1 for additional information that may thwart many from participating, or to save c_2 and yet bid aggressively in the second stage. This can also enhance higher bidding in the final stages. But this conclusion is confounded on two grounds.

First, as s is private information and cannot be credibly disclosed, particularly if it comes in the form of soft information, a vendor with a low signal l might

mimic the above behavior of a vendor with high signal h. This will reduce the power of a VDD to attract buyers at an early stage. But despite this possibility (called pooling in the language of Bayesian games), the commitment to a VDD can still send some information that increases buyer participation. Of course, this possibility is lower the higher is the cost C of hiring an expert, particularly if that cost is observable.

Second, there might be a reverse signaling mechanism working in the background where by announcing the absence of a VDD, the vendor sends the message that his information is too strong (this can happen only when r is high enough) and he is confident that buyers will also learn the same if and when they indulge in costly information acquisition on their part. But again, to hide one's type, a vendor with a low signal might end up mimicking his high type counterpart. Overall, it is generally true that equilibria are typically pooling in nature (where both vendor types undertake the same VDD strategy with positive probabilities). This implies that the use of VDD is expected to be robust.

How about a separating equilibrium where a commitment to a VDD strategy reveals the vendor's private signal? For this to be the case, one of the two things need to be true. If the high type vendor is the only one with a VDD, then r must be sufficiently high so that it is not profitable for a low type vendor to mimic the action of his high-type counterpart, and instead pass the buck to the buyers when it comes to more information. Of course, in this case a VDD is expected to enhance buyer participation and bids even beyond the case of a pooing equilibrium with a VDD. The impact on buyer welfare is ambiguous in such equilibria. This is because while a strong signal of high quality due to the use of VDD in a separating equilibrium can save the buyer's cost in the entire bidding protocol, the average bids can be higher and then the net surplus to the winning bidder could be lower.

On the other hand, why would a low type vendor spend money to signal his type when by not using a VDD, he can hide himself as a high type? It could only be in the hope that it reduces the buyer's cost of participation and information acquisition so that in the end they have a bigger budget to bid with. Hence, while this equilibrium is least likely, it is not impossible. In other words, it is not universally true that VDDs are only conducted for assets with high valuation.

Despite these nuances, VDDs typically increase informational efficiency in the market. Therefore it is safe to conjecture that the value of VDD to both the buyer and the vendor is higher as the prior probability p is closer to $\frac{1}{2}$, where pre-market information is very weak so that the asset is deemed informationally complex. A similar set of arguments can be put forward for the actual disclosure policy δ. In particular, higher disclosure should raise higher participation at the

15

early stage and stronger bids in the later stage.

The above arguments should hold true for each value of k even though in the model, k is chosen strategically by the vendor. The equilibrium value of k is a very complex matter in this scenario because its choice can also transmit signal about the vendor's private information. For example, a high value of k might signal that the vendor's initial information is moderate and that he is enhancing competition in the hope to include more competitive bids. One would typically expect that the more likely is the VDD and more open is the disclosure policy, the smaller is k. The value of a VDD both to the buyer and the vendor is typically higher the higher are the costs c_1 and c_2 of acquiring private information or the participation cost c. How about the value of VDDs in relation to the strength of private signals?

The vendor's side involves two signals with precisions s and r and it is easy to see why the value of a VDD should typically be higher as these precisions are higher as a vendor with a VDD and with high values of s will typically be spending on r and buyers should expect the value of q to be higher. This will enhance participation, bids and save costs of information acquisition. On the buyer's side, there are two signal precisions, p and ε and it is easy to understand why the marginal value of a VDD decreases with these precisions.

3.2 Related literature in Economics

The theoretical model that we propose with respect to BDD and VDD involves a two-stage bidding process. In general, in the first stage, bidders make non-binding "indicative bids" that are used to separate serious candidates. Then, after an information gathering stage, serious bids are made. This particular setting has not received as much attention in terms of theoretical modelling as some other auction designs have. Ye (2007) was to the best of our knowledge the first paper to theoretically model indicative bidding theory.

