# Discussion of "CDS Auctions" by Michael Chernov, Alexander Gorbenko and Igor Makarov

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- Under/overpricing Intuition
- Empirics
- Is it the auction design?
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# Main Findings

- Analyze CDS settlement auctions both theoretically and empirically.
- Propose a theoretical model for the CDS auction:
  - Prove conditions under which over or under pricing equilibria can arise in the current auction process.
  - Theory predicts that magnitude of underpricing should be related to ratio of Net Open Interest (NOI) to cash-settled CDS positions carried into second auction round.
  - Propose various mechanism to improve efficiency of the auction.
- Analyze empirically all auctions that have occurred:
  - Find V-shaped pattern: bond prices decrease 30% 10 days prior to the auction and recover thereafter.
  - Underpricing (estimated at 10% relative to pre-auction day) seems related to NOI and consistent with theory.

# Why do we need an auction?

- In a CDS contract the protection buyer (PB) makes payment to the protection seller (PS) until maturity or a credit event occurs.
- When a credit event occurs PB hands over a bond (of defaulted company) to PS in exchange for its par value (physical settlement).
- If all CDS trades were physically settled, there would be no settlement issue.
- A settlement issue arises if a PB cannot deliver a bond to the PS.
  - More CDS protection has been written than there are outstanding bonds.
  - Secondary market for bonds may be very illiquid (especially around a default event).
  - An investor has setup 'naked' short on the name via CDS to hedge a position in stocks, and/or options, or simply to speculate.
  - An investor may have an exposure to a name through a CDS index trade.
  - Many derivatives trader are not 'setup' to trade physical bonds.
- Further, to avoid recovery 'basis risk' it is useful to offer the option to cash-settle to all investors and establish one unique reference price for the settlement of all CDS contracts.
  - Recovery basis risk arises when an investor has several positions (e.g, an index trade and a single name trade), that should, in theory, perfectly compensate.
- This is the objective of the CDS settlement auction, which has now been hardwired into standard CDS contracts.

# A two stage auction process

- The price determined in the second stage($P^A$), will be used to cash-settle **all** CDS.
  - PB (PS) receive (pay) $100 - P^A$.
- CDS investors have still the option to replicate a physical settlement, by requesting (at the first stage) to buy/sell bonds in the second round auction (effectively submitting market orders).
  - PB (PS) submit market sell (buy) orders, thus receiving (paying) $P^A$ from market order.

$\Rightarrow$ Note that the sum of the cash-settlement plus the market order replicates the physical settlement (independent of $P^A$)!

Q? How do we determine $P^A$?

- In first stage:
  - PB (PS) submit market sell (buy) orders (capped by the size of their CDS position)
  - Net sum of market orders establishes Net Open Interest (NOI).
  - At same time, dealers submit indicative bid/ask quotes for a small quantity ($5mm) and fixed bid-ask (2%) to establish a reference Mid-point ($P^M$).
- In Second stage,
  - **Any** investor can submit **limit** orders to buy (sell) if NOI is to sell (buy).
  - Run through the limit order book from best (highest buy or lowest sell) to worst until NOI is absorbed. Last limit price used to clear NOI is $P^A$.
  - If NOI not cleared, then $P^A$ is set to zero (100) if NOI is to sell (buy).
  - $P^A$ is capped at $P^M$+1% ($P^M$-1%) if NOI is to sell (buy).

# Describing the auction mechanism

Q? Who cares about $P^A$?

- Clearly, any PB (PS) who replicates physical settlement by entering market order does not!
- PS (PB) who chooses to cash-settle by not entering market orders, wants highest (lowest) $P^A$.

Q? Who can affect $P^A$?

- Only an investor who participates in second stage auction, can bid up (down) $P^A$ if NOI is to sell (buy) by putting aggressive limit orders.

$\Rightarrow$ If NOI is to sell (buy) a PS (PB) can gain on his CDS position by aggressive bidding up (down) the settlement price.

$\Rightarrow$ The PS (PB) will gain only if his CDS position is larger than the NOI (else the gain on the CDS position cash-settlement payoff is offset by the loss on the limit order purchase (sale)).

$\Rightarrow$ Over (under) pricing can occur if the NOI to sell (buy) is smaller than the net naked outstanding CDS position held by PS (PB).

# Describing the auction mechanism

- Of course, since the derivative market is a zero-sum game, and investors can always mimick the physical settlement payoff (which is independent of $P^A$), there always exists an equilibrium, where, absent frictions, (i) NOI=0 and $P^A = v$, or (ii) $NOI \geq 0$ and $P^A \in (v, 100]$ where PB use physical settlement and PS cash-settle, or (iii) $NOI \leq 0$ and $P^A \in [0, v)$ where PS use physical settlement and PB cash-settle. In all cases agents obtain same payoff (proposition 4).
- Whence, authors introduce asymmetry/frictions:
  - Limits to physical ownership of bonds by agents
  - Short-sell constraints.
- With friction 1, authors construct equilibria where second stage price will be linear in $NOI > 0$: $P^A = v - \delta\, NOI$ for $\delta > 0$ (underpricing).
- with friction 2, construct equilibrium where (as long as some investor has large enough CDS position relative to physical bond position), there exists an equilibrium with NOI$>0$, such that $P^A = 100$ (overpricing).

