

Sovereign CDS Auction

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Abstract

Credit default swap (CDS) auction uses a two-stage process to facilitate cash settlement following a credit event. The initial market midpoint (IMM), net open interest (NOI), and adjustment amounts are set in the first stage. The final auction price which is used for cash settling the CDS contracts is determined in the second stage. This paper studied the results of sovereign CDS auctions from January 2009 to August 2020. We find that there were on average 11 dealers in each sovereign CDS auction. 50% of the auctions had sell-NOIs. The typical credit event was Failure to Pay. The most common value of bid-offer spread was 2, while the most common value of quotation amount was \$2 million. Majority of the sovereign CDS auctions contained penalties. In general, the final auction price was between 20 to 40.

1 Introduction

Credit default swap (CDS) is a fixed income derivative instrument and performs similarly to an insurance. The recent European sovereign debt crisis has fueled interest in the sovereign CDS market. During the crisis, the sovereign CDS contract was blamed for being used by speculators to manipulate the sovereign borrowing costs and destabilizing the European financial market.

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While many papers have studied the determinants of sovereign CDS spreads (Blommestein et al. , 2016; Dieckmann and Plank , 2012; Eyssel et al. , 2013; Fontana and Scheicher , 2016; Li , 2019; Longstaff et al. , 2011), our understanding of the sovereign CDS auctions remains limited.

We use the current paper to study the results of sovereign CDS auctions from January 2009¹ to August 2020. The auction data is collected from <http://www.creditfixings.com>, which is a public website run by Creditex. For each sovereign CDS auction, we collect the auction date, credit event, sovereign name, final price, number of participating dealers, initial market midpoint (IMM), net open interest (NOI), adjustment amount, bid-offer spread, and quotation amount. The price cap (floor) of each auction is calculated based on the information of IMM and NOI. To further compare the results of sovereign CDS auctions and corporate CDS auctions, we collect the data of corporate CDS auctions for the same period. Following Gupta and Sundaram (2013) and Coudert and Gex (2013), LCDS auctions are dropped. We do not include the results of CDS auction buckets and CDS auctions with zero NOIs since their final auction prices are typically near or above 100².

Our analysis shows that there were on average 11 dealers in each sovereign CDS auction. Half of the sovereign CDS auctions had sell-NOIs. This is different from the results of corporate CDS auctions. For corporate CDS auctions that took place in the same period, 85.2% of them had sell-NOIs. The typical credit event that triggered the sovereign CDS auction was Failure to Pay. The most common value of the bid-offer spread was 2, while the most common value of quotation amount was \$2 million. Penalties were involved in six of the eight sovereign CDS auctions. The final prices typically fell in the range of 20-40. Majority of the sovereign CDS auctions had adjustment amounts.

¹The beginning of our sample period is January 2009 since the first sovereign CDS auction (Republic of Ecuador CDS Auction) took place on January 14, 2009.

²These prices are viewed as outliers and will produce a biased average final price.

We are the first paper, to our best knowledge, provides a comprehensive study on sovereign CDS auctions. Most CDS auction related papers focus on studying whether the final auction price is based or not. Du and Zhu (2017) study the design of CDS auctions and find that the restrictions imposed in CDS auctions bias the auction price. Chernov et al. (2013) show that the CDS holding participants have incentive to manipulate the final price which results in a biased final price. On the empirical side, Coudert and Gex (2013) study the CDS auctions that took place between 2005 and 2012. They find that there might exist bias or manipulation in the CDS auction since the bond prices on the secondary market are not the same as the final prices on the auction day. Gupta and Sundaram (2013) study the results of CDS auctions from 2008 to 2010 and find that auction price is biased compared to the pre- and post-auction market prices. Paulos et al. (2019) extend Chernov et al. (2013)'s work using the Depository Trust & Clearing Corporation (DTCC) data and find that some dealers have large CDS positions. This supports Chernov et al. (2013)'s finding that some dealers might have incentive to manipulate the final price.

The remainder of the paper is organised as follows: Section 2 describes the mechanism of CDS auction and credit events; Section 3 presents the data and the list of historical sovereign CDS auctions; Section 4 summarizes results; Section 5 presents concluding remarks.

2 CDS Auction

2.1 CDS Auction Mechanism

A CDS auction has two stages. The first stage is used to gather information and set constraints for the second stage. The initial market midpoint and net open interest are determined in the first stage. The second stage is used to produce a final price³, which is used for cash

³The final price is a uniform price for the underlying bonds. All participants who have submitted Physical Settlement Request (PSR) files will trade on this final price.

settling CDS contracts. A CDS protocol document is released by the International Swaps and Derivatives Association (ISDA) before each auction. This document is used to specify the auction terms. Markit and Creditex are two companies who administrate the auction on the auction day. Dealers must prepare to sell or buy a minimum amount of bonds if they participate. This setting is used to keep the honesty of a dealer in a CDS auction process. Dealers can act on behalf of themselves, their customers or both.

Each CDS auction can be seen as a price discovery process for the bond value since the cash market will be quite illiquid at that time⁴. Theoretically speaking, the price discovered in a CDS auction should be close to the price at which the same bond is trading in the open cash market. However, the empirical evidence shows otherwise. Coudert and Gex (2013) study the bond prices and the final prices for all CDS auctions that took place from 2005 to 2012. They find that bond prices on the secondary market are not the same as the final prices on the auction day. Moreover, this paper reveals that market price typically declines before the auction day⁵ and increases afterwards for a CDS auction with an NOI to sell. For a CDS auction with an NOI to buy, the price on the secondary market typically increases before the auction and declines afterwards. There are a few exceptions. For example, in the case of Lehman Brothers auction, the auction price was higher than the price of deliverable bonds both before and after the CDS auction. In the Hellenic Republic CDS auction, the average price of the bonds declined before the auction and continued to decrease afterwards.

2.1.1 Stage One

ISDA publishes a list of bonds that are eligible for the Physical Settlement Request (PSR) before each auction. The PSR represents a request to buy or sell a certain face value of the

⁴A particular goal of each CDS auction is to determine the *fair* value of the deliverable bond.

⁵Coudert and Gex (2013) use a ten-day window, five days before and five days after the auction, to study the price changes.

deliverable bonds at the final price. Although PSR refers to the physical settlement request, it does not mean that there will be a physical settlement⁶. The submission process of PSRs is specified as follows: CDS investors/customers who want to buy or sell the defaulted bonds can submit their PSRs to the participating dealers⁷. Dealers then nest their own net exposures with their customers' requests and submit the PSRs. Dealers have to make price and quantity submissions if they participate. The prices are used to identify the initial market midpoint, while the quantity submissions are used to obtain the net open interest. The participants are locked into a trade to buy or sell the bonds at the final price once the PSRs have been submitted.

There are some requirements of the price and quantity submissions posted by ISDA:

- Orders must in the same direction as their CDS market positions.
- The posted amount cannot exceed the party's CDS market position.