Two important points to address in this regard are the following. Firstly, the prospects of potential buyers making infinite or at least very large bids in the indicative stage need to be considered. According to Quint and Hendricks (2018), buyers want to avoid being selected if they are unlikely to win. As a result, low-value buyers will try to separate themselves from high value buyers by submitting lower indicative bids. Thus, the equilibrium helps the vendor select high value buyers with greater likelihood. Hence, despite the fact that the indicative bids are non-binding, they turn out to contain information about buyer's valuation and serve as a tool to control the number of entrants in the final stage of the auction.

This gives rise to the second question, which is to ask why a vendor would

want to deliberately curtail the number of participants in the auction through this two-stage indicative bidding process in the first place. It is postulated here that the vendor often may find it difficult to attract a large number of bidders without the indicative stage, because bidders do not want to spend substantial capital on participating in an auction against a large number of competitors. In this context, merely ensuring the right number of final participants alone is not enough. For the sale to be optimal, not only is the number of participants in the second stage important, but also it should be that they are the most qualified ones. In other words, the entry process must be "efficient". Naturally, all these concerns are not automatically satisfied and need to be verified in the context of the model that is considered.

In an early contribution pertaining to an experimental setup, Kagel et al. (2008) have conducted experiments to compare the relative performances of a uniform-price, two-stage bid process with indicative bidding. Their experiment shows that indicative bidding performs as well as the alternative bid process in terms of efficiency. Further, indicative bidding does better on other dimensions; most importantly, indicative bidding yields higher average profits than the alternative two-stage process in the initial auction periods. Ye (2007) considers first price, second price, all pay auctions with different bidder valuation distributions in a theoretical setting and concludes that in general, efficient entry is unlikely to be achieved under indicative bidding. However, when auctions with entry rights and binding first-stage bids are considered, efficient entry may be induced.

With respect to the relative performance of the two-stage indicative bidding framework, Quint and Hendricks (2018) compare it to the unrestricted entry setting. In the latter, buyers decide on the basis of their private information whether or not to enter the auction, pay the entry cost, update their values, and submit binding bids. Their main theoretical result is that indicative bidding yields greater revenue and greater total surplus than the unrestricted auction when the number of potential buyers is large. They also establish that two-stage auctions with indicative bids help the vendor select high value bidders with higher likelihood, although the highest value bidders are not always selected.

In the model we propose, the bidders invest as a part of BDD to acquire information about the quality of the asset. This therefore connects our framework to the literature on auctions where the participants have to incur a cost to acquire information. This includes Persico (2000), Bergemann and Valimaki (2002), Compte and Jehiel (2007), Bergemann et al. (2009), Shi (2012) and Cremer et al. (2009). Bergemann and Valimaki (2002) consider a one-period general mechanism design problem in which agents can acquire costly information of varying qualities. How-

17

ever, the decision regarding acquisition of information is made simultaneously by all agents before they participate. Cremer et al. (2009) characterize optimal selling mechanisms in auction environments with learning costs for the bidders. They define "search procedures," which provides instructions on which buyers should acquire information at each period, when to end the process, and which buyer should eventually get the good. They show that the vendor can obtain the same profit as if he had full control over the bidders' acquisition of information and could have observed directly their valuations once they are informed. This holds whether or not the buyers' types are independent, and can be extended to cases where the acquisition of information proceeds through several stages.

Lu (2010) and Moreno and Wooders (2011) consider endogenous entry, in which potential bidders decide whether to enter the auction (and incur information acquisition costs) independently and simultaneously. They characterize threshold entry equilibria in which each bidder enters the auction if and only if her entry cost is lower than some endogenously determined entry threshold. Lu and Ye (2017) study optimal two-stage mechanisms in an auction environment where bidders are endowed with original estimates ("types") about their private values and can further learn their true values of the object for sale by incurring an entry cost. They derive conditions as required by incentive compatibility in these two-stage mechanisms, based on which the optimality of the generalized Myerson allocation rule is demonstrated in this environment of costly information acquisition.