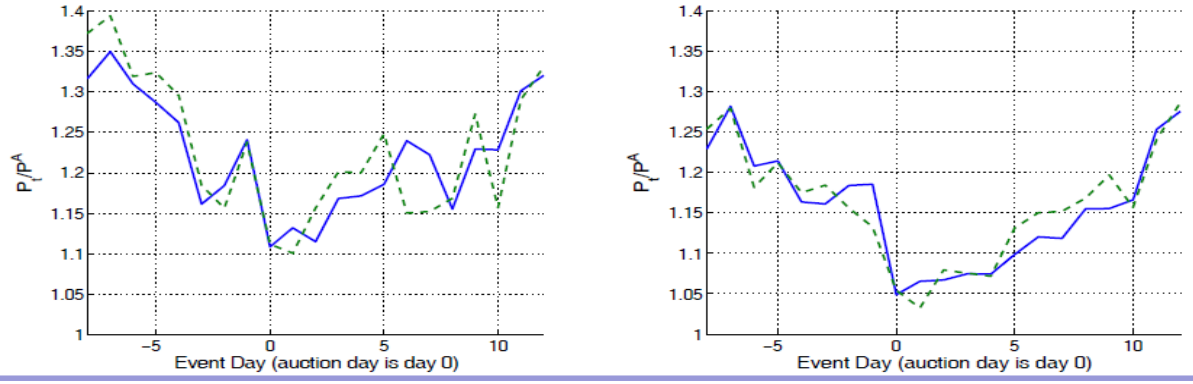
# Empirical Evidence

- Merge 86 (L)CDS auctions with TRACE data to obtain 23 auctions.
- Define true value $v$ as pre-auction day TRACE price ($p^{-1}$).
- Ideally, to test the theory would like to compare NOI to cash-settled CDS position of agents that participate in second stage auction.
- Since data on individual CDS position is not available, look at ratio of NOI to Notional Amount of Deliverable bond (NAB) in the regression:

$$\frac{p^A}{p^{-1}} = \alpha + \beta\, NOI/NAB + \epsilon$$

- Find $\alpha \approx 1$ and $\beta = -1.19$ consistent with average underpricing and negative relation to (positive) NOI, consistent with some of their theory.
- Find also tremendous price impact around auction day

Figure 5: *Price Impact*

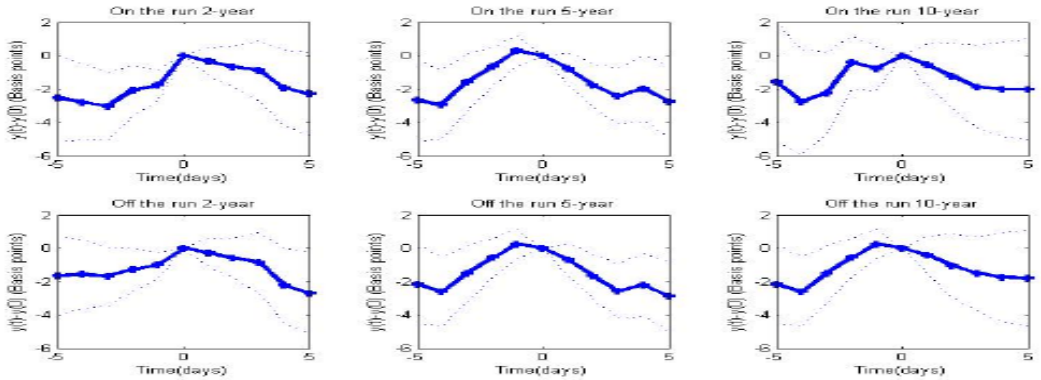


# Evidence on price pressure around Treasury Auctions

- Lou, Yan, Zhang (2011) find systematic price patterns around regularly scheduled Treasury auction dates from 1980 to 2008:
  - Prices of 2, 5 and 10 year Treasury notes drop a few days before regularly scheduled auction dates and recover a few days after.
  - The average yield difference between newly auctioned note and outstanding (similar maturity note) is around 2 to 4bps for on the run (slightly less for first off the run)
- A trading strategy going long the 2-year note and short the duration matched 0.5 and 10 year notes in the 10 days prior to each auction and reversing for the 10 days post-auction yields a Sharpe of 1.44 pre-tcosts and .9 post t-costs (for last 10 years, and sharpe of 1 full sample)

Figure 1
Treasury Yields Around Auctions (1980-2008)