For example: a net CDS buyer (seller) with \$100 in protection can only submit offer (bid) to sell (buy) the underlying bonds using a request less or equal to \$100 via the PSR. In other words, if dealers submit offers to sell, they either have net long positions in the CDS themselves or other participants who have long positions submit offers through them. For example: Paulos et al. (2019) show that Goldman Sachs submitted a large offer to sell since it had a large long position in the Toys R Us CDSs.

Why do investors want to buy or sell the bonds? An investor who has a net short position in CDS may still believe the deliverable bonds are undervalued. He or she would like to buy the bonds and hope to recover a certain value through the restructuring or bankruptcy procedure. An investor who holds both bonds and CDS would like to sell the bonds and receive a 100% cash position after an auction. This process acts similar to a physical settlement, although all CDS contracts are cash settled.

⁶All CDS can only be cash settled. However, one can still trade bonds to replicate a physical settlement by participating in the CDS auction process.

⁷Physical Settlement Requests can only be submitted by the CDS dealers. One dealer can submit one PSR.

Table 1: Dealer Inside Markets: Hellenic Republic Sovereign CDS Auction

Dealer	Bid	Offer	Dealer
Bank of America N.A.	21.625	23.625	Bank of America N.A.
Barclays Bank PLC	21.0	23.0	Barclays Bank PLC
BNP Paribas	20.75	22.75	BNP Paribas
Citigroup Global Markets Limited	20.5	22.5	Citigroup Global Markets Limited
Credit Suisse International	20.25	22.25	Credit Suisse International
Deutsche Bank AG	20.25	22.25	Deutsche Bank AG
Goldman Sachs International	21.125	23.125	Goldman Sachs International
HSBC Bank PLC	20.25	22.25	HSBC Bank PLC
JPMorgan Chase Bank N.A.	21.25	23.25	JPMorgan Chase Bank N.A.
Morgan Stanley & Co. International PLC	21.0	23.0	Morgan Stanley & Co. International PLC
Nomura International PLC	20.0	22.0	Nomura International PLC
Société Générale	21.0	23.0	Société Générale
The Royal Bank of Scotland PLC	22.0	24.0	The Royal Bank of Scotland PLC
UBS AG	20.5	22.5	UBS AG
Initial Market Midpoint: 21.75			

This table displays the dealer initial markets of Hellenic Republic Sovereign CDS Auction, which took place on March 19, 2012. The data is collected from the creditfixings website. Prices are expressed as points per 100 notional.

Participating dealers provide both bid and offer prices at which they are willing to buy and sell securities. Table 1 shows the 14 dealers' bid and offer prices of Hellenic Republic Sovereign CDS Auction, which took place on March 19, 2012. Prices are expressed relative to a par value of 100. The pre-specified bid-offer spread was 2, which indicates that the offer price cannot be more than 2 greater than the bid price.

Initial Market Midpoint

In order to calculate the initial market midpoint, we need to sort the offers from the lowest to the highest and bids from the highest to the lowest first. In this way, the *lowest offers* can match with the *highest bids*. To be specific, if the bid price is higher than or equal to the offer price, we can match and cancel the pair (*crossing bid-offer pair*). We use the results of Hellenic Republic CDS Auction as an example. The initial offers and bids are shown in Table 1 and the ordered bids and offers are shown in Table 2. The highest bid price (The Royal Bank of

Table 2: IMM Calculation: Ordered Bids and Offers

Dealer	Bid	Offer	Dealer
The Royal Bank of Scotland PLC	22.0	22.0	Nomura International PLC(match & cancel)
Bank of America N.A.	21.625	22.25	Credit Suisse International
JPMorgan Chase Bank N.A.	21.25	22.25	Deutsche Bank AG
Goldman Sachs International	21.125	22.25	HSBC Bank PLC
Barclays Bank PLC	21.0	22.5	Citigroup Global Markets Limited
Morgan Stanley & Co.International PLC	21.0	22.5	UBS AG
Société Générale	21.0	22.75	BNP Paribas
BNP Paribas	20.75	23.0	Barclays Bank PLC
Citigroup Global Markets Limited	20.5	23.0	Morgan Stanley & Co.International PLC
UBS AG	20.5	23.0	Société Générale
Credit Suisse International	20.25	23.125	Goldman Sachs International
Deutsche Bank AG	20.25	23.25	JPMorgan Chase Bank N.A.
HSBC Bank PLC	20.25	23.625	Bank of America N.A.
Nomura International PLC	20.0	24.0	The Royal Bank of Scotland PLC

This table shows the ordered bids and offers. The bids are sorted from the highest to the lowest. The offers are sorted from the lowest to the highest. The Royal Bank of Scotland PLC's bid price matched and cancelled with Nomura International PLC's offer price (marked in blue). Seven pairs (marked in red) are used to calculate the initial market midpoint. These trades are the best-half remaining non-tradable offers and bids. Prices are expressed as points per 100 notional.

Table 3: Adjustment Amounts of Hellenic Republic CDS Auction

The Royal Bank of Scotland PLC	EUR 12,500
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Scotland PLC) was the same as the lowest offer price (Nomura International PLC). Therefore, this bid-offer pair was crossed. The remaining best-half non-tradable offers and bids were used to calculate the IMM. The number of remaining pairs was odd as 13 pairs as shown in Table 2. It was rounded up to $(13+1)/2=7$ pairs as the best-half (marked in red). IMM took the average value of 21.625, 22.25, 21.25, 22.25, 21.125, 22.25, 21.0, 22.5, 21.0, 22.5, 21.0, 22.75, 20.75, 23.0. Note that the final IMM should be rounded to the nearest eighth⁸ of a percentage point.

Adjustment Amounts

⁸ISDA suggests that the IMM should be rounded to the nearest 0.125. However, Paulos et al. (2019) suggests that there is no specific rule indicating IMM should be rounded down or rounded up when facing an equal distance. For example: if the precise IMM is calculated at 20.3125, which is equidistant to 20.25 and 20.375. There is no specific rule suggesting IMM should be rounded up to 20.375 or rounded down to 20.25.

Table 4: Physical Settlement Requests of Hellenic Republic CDS Auction

Dealer	Bid/Offer	Size
BNP Paribas	Offer	158.0
Citigroup Global Markets Limited	Offer	111.1
Credit Suisse International	Offer	0.0
Deutsche Bank AG	Offer	12.55
Goldman Sachs International	Offer	18.0
HSBC Bank PLC	Offer	332.0
Nomura International PLC	Offer	6.3
Société Générale	Offer	5.0
The Royal Bank of Scotland PLC	Offer	5.0
Bank of America N.A.	Bid	17.0
Barclays Bank PLC	Bid	24.3
JPMorgan Chase Bank N.A.	Bid	17.85
Morgan Stanley & Co. International PLC	Bid	236.55
UBS AG	Bid	60.65
Net Open Interest: EUR 291.6 million to sell		

Adjustment amounts, also known as penalties, are put in place to prevent dealers from submitting off-market quotes. A dealer needs to pay an adjustment amount to ISDA if his or her quotation is crossed and also on the “wrong side” of the IMM (Coudert and Gex (2013)). For example: if an NOI is to sell with 11.5 as the IMM. This suggests any bid higher than 11.5 would get a penalty since the *proper* bid price should be lower than 11.5. Alternatively, if an NOI is to buy with 11.5 as the IMM, any offer lower than 11.5 would get a penalty. Table 3 shows that The Royal Bank of Scotland PLC was demanded to pay the penalty in the Hellenic Republic CDS Auction since it submitted a bid price (22.0) higher than the IMM (21.75). The penalty amount was calculated as $\frac{22.0-21.75}{100} * \text{€} 5 \text{ million} = \text{€} 12,500$. The € 5 million was the quotation amount, which could be found in the table of Limit Orders.