Lu and Ye (2013) consider two-stage mechanisms with the first stage being the entry right allocation mechanism and the second stage being the (standard) private good provision mechanism. They find that both efficiency and revenue optimality require that the second-stage selling mechanism be ex post efficient. They also show that in all-pay auctions, efficient entry can be truthfully implemented in dominant strategies. However, they are not implementable in uniform-price or discriminatory price auctions.

In our model we have the vendor publicly declaring VDD disclosure policy to the prospective buyers strategically. This embeds our framework in the literature of strategic information dissemination in auctions. Szech (2011) considers a second-price auction with entry fees and characterises the optimal structure through which a vendor should optimally disseminate costly information among the bidders. It is found that marginal gross revenues do not generally behave monotonically in total information release. Even the bidder who gets less information is willing to pay a higher entry fee for asymmetric information allocations than for the symmetric one.

In this line of research, there are papers which deviate from these assumptions

18

partially. Bergemann and Pesendorfer (2007) consider the case of no entry fees and no information costs. Eso and Szentes (2007) allow for entry fees, but rule out information costs. Ganuza and Penalva (2010) rule out entry fees, but allow for information costs. However, the issue of strategic dissemination of information in a two-stage auction with indicative bidding has not been addressed as yet.

4 Conclusion

The analysis of the theoretical model suggests that VDD can be of value for transactions of complex assets, such as real estate, irrespective of the value of the asset. VDDs typically increase informational efficiency in the market with the value of VDD to both the buyer and the vendor increasing with the extent of informational complexity of the asset, which in turn is signified through the weakness of the public signal. Similarly, a higher degree of VDD disclosure should increase participation at the early stage and result in stronger bids in the later stage. The value of a VDD both to the buyer and the vendor is typically higher when the costs of acquiring private information in both stages of the bidding process is more, or the participation cost in the bidding process is higher.

From the vendor's perspective, the value of a VDD should typically be higher when the precision of information about the asset is higher at both stages. From the buyer's perspective, the usefulness of VDD decreases with increasing precision of their information.

The main body of the industry literature is produced by institutions typically acting as lead transaction advisors and VDD experts. Hence, it is only natural that this literature focuses on promoting benefits of VDD rather than its limitations. Thus, vendors making their divestment decisions should carefully consider if indeed the VDD is likely to help them obtain a better price for their assets.

The paper provides a strong foundation platform for further empirical research. Firstly, observable parameters described in the model are worth exploring. Secondly, enrichment of the analysed mechanism and detailed analysis of the industrial practice – especially considering differences between the US and European markets – will shed more light on the value of VDD subject to specific conditions. We reserve these issues for future research.

References

Bergemann, D. and Valimaki, J. (2006): "Information in Mechanism Design", *Proceedings of the 9thWorld Congress of the Econometric Society, ed. by R. Blundell, W. Newey, and T. Persson*, pp. 186-221. Cambridge University Press, Cambridge.

Bergemann, D., and Valimaki, J. (2002): "Information acquisition and efficient mechanism design", *Econometrica*, Vol. 70, pp. 1007-1033.

Bergemann, D., and Pesendorfer, M. (2007): "Information structures in optimal auctions", *Journal of Economic Theory*, Vol. 137, pp. 580-609.

Bergemann, D., Shi, X., and Valimaki, J. (2009): "Information acquisition in interdependent value auctions", *Journal of the European Economic Association*, Vol. 7, pp. 61-89.

Bond, S., Crosby, N., Hwang, S., Key, T., Lizieri, C., Matysiak, G., McAllister, P. and Ward, C. (2004): "Liquidity in Commercial Property Markets", *London: Investment Property Forum*.

Brady, S.E. (2011): "A Growing Trend; Preparing a business for sale through sell-side due diligence", *Mergers & Acquisitions* [Online], Vol. 46 (2), pp. 54.

Bromberg, S., Cohen, C. and Shanley, M. (2014): "Don't Sell Sell-Side Due Diligence Short", *Mergers & Acquisitions* [Online], Vol. 49 (4), pp. 52.

