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Trading in distressed debt:
Game theory between buyers and sellers

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Contents

Introduction

Unsecured consumer debt continues to grow strongly in both the US and UK, with the sum of outstanding debt now exceeding $2.5 trillion. Of this, distressed debt, where there are problems with payments, is conservatively estimated at over $200 billion.

Debt sale is an attractive way for lenders to clean up their balance sheets and financial ratios. Lenders' expertise tends to be in underwriting and not collections, as they are not as effective in collections as specialist distressed debt investors who are more flexible and aggressive in collecting the debt.

The market for distressed debt investments is well established in the US, and is developing in Europe and Asia. This paper applies game theory to understand why some transactions are not concluded and examines methods for developing a successful market in these new regions.

Transaction opportunity

Distressed debt investors ("buyers") are better at debt collection than lenders ("sellers") due to a mixture of factors including their capability, methodology, infrastructure and experience. To illustrate this we use the example of a seller with $1,000 of distressed debt. For the seller the value of the debt is assumed to be between $10 ("bad [distressed] debt") and $25 ("good [distressed] debt"), whilst for the buyer the value is between $20 and $30. Both valuations are net of collecting costs, and the cost of arranging any transaction is assumed to be $1.

If the buyer and seller both accurately estimate that the debt equally contains 50% goods and 50% bads then debt is worth $17.50 and $25 to the buyer and seller, respectively. Hence, net of the transaction cost there is $6.50 surplus to be split between both parties.

It is worth noting that in this example if both parties can agree on a valuation there is always a transaction to be made that will benefit both parties regardless of the quality of the debt. Indeed, if the debt is of poor quality the transaction surplus is larger because of the buyer's specialist expertise.

Market conditions

In reality there will be many buyers and sellers and market conditions will influence the transaction price. For example, towards the end of the financial year a surplus of sellers generates a buyers' market. Conversely, in quieter times some of the larger buyers pay over the odds to offset their fixed costs. These conditions in themselves don't prevent a transaction from being concluded and simply skew the share of the surplus towards one particular party. To focus on the key issue of when a deal is agreed a neutral market is assumed for the rest of this paper.

Deal negotiation

In the debt sale example, we've seen that when the debt comprises equal proportions (50% / 50%) of good and bad debt, a price of $21.25 would share a transaction surplus of $6.50 equally between the two parties. However, whether a transaction is concluded and at what price, depends on both the value forecasts of both parties and their level of confidence in their estimates. For example, the following diagram keeps the same common estimate for percentage good at 50% but adds a 90% confidence interval for setting the price.