Net Open Interest

The net open interest is determined by netting the buy-PSRs against the sell-PSRs. Table 4 shows the Physical Settlement Requests of Hellenic Republic CDS Auction. The NOI was

Table 5: Limit Orders and the Final Price of Hellenic Republic CDS Auction

Dealer	Bid	Size
JPMorgan Chase Bank N.A.	22.75*	50.0
Deutsche Bank AG	22.75*	19.5
Citigroup Global Markets Limited	22.75*	10.0
Credit Suisse International	22.75*	5.0
Credit Suisse International	22.125*	5.0
Citigroup Global Markets Limited	21.75*	50.0
Barclays Bank PLC	21.75*	10.0
The Royal Bank of Scotland PLC**	21.75*	5.0
Barclays Bank PLC	21.625*	30.0
Bank of America N.A.**	21.625*	5.0
HSBC Bank PLC	21.5^	60.0
Barclays Bank PLC	21.5^	60.0
JPMorgan Chase Bank N.A.	21.375	20.0
Credit Suisse International	21.375	5.0
JPMorgan Chase Bank N.A.**	21.25	5.0
UBS AG	21.25	1.0
Goldman Sachs International**	21.125	5.0
.....		
Final Price: 21.5		

Note: ** Limit orders that were derived from inside markets. * Limit orders that were filled. ^ Limit orders that were partially filled.

€291.6 million to sell, which indicated that there were more requests to sell the deliverable bonds than to buy the bonds.

2.1.2 Stage Two

We first illustrate three special cases before introducing stage two. Case 1: if the NOI from stage one is zero, the final price is the same as IMM; Case 2: if the NOI is to sell but it is not filled in stage two, the final price is zero; Case 3: if the NOI is to buy but it is not filled in stage two, the final price is par.

Stage two is about posting Limit Orders to fill the net open interest. Once the results of stage one are published, the market is given 90 to 120 minutes to digest this information. This is called

the waiting period. Second stage begins when dealers enter the orders to fill the NOI. If an NOI is to sell (buy), dealers who can bid (offer) are allowed to submit the limit bid (offer) orders. Dealers' initial quotes from stage one are carried into the second stage with the pre-determined quotation amount. These quotes are called *carried over quotes* by ISDA. The bids or offers that belong to the crossing bid-offer pairs will be carried to the second stage differently. To be specific, if the NOI is to sell, the price carried to the second stage is the minimum of the initial bid and the IMM. If the NOI is to buy, the price carried to the second stage is the maximum of the initial offer and the IMM. The size for both cases is the pre-determined quotation amount.

Carried over quotes are indicated by ** shown next to the deals' names. For example: Table 5 shows the information of the Limit Orders in the Hellenic Republic CDS Auction. The Royal Bank of Scotland PLC, Bank of America N.A., JPMorgan Chase Bank N.A., and Goldman Sachs International were all marked by **. As we stated before, if the initial bids do not belong to the crossing bid-offer pairs, the prices will be directly carried to the second stage with the quotation amount. Therefore, the initial bids of Bank of America N.A. (21.625), JPMorgan Chase Bank N.A. (21.25), and Goldman Sachs International (21.125) were directly carried into the second stage with the quotation amounts. However, the bid of The Royal Bank of Scotland PLC belonged to the crossing bid-offer pair as shown in Table 2. Thus, its price was replaced by the minimum of the initial bid (22.0) and the IMM (21.75) before being carried into the second stage.

Overall, the Limit Orders in stage two contain three types of orders: first, the new orders if there is any. Second, the carried over quotes. Third, the bids or offers that belong to the crossing bid-offer pairs in stage one. Table 5 shows that the NOI of € 291.6 million to sell was cumulatively filled⁹ from the highest bid of 22.75 with size 50m (JPMorgan Chase Bank N.A.) to the bid of 21.5 with size 60m (Barclays Bank PLC). Therefore, the final price was 21.5.

⁹Filled limit orders were marked by price* and the partially filled limit orders were marked by price^.

Cap and Floor

ISDA sets cap and floor on the final price to prevent manipulation. If an NOI is to sell, price cap equals $IMM + (\text{bid-offer spread})/2$. If the NOI is to buy, price floor equals $IMM - (\text{bid-offer spread})/2$. In other words, the direction of the NOI determined whether to impose a price cap or price floor. The value of price cap or price floor is determined by the IMM and the pre-determined bid-offer spread. Take the results of Hellenic Republic CDS Auction as an example. The IMM was 21.75, the NOI was to sell, and the pre-determined bid-offer spread was 2. Therefore, the price cap was 22.75.

Setting price cap and floor is important. For example, if an investor has taken a large net short position on CDS. It's in his or her best interest to have a high final price in order to make the payment for settling the CDS as little as possible. The strategy is to have an NOI to sell with a small amount. In the second stage, he or she can post a superficially high bid to fill the NOI. In this way, this deal only costs a small payment to buy the bonds, while saving a large amount of payment on cash settling the CDS. Price cap limits the ability of this type of final price manipulation.

2.2 Credit Events

In general, credit event refers to the failure of an reference entity to meet its debt obligation¹⁰ (Augustin et al. , 2014). Typically, the credit events¹¹ applicable to the standard sovereign CDS contracts include Failure to Pay, Restructuring, and Repudiation/Moratorium. For Latin America sovereign CDSs and Emerging European & Middle Eastern sovereign CDSs, Obligation Acceleration is also considered as a relevant event. There are hard and soft credit events. Failure to Pay, Repudiation/Moratorium, and Obligation Acceleration belong to the hard credit

¹⁰The underlying reference obligation and reference entity of a CDS contract can be found using the RED data of the CDS.

¹¹A sovereign CDS contract typically lists the events that affect the reference obligation.

events. A CDS contract is *automatically* triggered as long as a hard credit event occurs. Restructuring belongs to the soft credit event. A CDS contract is *not automatically* triggered when a soft event occurs. Loosely speaking, if both protection buyers and sellers decide not to trigger the contract, the CDS will continue until maturity or a future credit event (Haworth , 2011).