Caruso, J.J. (2012): "Business Industry", *Pennsylvania CPA Journal* [Online], Vol. 83 (3), pp. 10.

Cohen, M., Herman, K. and Sherman, A. (2015): "Conducting Sell-Side Due Diligence in M&A: Maximizing Deal Value and Minimizing Closing Delays", Available from: http://media.straffordpub.com/products/conducting-sell-side-due-diligence-in-m-and-a-maximizing-deal-value-and-minimizing- closing -delays-2015-06-04/presentation.pdf [Accessed 02/03/2020].

Cohen, C., Kwestel, M. and Finkle, A. (2010): "Defensive Due Diligence", *Mergers and Acquisitions* [Online], Vol. 45 (1), pp. 38.

Compte, O. and Jehiel, P. (2007): "Auctions and information acquisition: Sealed-bid or dynamic formats", *RAND Journal of Economics*, Vol. 38 (2), pp. 355-372.

Crawford, V.P. and Sobel, J. (1982): "Strategic Information Transmission," *Econometrica*, Vol. 50(6), pp. 1431-1451.

Cremer, J., Spiegel, Y., and Zheng, C. (2009): "Auctions with costly information acquisition", *Economic Theory*, Vol. 38, pp. 41-72.

Devaney, S. and Scofield, D. (2015): "Liquidity and the drivers of search, due diligence and transaction times for UK commercial real estate investments", *Journal of Property Research*, Vol. 32 (4), pp. 362-383.

Dickens, J., W. (2015): "United States: Vendor Due Diligence Reports: A Tale of Two Markets. The International Comparative Legal Guide to: Private Equity 2015", Available from: https://www.houthoff.com/-/media/Houthoff/Publications [Accessed 21/07/2020]

Eso, P., and Szentes, B. (2007): "Optimal information disclosure in auction", *Review of Economic Studies*, Vol. 74, pp. 705-731.

Foley, A. (2003): "Multi-round Auctions for Institutional Real Estate Assets: Theory and Practice", M.S. Thesis in Real Estate Development, MIT.

Ganuza, J.J., and Penalva, J. (2010): "Signal orderings based on dispersion and the supply of private information in auctions", *Econometrica*, Vol. 78, pp. 1007-1030.

Grossman, S.J. (1981): "The Informational Role of Warranties and Public Disclosure about Product Quality," *Journal of Law and Economics*, Vol. 24, pp. 461-483.

Haurin, D. R., Haurin, J. L., Nadauld, T. and Sanders, A. (2010): "List Prices, Sale Prices and Marketing Time: An Application to U.S. Housing Markets", *Real Estate Economics*, Vol. 38 (4), pp. 659-685.

Howson, P. (2017): "Due Diligence: The Critical Stage in Mergers and Acquisitions", *Routledge*, pp. 1-14.

Ishaak, F., van Schie, R. and de Haan, J. (2019): "Why investors utilize Single Purpose Entities in real estate transactions.", Conference paper: International Conference on Real Estate Statistics, Luxembourg, 20-22 February 2019.

Israel, B. (2017): "Sell-Side Due Diligence â What is Involved and Why it Makes Sense", Available from: https://mazarsusa.com/ledger/sell-side-due-diligence-what-is-involved-and-why-it-makes-sense/ [Accessed 01/03/2020].

Johnston, N. and Leshinsky, R. (2018): "Gatekeeping information in the multi-owned property environment", *Property Management*, Vol. 36 (5), pp. 506-520.

Kagel, J., Svetlana P., and Lixin Y. (2008): "Indicative bidding: An experimental analysis", *Games and Economic Behavior*, Vol. 62 (2), pp. 697-721.

Kruse, D. and Toor, N. (2016): "Legal Vendor Due Diligence: Staging a Successful Sale", Available from: https://www.jdsupra.com/legalnews/legal-vendor-due-diligence-staging-a-26355/ [Accessed 21 April 2020].