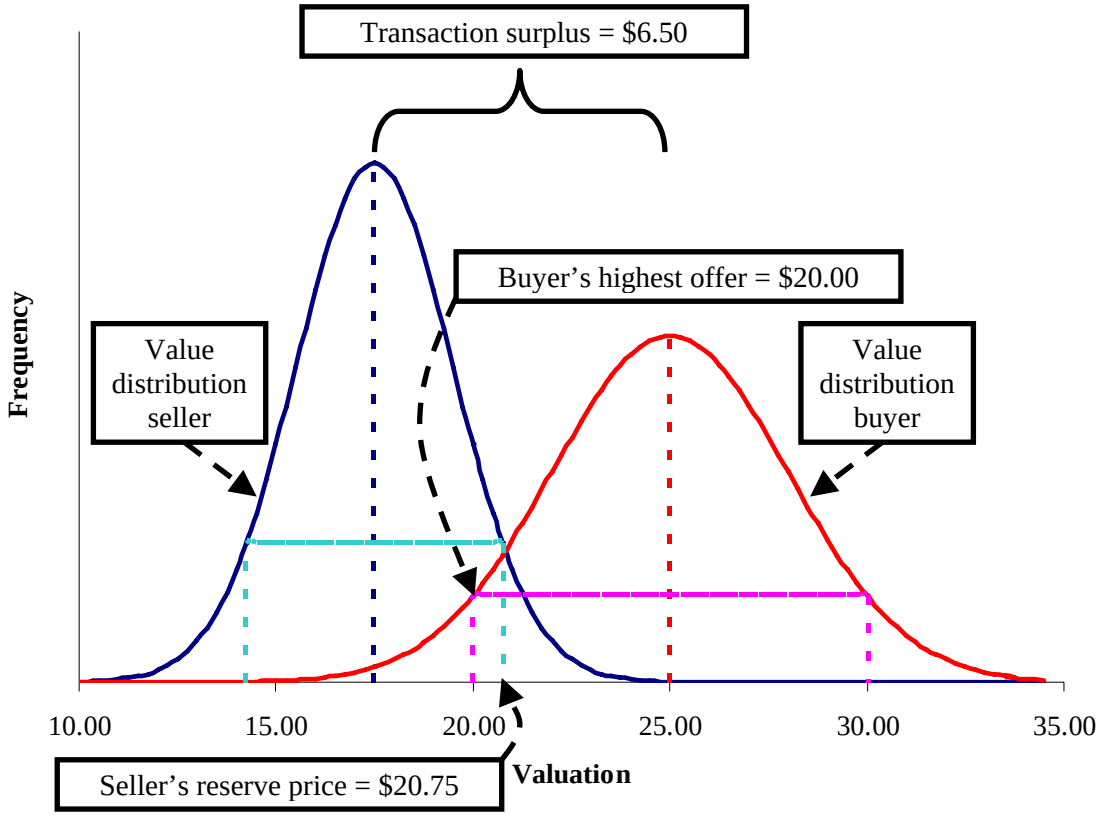

Figure 1: Value estimation from buyer and seller.

In this example the seller's distribution is assumed to have a standard deviation of $2 giving an upper confidence limit of $20.75. For simplicity a normal distribution has been assumed and therefore a 90% confidence interval is the same as saying there is 95% confidence that value to the seller is below $20.75. The buyer knows less about the debt so their distribution is assumed to have a higher standard deviation of $3. As buyers they're interested in the lower confidence limit which is $20, because paying this price will result in only a 5% chance in them overpaying. Even though the deal still has transaction surplus of $6.50 to share between the parties there is no transaction as the seller's reserve price exceeds the buyer's highest bid.

Game theory

The following model illustrates the potential outcomes from the transaction and highlights why a deal was not reached. For each scenario the price is assumed to be the mid-point of the buyer's and seller's mean valuations.

Quality estimate		Actual quality	Value estimate		Price	Deal	Actual return	
By seller	By buyer		By seller	By buyer			For seller	For buyer
Good	Good	Good	25.00	30.00	27.50	Yes	**2.00**	**2.00**
		Bad	25.00	30.00	27.50	Yes	17.00	-8.00
	Bad	Good	25.00	20.00	22.50	No	-3.00	7.00
		Bad	25.00	20.00	22.50	No	12.00	-3.00
Bad	Good	Good	10.00	30.00	20.00	Yes	-5.50	9.50
		Bad	10.00	30.00	20.00	Yes	9.50	-0.50
	Bad	Good	10.00	20.00	15.00	Yes	-10.50	14.50
		Bad	10.00	20.00	15.00	Yes	**4.50**	**4.50**

Figure 2: Distressed debt model.

You can confirm this represents the same example by multiplying the total return for buyer and seller (26 + 26 = 52) by the likelihood of each event occurring (50% x 50% x 50% = 12.5%) and getting the same transaction surplus of $6.50.

Interestingly there are only two cases (Good/Good/Good and Bad/Bad/Bad) where both parties make a profit. In 2 of the 8 cases there would not be a transaction as the price is unacceptable to both buyer and seller. In the remaining 4 cases one party makes a loss but the total return is positive, so if priced correctly the deals would benefit both parties.

With the case Good/Bad/Bad only the buyer correctly assesses the debt being of poor quality. In this situation the seller suffers a double impact as it's likely that they are under provided for the debt.

In terms of negotiating the following strategies should be adopted:

- If the buyer thinks it's good the seller should sell
- If the seller thinks it's bad the buyer should buy

Adverse selection

This is an example of a market where the sellers have more information about product quality than the buyers. George Akerlof's[1] pioneering paper "The market for lemons" first noted the problem of adverse selection in such markets, using the example of the second hand car industry. Briefly, sellers of used cars are better informed than potential buyers about the quality of the cars. Owners of good cars ("peaches") are less likely to sell than owners of "lemons". This reduces the expected value, and hence the price buyers are prepared to pay, which further discourages peaches from entering the market. This market has 2 possible equilibria:

1. **All cars sell at the same price** and the sellers of lemons, and buyers of peaches benefit at the expense of sellers of peaches, and buyers of lemons
2. **Only lemons sell** at a price set by the buyers

In the debt sale example, the seller has more information as they know details such as how hard they've worked the debt, what treatments have been applied and any issues regarding poor service and/or customer complaints. In this single deal, no equilibrium is reached and there is no transaction.

In response to the problem of adverse selection, Michael Spence's[2] work showed that under certain conditions the better informed party can improve their market outcome by credibly "signalling" their private information to the other party. For example, car dealers can signal the quality of a second hand car by offering a warranty. With the debt sale example, if the seller's extra information helped reduce the standard deviation of the buyer's valuation from $3 to $2, then their lower confidence limit increases from $20.00 to $21.75 and a deal would then be agreed at the neutral price of $21.25.

[1] George A. Akerlof, "The Market for 'Lemons:' Quality Uncertainty and the Market Mechanism," Quarterly Journal of Economics, 1970.
[2] A. Michael Spence, "Job Market Signaling," Quarterly Journal of Economics, 1973.