- **Failure to Pay** When due on one or more of its obligations, the reference entity fails to make a payment at least or larger than the Payment Requirement after the expiration of any applicable grace period. The Payment Requirement is typically 1 million U.S. dollars or relevant currency equivalent. It can be fixed as other pre-specified amount in the CDS confirmation.
- **Obligation Acceleration** One or more Obligations in an aggregate amount of at least the Default Requirement become due and payable before they should as the result of, or on the basis of, the occurrence of a default or similar event, other than the result of Failure to Pay. The Default Requirement is usually 10 million U.S. dollars or relevant currency equivalent. It can be fixed as other pre-specified amount in the CDS confirmation.
- **Repudiation/Moratorium** We can declare a *Full* Repudiation/Moratorium if (i) & (ii) *both* occur. The occurrence of (i) is called a *Potential* Repudiation/Moratorium, which will not trigger a CDS.
 - (i) An authorized officer of a reference entity or a government authority (a) disaffirms, disclaims, repudiates, rejects, in whole or in part, or challenges the validity of one or more obligations in an aggregate amount of at least the Default Requirement. (b) declares or imposes a moratorium, standstill, rollover or deferral, whether de facto or de jure, with respect to one or more obligations in an aggregate amount of at least the Default Requirement.
 - (ii) A Failure to Pay or a Restructuring (both determined without regard to the Payment Requirement) occurs with respect to any such Obligation on or prior to the Repudia-

tion/Moratorium Evaluation Date.

- **Restructuring** One of the followings should occur to qualify as a restructuring credit event. It should binds *all* creditors to one or more Obligations in an amount of at least the Default Requirement¹².
 - (a) A reduction, postponement or deferral of Obligation principal or contractually agreed interest payments.
 - (b) A change in priority ranking causing subordination to another Obligation.
 - (c) A change in currency or composition of interest or principal payments to any currency that is not a Permitted Currency (Permitted Currencies refer to the legal tender of either any G7 country or any country that is the member of OECD and has a triple A rated local currency long-term debt by S&P, Moody's or Fitch.).
 - (d) Arise directly or indirectly from a deterioration in the creditworthiness or financial condition of the Reference Entity.
 - (e) Satisfy the Multiple Holder Obligation. The Multiple Holder Obligation means the Obligation that triggers the Restructuring Credit Event must be held by more than three holders and at least more than 2/3 of the holders must be required to consent to the event.
 - (f) Not be due to an accounting or tax adjustment incurred in the normal course of business.

¹²CDS will be triggered with a near certainty if collective action clause (CAC) and exit consent are used to restructure sovereign debt (Waibel , 2014). The insertion of CAC into the existing bonds for future use does not trigger a restructuring credit event. If one or more of the restructured bonds contain CAC and the proportion of holders who have voluntarily agreed to the restructuring has reached the required threshold, it would bind all bond holders and thus trigger the CDS. CDS will not be triggered if creditors accept debt restructuring voluntarily (Coudert and Gex , 2013).

3 Data and List of Sovereign CDS Auctions

3.1 The Data Set

The auction data is collected from <http://www.creditfixings.com>. It is a public website run by Creditex. For each auction, the site provides information for the type of auction (LCDS or CDS auction), the type of deliverable instruments (senior or subordinated), the list of deliverable instruments, and the results of stage 1 & 2. Eight sovereign CDS auctions were held between January 2009 and August 2020. To be specific, these eight sovereign CDS auctions took place in 2009, 2012, 2014, 2015, 2017, and 2020. We collect the auction date, credit event, sovereign name, final price, number of participating dealers, IMM, NOI, bid-ask spread¹³, adjustment amount, and quotation amount for each sovereign CDS auction. The price cap or floor is calculated based on the information of IMM and NOI.

To compare the results of sovereign and corporate CDS auctions, we collect the data of corporate CDS auctions in the same period¹⁴. Three types of auctions are dropped. First, LCDS auctions are excluded following Gupta and Sundaram (2013) and Coudert and Gex (2013). Second, we do not consider CDS auctions with zero NOIs. Third, we drop the results of CDS auction buckets. We exclude the results of CDS auction buckets and CDS auctions with zero NOIs because their final auction prices are typically near or above 100. Overall, there are two CDS auctions have zero NOIs and three CDS auctions contains results of different buckets¹⁵

¹³The bid-offer spread stands for the pre-specified maximum bid-ask spread.

¹⁴To be specific, we collect the results of corporate CDS auctions that took place in 2009, 2012, 2014, 2015, 2017, and 2020, respectively.

¹⁵The three CDS auctions are the Northern Rock (Asset Management) PLC CDS auction in 2012, the Bca Monte dei Paschi di Siena S.P.A CDS auction in 2017, and the Banco Popular Español SA CDS auction in 2017. The Northern Rock (Asset Management) PLC CDS auction was held on February 02, 2012. The final prices for CDS Bucket 1 and 2 were 104.25 and 99.125, respectively. The Bca Monte dei Paschi di Siena S.P.A auction took place on November 01, 2017. The final prices for CDS Bucket 2 and 1 were 99.875 and 100, respectively. The Banco Popular Español SA CDS auction was held on October 05, 2017. The final prices for CDS Bucket 1 and 2 were 100.375 and 102.5, respectively. The Northern Rock (Asset Management) PLC CDS auction and Bca Monte dei Paschi di Siena S.P.A auction both had prices over 100. Therefore, for purposes of settling the auction covered transactions only, the final price would be deemed to be 100.

during our sample period.

3.2 The List of Sovereign CDS Auctions

- **Republic of Ecuador (2009 and 2020)**

President Rafael Correa refused to make an interest payment on the 2012 global bond due on December 15, 2008¹⁶, which made Ecuador the first country to trigger a sovereign CDS payment. When Rafael Correa announced he would become a candidate for president in 2006, he promised that he would refuse to pay the foreign creditors if he was elected. After becoming the President, Correa formed a public debt audit commission to evaluate Ecuador's debt for the past 30 years. In a report issued in October 2008, the commission concluded that a large proportion of the external debt was illegitimate. Correa announced that Ecuador would default on its global bonds maturing in 2012 and 2030 in the late 2008 (Feibelman , 2017).

For the 2009 Republic of Ecuador CDS auction, the credit event was Failure to Pay. The CDS auction was held on January 14, 2009 and 12 dealers participated in the CDS auction. The Ecuador sovereign CDS was triggered again on 2020. ISDA's Americas DC declared a Restructuring Credit Event occurred with respect to Republic of Ecuador on April 27, 2020. All 14 participants¹⁷ voted affirmatively. The 2020 Republic of Ecuador CDS auction was held on May 19, 2020. 10 dealers submitted initial markets, physical settlement requests, and limit orders.

- **Hellenic Republic (2012)**

¹⁶To be specific, the government failed to make a \$30.6 million interest payment within the 30 day grace period that started after the country failed to make the payment for the original due date which was December 15, 2008.