Lu, J. and Ye, L. (2018): "Optimal Two-Stage Auctions with Costly Information Acquisition", *Ohio State University Discussion Paper*.

Lu, J. (2010): "Entry coordination and auction design with private costs of information acquisition", *Economic Inquiry*, Vol. 48(2), pp. 274-289.

Lu, J. and Ye, L. (2013): "Efficient and optimal mechanisms with private information acquisition costs", *Journal of Economic Thory*, Vol. 148, pp. 393-408.

Lu, J. and Ye, L. (2017): "Optimal Two-stage Auctions with Costly Information Acquisition", *Working Paper*.

Milgrom, P. (1981): "Good News and Bad News: Representation Theorems and Applications", *The Bell Journal of Economics*, Vol. 12 (2), pp. 380-391.

Martin, D.R., Wathen, M.M. and Smith, N.W.H. (2007): "Developing an effective sell-side strategy", *Journal of Corporate Accounting Finance*, Vol. 18 (2), pp. 33-40.

McDonald, D. and Lam, D. (2014): "Sell-side strategies for private companies, Deloitte", Available from: https://www2.deloitte.com/ca/en/pages/mergers-and-acquisitions [Accessed 29/02/2020].

McNamara, P. (1998): "Exploring liquidity: Recent survey findings", Paper presented at the 7th investment property databank conference, Brighton.

Moreno, D. and Wooders, J. (2011): "Auctions with heterogeneous entry costs", *RAND Journal of Economics*, Vol. 42 (2), pp. 313-336.

Narwe, D. and Nagel, F. (2005): "Vendor Due Diligence", In Wolfgang Berens, Hans U. Brauner, Joachim Strauch: Due Diligence bei Unternehmensakquisitionen. 4th edition. Schaffer-Poeschel-Verlag, Stuttgart 2005, ISBN 3-7910-2338-1, pp. 757-784.

Olson, H., G. and Bergamini, T. (2014): "Advance Due-Diligence Activities Benefit Contaminated Real Estate Transactions", *Real Estate Issues*. Winter 2003-2004.

Orton, M. (2018): "Vendor assistance and vendor due diligence", Available from: https://www.mercerhole.co.uk/restructuring-blog/vendor-assistance-and-vendor-due-diligence [Accessed 21/04/2020].

Persico, N. (2000): "Information acquisition in auctions", *Econometrica*, Vol. 68, pp. 135-148.

Potter, L.J. (2011): "Vendor Due Diligence: Could It Catch On Here?", *Business Law Today* [Online], Vol. 20 (7), pp. 1-2.

Quint, D., and Hendricks, K. (2018): "A Theory of Indicative Bidding", *American Economic Journal: Microeconomics*, Vol. 10(2), pp.118-151.

Rankine, D., Stedman, G., and Bomer, M. (2003): "Due Diligence: Definitive Steps to Successful Acquisitions", Harlow: FT Prentice Hall, pp. 156.

Scott, I., Misic, D. and Lee, G. (2014): "Creating deal value with tax due diligence", Governance Institute of Australia, available from: https://www.governanceinstitute.com.au [Accessed 29/02/2020].

Shi, X. (2012): "Optimal auctions with information acquisition", *Games and Economic Behavior*, Vol. 74 (2), pp. 666-686.

Shin, H.S. (1994): "The Burden of Proof in a Game of Persuasion", *Journal of Economic Theory*, Vol. 64 (1), pp. 253-264.

Swan, M. (2017): "Completing Vendor Due Diligence Prior to a Sale", Available from: https://www.pkf.com.au/blog/2017/completing-vendor-due-diligence-prior-to-a-sale/ [Accessed 21/07/2020].

Szech, N. (2011): "Optimal disclosure of costly information packages in auctions", *Journal of Mathematical Economics*, Vol. 47 (4-5), pp. 462-469.

Tschani, R. (2009): "Mergers & Acquisitions", XI. Zurich, Schulthess.

Ye, L. (2007): "Indicative bidding and a theory of two-stage auctions", *Games and Economic Behavior*, Vol. 58 (1), pp. 181-207.