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Different valuations

The following shows the impact when one party has more information and a more accurate forecast:

Example	Estimated percentage good		Actual percentage good	Price limit with 95% confidence		Actual return	
	By seller	By buyer		For seller	For buyer	For seller	For buyer
Base case	50%	50%	50%	20.75	20.00	No Deal	
Buyer knows bad	50%	**25%**	**25%**	20.75	17.50	No Deal	
Buyer knows good	50%	**75%**	**75%**	20.75	22.50	-0.13	5.38
Seller knows bad	**25%**	50%	**25%**	17.00	20.00	4.25	3.50
Seller knows good	**75%**	50%	**75%**	24.50	20.00	No Deal	

Figure 3: Information inequality analysis.

There are two cases where a transaction could be made. In the "buyer knows good" the buyer can be seen to offer a premium price to secure the deal. The outcome is a huge upside for them at the expense of the seller who incurs a loss. There are still two new scenarios where agreement is not reached.

Thinking again about the strategy for negotiating the following seem to apply:

- If the buyer knows it's good they should buy
- If the seller knows it's bad they should sell

However while these strategies seem logical they are only favourable for the first deal and may hinder the chance of future deals with a party who feels they've been ripped-off.

In contrast to market signalling Joseph Stiglitz[3] examined ways the poorly informed party can extract information from the better informed through "screening". An example of this is how insurance companies divide customers into risk classes by offering different policies, trading higher excesses for lower premiums.

With the debt sale example the seller needs to know the likely value of the debt to the buyer to confirm they're getting a fair price. Here to improve their knowledge the seller should get quotes from several buyers. However caution is needed as the debt will have different values to different buyers and the process may be time consuming and the delay may adversely impact price.

[3] Joseph E. Stiglitz, "The Theory of Screening, Education and the Distribution of Income," American Economic Review, 1975.

Repeat transactions

To grow their reputation and profits buyers and sellers need to move away from short term thinking, such as the earlier "buyer knows good" example, and aim for a long term relationship that will mutually benefit both parties. One option is through a pipeline of regular transactions where the results from previous transactions inform future prices. This approach also reduces the need for sellers to get as many additional quotes, as the performance monitoring reports from earlier deals are shared between the parties.

Insurance companies were referred to earlier regarding the concept of screening. Insurance companies are concerned about the term "moral hazard". This is a condition that exists when a person is less careful because of the existence of insurance, such as the attitude "Don't worry about it - it is insured!" With debt purchase buyers need to exercise caution when agreeing a repeating deal because of the hidden impact it may have on the seller. The moral hazard for sellers may be an indifferent attitude to how they treat delinquent customers if they feel their return is guaranteed.

The key issue with agreeing a successful regular deal is ensuring the pricing structure gives the proper incentives to both parties. In the base case example the debt was valued at $17.50 by the seller, $25 by the buyer and a price of $21.25 shared equally the transaction surplus of $6.50. A deal of the following form protects both parties:

- Buyer pays $10 upfront to the seller and the $1 transaction cost
- Net cash collected by buyer split as follows:

Amount	Percentage kept by buyer	Percentage returned to seller
$0.00 to $1.00	100% (transaction costs)	0%
$1.01 to $5.00	100%	0%
$5.01 to $23.75	45%	55%
$23.76 to $27.50	65%	35%
$27.51 and above	85%	15%

Figure 4: Cash collected allocation.

If the buyer collects the expected $25 then both parties each get $3.25. However, if the buyer can find new ways to collect $30 then they will instead earn $7.00 and the seller will get $4.50.

There are legal complications when structuring a repeating transaction but once agreed it will bring additional benefits to both parties. Selling the debt regularly, such as monthly, will effectively mean selling the debt earlier and lead to a better price for the seller. For the buyer a guaranteed regular supply will help with their planning and resourcing.

Conclusion

It is widely recognised that there is a huge market and opportunity in distressed debt transfer worldwide. In the US and parts of Europe rapid expansion has been possible due to the standardised format of much of the valuation information. The main reasons for a transaction not being concluded are incomplete and/or non-standard information, leading to the need for multiple assumptions and finally disagreement on price. Indeed in newer markets the sellers often have limited or unrealistic ideas about the value of the debt.

In all markets, new and established, there appears to be a gap for intermediaries to help facilitate transactions. They would need to provide a means for credibly sharing information and analysis to give an objective valuation of the debt for both parties. They will also need to help structure the transaction for the long term benefit of both parties. And finally, the intermediary needs to define, and potentially undertake, the future monitoring.

This in-depth due diligence will help bring security and liquidity to the distressed debt market, and help purchasers if they needed to resell the debt quickly to pursue other opportunities. Alternatively, this could allow private investors to enter the market by buying a tranche of debt. For private investors the need for regular monitoring information is particularly important. With traditional corporate investments the investors passively wait for the selected company to improve its own financial position, and hence share price. However, with distressed debt purchase the investor actively needs to ensure the chosen specialist collector is delivering the expected results.