¹⁷The 14 participants are Bank of America, Barclays Bank PLC, BNP Paribas, Citibank, Credit Suisse International, Goldman Sachs International, JP Morgan Chase Bank, Deutsche Bank AG, Mizuho Securities Co., Ltd, Citadel Americas LLC, Pacific Investment Management Co., LLC, AllianceBernstein L.P., Cyrus Capital Partners, L.P., and Elliott Management Corporation.

On March 09, 2012, 85.5% of the holders agreed to exchange sovereign debt issued under Greek law. CAC was activated since 85.5% is higher than the threshold of qualified majority (75%) but lower than the 90% to be deemed as sufficient. The activation of CAC suggested that the restructuring would bind *all* holders¹⁸ and CDS would be triggered. ISDA's EMEA Credit Derivatives DC determined a Restructuring Credit Event occurred to Hellenic Republic on the same day. The followed Hellenic Republic CDS Auction took place on March 19, 2012. 14 dealers participated in the CDS auction. The loss of old Greek securities was around 78% of the par which was expected to be covered by the CDS position. However, most of the old securities had already been exchanged at the time of CDS settlement. Fortunately, the market value of the package was around the same market value of the old bond¹⁹ on the same day. Therefore, the amount covered by the CDS also matched the loss on the new bonds.

- **Argentine Republic (2014 and 2020)**

ISDA's Americas DC voted (15:0) on August 01, 2014 and determined a Failure to Pay Credit Event occurred to Argentine Republic on July 30, 2014, which triggered the settlement of \$1 billion Argentina sovereign credit default swaps. This 2014 default was a technical default which related to the two bond exchanges held in 2005 and 2010. The 2014 Argentine Republic CDS Auction took place on September 03, 2014. 11 dealers submitted initial markets, physical settlement requests, and limit orders.

The 2014 credit event of Argentine Republic is the result of a dilemma. To be specific, Argentina had to give *equal treat* to the hedge funds and paid them \$1.5 billion in full

¹⁸The CAC amended the terms of Greek law governed bond issued by Greece. The right of all holders of the affected bonds was reduced (to receive payments).

¹⁹The market value of the package was around €21.93 with a face value of €100, which was a roughly discount of 78% similar to the old Greek securities. Please see Coudert and Gex (2013) for more detailed information relates to the 2012 Greek CDS settlement.

(\$1.3 billion in principle plus the related past due interest) based on the District Court ruling. However, if Argentina accepted to pay the \$1.5 billion, it had to pay the other holdout creditors as well. This meant another \$15 billion, which was around half of its foreign currency reserve (\$29 billion). Moreover, the Rights Upon Future Offers (RUFO) clauses in 2005 and 2010 exchanges forbade Argentina from offering a future better deal to these holdout creditors. This meant if Argentina agreed to pay the \$1.5 billion in full, it would open a possible further \$120 billion law suit from the exchange bondholders who settled in 2005 and 2010²⁰.

The Americas DC met on May 28, 2020 and declared on June 01, 2020 that a Failure to Pay Credit Event had occurred to Argentine Republic. Argentina failed to make a \$503 million payment of interest on three bonds on the expiry of their grace periods²¹. The defaulted bonds had a 30 calendar day grace period which expired on May 22, 2020. The coupon payments of the defaulted bonds were due on April 22, 2020. This event was the result of multiple economic challenges such as unsustainable external debt²², inflation, and depreciation of peso. The COVID-19 pandemic accelerated the economic contraction. In December 2019, President Fernández took office and the new government tried to revive the economy by reducing prices, increasing wages, providing tax rebate to the poor, and addressing public debt issues with bondholders and other creditors such as IMF. On May 22, Argentina failed to make a \$503 million interest payment and went into a technical default. The 2020 Argentine Republic CDS Auction took place on June 12, 2020 and 11 dealers participated in the auction.

- **Bolivarian Republic of Venezuela (2017)**

²⁰If Argentina agreed to pay the \$1.5 billion in full, it would violate the RUFO clauses since the exchange creditors only received 33 cents on a dollar.

²¹The related bonds are ISIN US040114GW47, ISIN US040114GX20, and ISIN US040114GY03.

²²According to International Monetary Fund (2019), the total external debt of Argentina increased around \$100 billion from 2015 to 2019.

The Americas DC resolved that a Failure to Pay Credit Event²³ had occurred with respect to Bolivarian Republic of Venezuela on November 16, 2017. The DC agreed to reconvene on November 20, 2017 at 3 p.m. to discuss issues related to CDS Auction. The Bolivarian Republic of Venezuela CDS Auction was held on December 12, 2017. 10 dealers submitted initial markets, physical settlement requests, and limit orders.

- **Lebanese Republic (2020)**

Lebanese Republic failed to pay principal on its \$1.2 billion Eurobond due on March 09, 2020. The country is struggling with the dwindling foreign currency reserves and high inflation. EMEA Credit Derivatives DC ruled that a Failure to Pay Credit Event occurred with respect to Lebanese Republic on March 20, 2020. The Lebanese Republic CDS Auction took place on April 23, 2020 and 8 dealers participated in the CDS auction.

- **Republic of Ukraine (2015)**

ISDA announced that its EMEA DC resolved a Repudiation/Moratorium Credit Event and a Failure to Pay Credit Event occurred with respect to the Republic of Ukraine on October 05, 2015. 11 dealers submitted initial markets, physical settlement requests, and limit orders.

