

Extract from "The Undercover Economist"
by Tim Harford (second edition, 2011)

The crisis auction

Shortly after the collapse of the British bank Northern Rock in mid-September 2007, the Bank of England ran four auctions

designed to inject cash into the banking sector. The auctions were not a success, and the Bank of England – in fact, the Governor of the Bank of England, Mervyn King – called Paul Klemperer for advice.

The Bank of England's aim was easily stated: how to lend the right amount of money to the right banks? But the details were difficult. Many banks had lots of valuable assets, but trust in the banking system had evaporated to such an extent that banks wouldn't lend each other the cash that they needed to conduct the simplest operations. The lack of access to cash from other banks had already pole-axed Northern Rock.

The Bank of England wanted to fix this problem by lending money to the banks. But they didn't want to lend any amount of money to any old bank: they wanted to lend only to banks that were fundamentally sound, and that meant asking for collateral. Collateral is a basic idea in borrowing and lending; a mortgage is a loan with a house as collateral, while a credit card balance is a loan with no collateral at all. Loans with better collateral should be cheaper, because they are more secure.

The total amount that the Bank of England lent out was also important: too much cheap credit would give bankers unnecessarily cheap loans to gamble with, while too little would risk another collapse.

The challenge seemed formidable. Previously, the Bank of England had lent money to banks based only on the very best collateral, and set the interest rate by holding an auction. The banks willing to pay the highest interest rate secured the cash.

But now the Bank wanted to hold an auction that allowed two different types of collateral – high-quality stuff, such as German government bonds, and riskier assets with less certain values. And ideally, both the amount of money lent out, and the interest rates for high- and low-quality collateral, would be determined by the

auction itself. If the Bank tried to guess at any of these numbers, it risked lending too little or too much. If it made the wrong guess about the difference between the interest rates, it would bias the flow of cash entirely towards one form of collateral or another. At best all that would be wasteful; at worse, the Bank's guestimates might spark panic in the market.

An alternative would have been to hold two separate auctions. But the two products on offer – borrowing with strong collateral versus borrowing with weak collateral – are very close substitutes. Banks would find it hard to bid in the first auction without knowing what would happen in the second auction. And by splitting the auction into two, the Bank of England would make each auction less competitive and less efficient.

And there was one further challenge. When offering liquidity to banks – when the state of the banking system would have affected the auction, and the state of the auction would have affected the banking system – speed is essential. Unlike the prolonged spectacle of the 3G auction, this one had to be concluded almost instantly.

Proxy bids, instant auction

Klemperer's proposal exploited a long tradition in auctions: that of proxy bidding. The simplest proxy bid in a standard auction – say, an eBay auction or a traditional open-cry auction at Sotheby's – works in a straightforward way. The real bidder gives his bid to the proxy – which may be an actual person, a piece of software or simply a note on the auctioneer's desk. Whenever a bid is made, the proxy bid will outbid it, until it wins or until the proxy bid has been exceeded.

Now imagine a proxy bid in a setting where there are three

identical cases of fine wine. You make a proxy bid of £200 for a single case: you only want one. The auctioneer will raise the bidding until there are only three bidders left. All of them pay the same price, of course. And if that price is £200 or less, you'll be a winner. But it's possible to get more clever than that: imagine that you might want *two* cases of wine, but only if there's a bargain to be had. So now you submit two proxy bids: one at £200 and an additional bid at £150. If all but one of your rivals drop out at £120, you win two cases and pay £120 per case. But if the bidding rises to £180, one of your proxy bids is discarded but you still win a single case for £180.

Here's the curious thing: if the auctioneer is known to be honest, she won't actually need to run this auction in real time. She could simply gather up envelopes from every bidder, each containing bids for one, two and three cases. She would then pick the three highest bids – which may all belong to the same bidder, or not – and would charge all three the *fourth* highest bid, which is the point at which the fourth bidder would have dropped out and the auction would have ended. The dynamic, open-outcry auction would have been replaced by an almost instant sealed-bid process. Very little of practical importance would have changed – except that the auction would have become much faster.

Let's add another twist. Now there are two vintages of wine on offer – some cases of a normal vintage and some cases of a fine vintage. Now when you submit your bids you need to consider how much you'd like to win of either vintage, or both, and what price might tempt you. But that's manageable. Previously, you'd submitted a bid at £200 and a second bid at £150. Now you submit a pair of either-or bids: a first bid offering £300 for the good vintage *or* £200 for the ordinary stuff; and a second bargain-hunting bid offering £200 for the good vintage *or* £150 for the ordinary stuff. If the other bidders drop out early enough you

might win two cases of wine, but not more, because your bids were 'either-or'. Whether you win the good vintage or the more everyday wine will depend on how fierce the bidding is for each type of wine.

You might worry that the auctioneer would begin to struggle with the proxy bids on her desk once bidders start submitting multiple, mutually exclusive sets of bids. You'd be right, but that doesn't matter. Because the entire auction has been transformed by proxy bids from a traditional open-outcry auction into a sealed-bid process, the auctioneer can simply feed all the bids into a computer and the computer can figure out which bidders get which bottles of wine and at what prices.

This, then, was the 'product-mix' auction that Klemperer designed for the Bank of England – instead of selling wine, the Bank extended credit, backed by strong or weak collateral. Klemperer made two small refinements. One was to use the lowest winning bid, rather than the highest losing bid, to set interest rates. Recall the embarrassment of the Vickrey auction deployed in New Zealand and you'll understand one of the reasons why. This tweak made little difference, in practice, to the outcome of the auction: bidders would be slightly more conservative, so the lowest winning bid under the Klemperer system would have been much the same as the highest losing bid under the Vickrey system. But the auction retained the attractive Vickrey-ish property that bidders had very little incentive to lie when submitting their proxy bids.

The second refinement was important: the Bank of England pre-committed to varying the total scale of the credit injection depending on how strong the bidding was, and how strong the preference for poor-quality collateral. (The equivalent would be for the auctioneer to decide in advance how much of each type of wine to sell for any given demand.) In effect the Bank was able to

decide in advance – without knowing much about the state of the banks who came to the auction – that if the banking sector was in good shape, the Bank would lend modest amounts of cash and insist on strong collateral, while if the banks were fragile, the Bank would lend plenty of cash in exchange for weak collateral, thus keeping interest rates down.

The Bank of England embraced the model – one executive director called it ‘a world first in central banking’ and ‘a major step forward in practical policies to support financial stability’ – and now routinely uses the auctions to interact with the UK’s banks.

But the multi-unit auction could be used much more widely: for instance when, in 2008, the US government was contemplating buying up ‘toxic assets’ from troubled banks, the multi-unit auction could have been used to set prices, with the government buying assets – potentially hundreds or thousands of different types of assets – from whoever was willing to sell them for the lowest price. Klemperer and several other auction theorists made this suggestion, before the US government changed direction and decided not to buy troubled assets after all. The auction design could be used to run electricity networks, with big industrial buyers bidding to be supplied more reliable gas, oil and nuclear power, or less reliable renewable energy, depending on their circumstances.

The Bank of England auctions were far less spectacular than the 3G auctions, with their multi-billion-pound price tags and seven-week media circus. In the long run, they may be just as important.