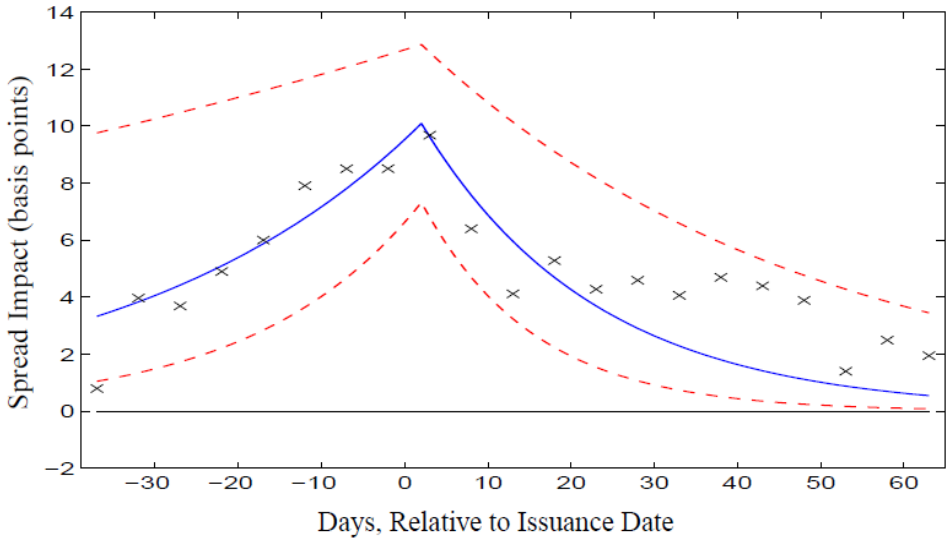
Solid lines in these figures correspond to the time-series average of $Y(t) - Y(0)$, which is the yield of the $n$-year Treasury note ($n$=2,5,10) on day $t$ (where $t$ ranges from -5 to 5) minus the yield of the same note on the day when a subsequent $n$-year note auction is conducted. (More precisely, the note is on-the-run before the auction and becomes off-the-run after the auction.) The dotted lines are the 95% confidence interval. The top three figures are for on-the-run Treasury notes, and the bottom three figures are for the first off-the-run notes. The sample period is from January 1980 to June 2008. All yields are expressed in basis points.



# Similar evidence on price pressure around Corporate Bond issuance

- 'New-Issuance' Risk also found for Corporate Bonds (Newman Rierson (2004)):
  - Focus on Telecom Bond issuances in the European bond market from 1999-2001
  - Find large impact of bond issuance own and other (close substitute) bond yields
  - Impact occurs in 15 days window and peak at issuance date (and not announcement date!).
  - Propose a (search-theoretical) model of risk-averse intermediaries who take time to find end buyers that explains phenomena

**Figure 3. The Cumulative Impact of Debt Issuance on Other-Bond Yield Spreads**




The solid line is the estimated cumulative other-bond yield-spread impact of debt issuances (scaled to reflect the impact of Deutsche Telekom's issuance of 15.5 billion Euro of debt in June of 2000), as implied by the constrained model. The dashed lines are two-standard-error confidence bands. The estimates obtained from the unconstrained model are marked '×'.

# Implications

- Significant evidence of price impact upon issuance across markets (corporate bond, IPOs, Treasury auctions).
- Why? price concession to intermediaries because of finite risk-bearing capacity? Or implicit collusion/non-competitive dealer behavior?
- Trading Anecdote from Dealer intermediated market
  1. Price-impact of settlement trades in LIBOR-swaption market disappeared with 'threat' of taking physical delivery:
     - Short put, payoff $-\max(K-S,0)$
     - At maturity, when cash-settling, observe 'price impact': the underlying $S$ decreases around settlement date, so losses on short exacerbated (forced to 'buy' at K something 'worth' S).
     - Ask for physical delivery, i.e., actually buy at $K$ and receive $S$ (not just cash-settling)

     $\Rightarrow$ price impact disappears!
- Suggestions:
  - Think more about the initial reference price $P^M$ set by dealer quotes.
  - Current model has 'utility' function for dealers justiied by reputation concerns, that pushes them to set the reference price as close as possible to true value.
  - Given cap in second round, large underpricing must mean reference price $P^M$ is set too low.
  - What role do dealers play in the second stage auction?
  - Do they take on a large part of the trades onto their balance sheet (provide 'liquidity')?

# Conclusion

- Nice combination of theory and empirics.
- Auction theoretic model does a great job trying to stay close to market mechanism.
- Results are quite provocative and suggestions are made to improve design, that dealers should think about.
- Empirical results are less convincing (as validation of theory).
- Mostly, data is limited and we miss the right information (on CDS positions). Can the DTCC data be used?
- Magnitude of the price action around auction seems too large (in magnitude and duration) to be solely due to auction design flaw.
- Instead, seems consistent with 'price concessions' observed around issuances or auctions in other markets
  - equity IPO
  - index reconstitutions
  - Treasury auctions
  - corporate bond issuances
  - futures rolls