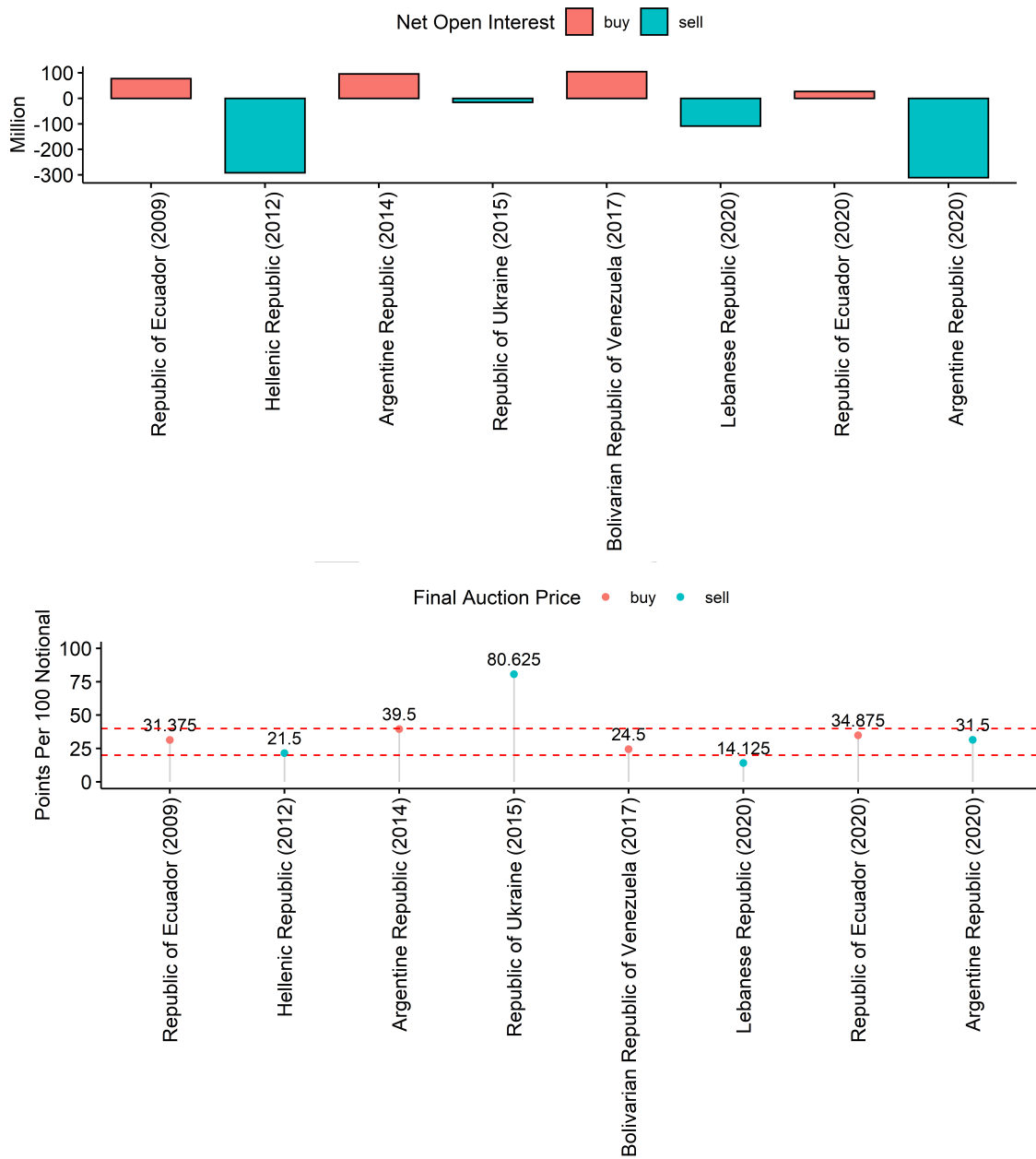
²³Venezuela failed to make \$200 million in payment on two global bonds. No payment was received after the 30-day grace period (as of November 13, 2017). All 15 participants vote 'yes' and determined that the date of the Credit Event was November 13, 2017 and the date of Potential Failure to Pay was October 13, 2017. The Petróleos de Venezuela CDS Auction took place one day after the Bolivarian Republic of Venezuela CDS Auction. The final price was 17.625, which was around 28% lower than the final price determined in the Venezuela Sovereign CDS Auction.

Table 6: Results of Sovereign CDS Auctions: January 2009 to August 2020

Date (dd/mm/yyyy)	Sovereign Name	Final Price	Number of Dealers	NOI	IMM
14/01/2009	Republic of Ecuador	31.375	12	\$77.482 million to buy	32.375
19/03/2012	Hellenic Republic	21.5	14	€291.6 million to sell	21.75
03/09/2014	Argentine Republic	39.5	11	\$96.03 million to buy	40.25
06/10/2015	Republic of Ukraine	80.625	11	\$15.45 million to sell	79.625
12/12/2017	Bolivarian Republic of Venezuela	24.5	10	\$105.133 million to buy	23.5
23/04/2020	Lebanese Republic	14.125	8	\$108.7 million to sell	16.375
19/05/2020	Republic of Ecuador	34.875	10	\$27.282 million to buy	34.5
12/06/2020	Argentine Republic	31.5	11	\$310.886 million to sell	34.5
Average	<i>All</i>	34.75	11 (round up)	half to buy, half to sell	35.359
Average	<i>Excluding Republic of Ukraine</i>	28.196	—	—	29.035
<i>Continue</i>					
Bid-Offer Spread	Credit Event	Adjustment Amounts	Quotation Amount	Cap&Floor	
2	Failure to Pay	Goldman Sachs & Co(\$11,250)	\$3 million	price floor at 31.375	
2	Restructuring	The Royal Bank of Scotland PLC(€12,500)	€5 million	price cap at 22.75	
2	Failure to Pay	Deutsche Bank(\$5,000) and Morgan Stanley(\$5,000)	\$2 million	price floor at 39.25	
2	Repudiation/Moratorium and Failure to Pay	Goldman Sachs International(\$12,500)	\$2 million	price cap at 80.625	
2	Failure to Pay	No Adjustment Amounts	\$2 million	price floor at 22.5	
3	Failure to Pay	Morgan Stanley & Co.International PLC (\$2,500)	\$2 million	price cap at 17.875	
3	Restructuring	No Adjustment Amounts	\$2 million	price floor at 33	
2	Failure to Pay	RBC Capital Markets LLC(\$20,000)	\$2 million	price cap at 35.5	

This table shows the results of eight sovereign CDS auctions from January 2009 to August 2020. The auction data is collected from Creditfixings which is run by Creditex. For each sovereign CDS auction, we show the auction date, credit event, sovereign name, final price, number of participating dealers, initial market midpoint (IMM), net open interest (NOI), bid-offer spread, adjustment amount, and quotation amount. Prices are expressed relative to a par value of 100. The price cap or floor is calculated based on the information of IMM and NOI. If an NOI is to sell, price cap equals $\text{IMM} + (\text{bid-offer spread})/2$. If the NOI is to buy, price floor equals $\text{IMM} - (\text{bid-offer spread})/2$.

Figure 1: Net Open Interest and Final Price



This figure shows the net open interest and the final price of each sovereign CDS auction that took place between January 2009 and August 2020. The NOIs are denominated in million USD except for the 2012 Hellenic Republic CDS Auction, which is denominated in million Euro. The final auction prices are expressed as points per 100 notional. The two red dotted horizontal lines are used to highlight the final prices that fall in the range of 20-40.

4 Results

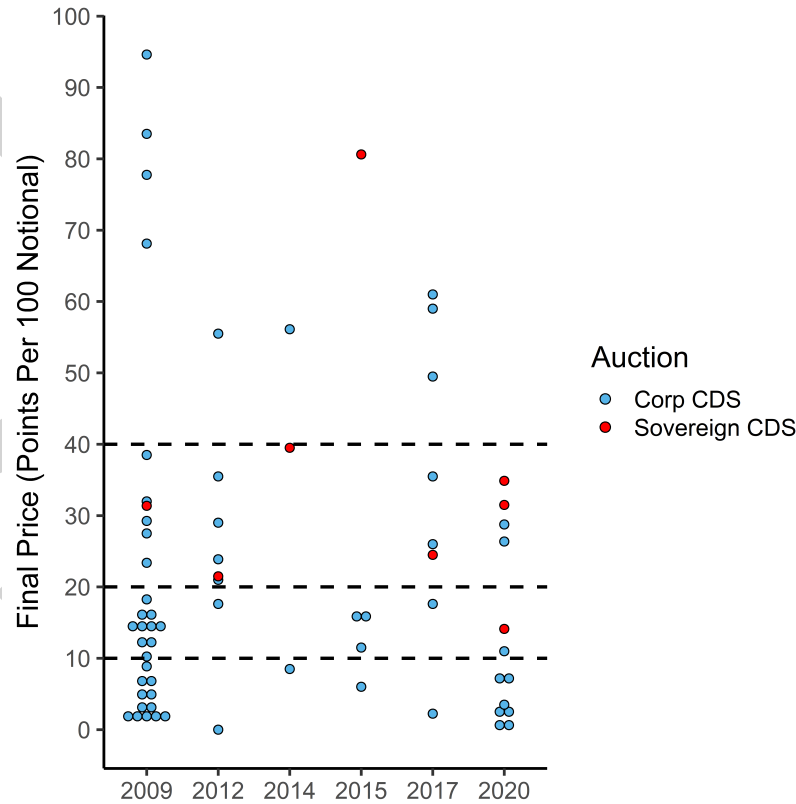
4.1 Results of Sovereign CDS Auctions

Table 6 shows the auction date, sovereign name, credit event, final price, bid-offer spread, number of participating dealers, NOI, IMM, adjustment amounts, quotation amount (size), and price cap (floor) of each sovereign CDS auction that took place between January 2009 and August 2020. The NOIs and final prices of eight sovereign CDS auctions are also plotted in Figure 1. There were on average 11 dealers in each sovereign CDS auction. Half of the auctions had sell-NOIs. The typical credit event was Failure to Pay. The most common value of the bid-offer spread was 2, while the most common value of quotation amount was \$2 million. There were no adjustment amounts for two of the eight sovereign CDS auctions. Figure 1 shows that most final prices were between 20 and 40. The average final price was 34.75. This value dropped to around 28.20 after excluding the final price of Republic of Ukraine CDS auction (80.625). It is worth to mention that three sovereign CDS auctions were held from January 2020 to August 2020. This might be the result of the COVID-19 pandemic that had accelerated the global economic contraction.

4.2 Results of CDS Auctions: Sovereign versus Corporate

To investigate the difference between the results of sovereign and corporate CDS auctions, we collect the data of corporate CDS auctions that were held in the same period. There were total 61 corporate CDS auctions took place in 2009, 2012, 2014, 2015, 2017, and 2020. More than half of the corporate CDS auctions were held in 2009 due to the impact of 2008-2009 global financial crisis. We compare the final price, NOI, number of participating dealers, relevant currency, quotation amount, and the bid-offer spread between sovereign and corporate CDS auctions. The results are shown in Table 7 panel A. We use Table 7 panel B to present the results of corporate CDS auctions by year.

Figure 2: Final Prices of Sovereign and Corporate CDS Auctions



This figure shows the final prices of each sovereign and corporate CDS auctions that were held in 2009, 2012, 2014, 2015, 2017, and 2020. The final auction prices are expressed as points per 100 notional. Red dots stand for the final prices of sovereign CDS auctions, while blue dots represent the final prices of corporate CDS auctions. The three black dotted horizontal lines are used to highlight the final prices that fall in the ranges of 0-10 and 20-40.

The final price of sovereign CDS auctions was on average higher than the final price of corporate CDS auctions. To be specific, the average final price of the 8 sovereign CDS auctions was around 34.8²⁴, while the average final price of the 61 corporate CDS auctions was around 21.4. Figure 2 shows that the final prices of corporate CDS auctions were more disperse than the final prices of sovereign CDS auctions. Due to the 2008-2009 global financial crisis and the 2020 COVID-19, around 38.7% and 70.0% of the final prices of corporate CDS cautions fell

²⁴The average final price of the sovereign CDS auctions after excluding the final price of Republic of Ukraine CDS auction was around 28.20, which was still higher the average final price of the corporate CDS auctions.

below 10 in 2009 and 2020. One special case is the final price of ERC Ireland Fin Ltd CDS Auction held in 2012, which had a zero final price. This was the result of filled limit order with the bid price as zero.

Table 7 panel A also compares the results of NOI, number of dealers, relevant currency, quotation amount, and bid-offer spread between sovereign CDS auctions and corporate CDS auctions. Half of the eight sovereign CDS auctions had sell-NOIs. However, corporate CDS auctions with sell-NOIs outnumbered the corporate CDS auctions with buy-NOIs. This is consistent with the findings of Gupta and Sundaram (2013) and Chernov et al. (2013). In fact, 85.2% of the corporate CDS auctions had sell-NOIs. Figure 3a shows the NOIs of corporate CDS auctions by year. There were more auctions with sell-NOIs than buy-NOIs for every year except 2014. Both sovereign and corporate CDS auctions had on average 11 dealers. However, the number of participating dealers in each corporate CDS auction declined in recent years as shown in Figure 3b. To be specific, there were around 11 to 14 dealers in each corporate CDS auction in 2009, 2012, 2014, and 2015. However, this number dropped to less than 11 in recent years. Turning to sovereign CDS auction, generally speaking, the number of participating dealers in each sovereign CDS auction was between 10 and 14. The only exception was the 2020 Lebanese Republic CDS Auction with 8 participating dealers. Typically, the relevant currency was U.S. dollar. This was true for both sovereign and corporate CDS auctions. However, there was one corporate CDS auction, the 2012 Elpida Memory CDS Auction, had JPY as its relevant currency.

Table 7 panel A also presents the results of quotation amounts and bid-ask spreads for both sovereign and corporate CDS auctions. The bid-offer spreads are grouped by relevant currency. For both sovereign and corporate CDS auctions, the quotation amount was most likely to be \$2 million. However, the range of quotation amounts of corporate CDS auctions was much

Table 7: Sovereign CDS Auctions versus Corporate CDS Auctions

Panel A: Results of CDS Auctions: Sovereign vs Corporate (Entire Sample Period)																											
# Auctions		Final Price				NOI to Sell (%)				#Dealers				Relevant Currency													
Sov	Corp	Sov	Corp	Median	Sov	Corp	Sov	Corp	Range	Sov	Corp	Sov	Corp	Range	Sov	Corp	Sov	Corp	USD	EUR	Yen	EUR	Yen	EUR	Yen		
8	61	34.8	21.4	31.4	15.0	[14.1, 80.6]	[0, 94.6]	50.0%	85.2%	11	11	[8, 14]	[5, 14]	87.5%	12.5%	0%	83.6%	14.8%	1.6%								
Quotation Amount (Size)																											
CDS	\$1m	\$2m	\$3m	\$5m	€1m	€2m	€5m	¥200m		1	2	3	4	5	1	2	3	4	2								
Sovereign	0%	75.0%	12.5%	0%	0%	12.5%	0%	0%	0%	0%	71.4%	28.6%	0%	0%	0%	100%	0%	0%	-								
Corporate	4.9%	65.6%	4.9%	8.2%	4.9%	9.8%	0%	1.6%	2.0%	2.0%	88.2%	2.0%	5.9%	2.0%	11.1%	33.3%	11.1%	44.4%	100%								
Panel B: Results of Corporate CDS Auctions by Year																											
Auctions		Final Price				NOI (%)				# Dealers				Relevant Currency				No Penalty									
Year	# CDS Auctions	Subordinated	Mean	Median	Min	Max	Sell	Buy	Mean	Min	Max	USD	EUR	Yen	EUR	Yen	EUR	Yen	EUR	Yen	EUR	Yen	EUR	Yen	EUR	Yen	
2009	31	1	21.500	14.000	1.375	94.625	80.6%	19.4%	12	10	14	83.9%	16.1%	0%	38.7%	12											
2012	7	0	26.071	23.875	0	55.500	85.7%	14.3%	12	12	13	71.4%	14.3%	14.3%	71.4%	5											
2014	2	0	47.813	32.313	8.500	56.125	50%	50%	11	11	11	100%	0%	0%	50%	1											
2015	4	0	12.313	13.688	6.000	15.875	100%	0%	11	11	11	100%	0%	0%	50%	2											
2017	7	0	35.839	35.500	2.250	61.000	85.7%	14.3%	9	5	10	71.4%	28.6%	0%	57.1%	4											
2020	10	0	9.025	5.250	0.125	28.750	100%	0%	9	7	10	90%	10%	0%	50%	5											
Quotation Amount (Size)																											
CDS	\$1m	\$2m	\$3m	\$5m	€1m	€2m	€5m	¥200m		1	2	3	4	5	1	2	3	4	2								
2009	0%	67.7%	3.2%	12.9%	0%	16.1%	0%	0%	0%	92.3%	3.8%	3.8%	0%	0%	20.0%	20.0%	0%	60.0%	-								
2012	0%	42.9%	28.6%	0%	0%	14.3%	0%	14.3%	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	100%								
2014	50%	0%	0%	50%	0%	0%	0%	0%	0%	50%	0%	0%	50%	0%	-	-	-	-	-								
2015	25%	75%	0%	0%	0%	0%	0%	0%	0%	75%	0%	25%	0%	0%	-	-	-	-	-								
2017	0%	71.4%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	50.0%	50.0%	-								
2020	10%	80%	0%	0%	0%	0%	0%	0%	0%	88.9%	0%	11.1%	0%	0%	100%	0%	0%	0%	0%								

This table compares the results of sovereign and corporate CDS auctions and summarizes the results of corporate CDS auctions by year. The auction data is collected from <http://www.creditfixings.com>. There are eight sovereign CDS auction were held between January 2009 and August 2020. To be specific, these eight sovereign CDS auctions are the Republic of Ecuador CDS auctions in 2009 and 2020, the Hellenic Republic in 2012, the Argentine Republic CDS auctions in 2014 and 2020, the Republic of Ukraine CDS auction in 2015, the Bolivarian Republic of Venezuela CDS auction in 2017, and the Lebanese Republic CDS auction in 2020. For comparison, we collect the data of corporate CDS auctions in 2009, 2012, 2014, 2015, 2017, and 2020, respectively. Panel A shows the statistics of final prices, NOIs, relevant currencies, quotation amounts, and bid-offer spreads for both corporate and sovereign CDS auctions during the entire sample period (2009, 2012, 2014, 2015, 2017, and 2020). Panel B presents the results of corporate CDS auctions by year. Prices are expressed as points per 100 notional.

quotation amounts, penalties, and bid-offer spreads. For example, it showed at least 50% of the corporate CDS auctions had no penalties, which was true for every year except 2009. This is different from our previous finding of sovereign CDS auctions. For sovereign CDS auctions, only two out of eight sovereign CDS auctions had no adjustment amounts as shown in Table 6.

5 Conclusion

In the current paper, we provide an in-depth study of the sovereign CDS auctions. We introduce the CDS auction mechanism and presents credit events that could trigger a CDS. The auction data is collected from creditfixing website. Eight sovereign CDS auctions were held between January 2009 to August 2020. The results reveal that there were on average 11 dealers in each sovereign CDS auction. Half of the sovereign CDS auctions had sell-NOIs. A sovereign CDS was typically triggered by Failure to Pay. For a sovereign CDS auction, the most common value of the bid-offer spread and quotation amount were 2 and \$2 million. Majority of the sovereign CDS auctions had adjustment amounts. The final prices of 75% of the sovereign CDS auctions were between 20 and 40.

We also studied the differences between the results of sovereign CDS auctions and corporate CDS auctions. Unlike a sovereign CDS auction, a corporate CDS auction is more likely to have an NOI to sell. In fact, 85.2% of the corporate CDS auctions had sell-NOIs in our sample. The ranges of quotation amounts and bid-offer spreads of corporate CDS auctions were much wider than the ranges of quotation amounts and bid-offer spreads of sovereign CDS auctions.

To our best knowledge, this paper provides the first comprehensive study of the results of historical sovereign CDS auctions. We believe it will be a helpful starting point for future researches on understanding the sovereign CDS auctions.

6 Appendix

Results of Sub-Sovereign CDS Auction

One sub-sovereign CDS auction was held during our sample period, which was the Commonwealth of Puerto Rico CDS Auction that took place on August 17, 2016. The results of Commonwealth of Puerto Rico Sub-Sovereign CDS Auction are shown in Table A1. The final price was 58.5 which is higher than the average price of sovereign CDS auctions. The initial market midpoint was 58 with USD 8.265 million to buy (NOI). Citigroup paid \$10,000 as the penalty amount. Only 6 dealers participated in the auction. The bid-offer spread and the quotation amount were \$2 and \$2 million, respectively. We consider the Commonwealth of Puerto Rico Auction as a unique case of sub-sovereign CDS auction²⁷. The reasons are as follows. First, Puerto Rico is a U.S. territory which makes it impossible to abandon the U.S. dollar to eliminate the risk of currency crisis; Second, Puerto Rico government does not have the legal authority to intervene in banking system; Third, a small share of U.S. banking sector is comprised by Puerto Rico's banks and these banks are protected by Federal Deposit Insurance Corporation; Forth, Puerto Rico data standards conform to the U.S. mainland.

Table A1: Results of Sub-Sovereign CDS Auction: Commonwealth of Puerto Rico

Date (dd/mm/yyyy)	CDS Name	Final Price	# Dealers	NOI	IMM
17/08/2016	Commonwealth of Puerto Rico	58.5	6	\$8.265 million to buy	58
Date (dd/mm/yyyy)	CDS Name	Bid-Offer	Adjustment Amounts	Quotation Amount	Cap&Floor
17/08/2016	Commonwealth of Puerto Rico	2	Citigroup: \$10,000	\$2 million	price floor 57.00

This table shows the results of Commonwealth of Puerto Rico CDS Auction. NOI stands for the net open interest and IMM stands for the inside market midpoint. Prices are expressed relative to a par value of 100.

²⁷See Chari et al. (2017) for more detailed information on Puerto Rico's sub-sovereign default risk.

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