NASDAQ CLEARING AS A COUNTERPARTY
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This document describes the clearing of Equity, Fixed Income and Commodity Derivatives at Nasdaq Clearing and how the role as clearing house and central counterparty (CCP) is fulfilled. It provides the reader with information relating to central counterparty activities, the counterparty risks inherent to clearing operations, how these risks are managed and the financial resources available to support the clearing operations.

One of the principal functions of a clearing house is to guarantee that all contracts traded will be honored. Nasdaq Clearing becomes the counterparty in all transactions, i.e. acts as a buyer to the seller and as a seller to the buyer. Counterparty risk is the risk that one party in a transaction will not be able to fulfill its obligations in due time. In order to ensure that the clearing house has the capacity to fulfill its obligations, it requires and receives collateral from the participating counterparties. In addition, it holds a member sponsored default fund and retains its own capital resources as well.

The ability to manage the counterparty risk is dependent on pro-active risk management, a sound legal foundation and the financial strength of the clearing house. Furthermore, rigid financial and operational requirements are applied to its members. Nasdaq Clearing also relies on advanced portfolio based marging models to determine the amount of collateral appropriate for the counterparty risks it assumes. In the event of a loss resulting from a counterparty default exceeding margins and default fund contributions of such defaulting counterparty, Nasdaq Clearing has a member sponsored default fund as well as its own funded risk-bearing capital, the latter serving as a buffer between any defaulting counterparty and all other counterparties.

The credit enhancing effects of a centralized clearing house boost market efficiency, reduce risk and allow broader client participation. Each of these features contributes to increasing liquidity in the marketplace.

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CHAPTER 1

INTRODUCTION

Nasdaq Clearing is part of Nasdaq – a leading provider of trading and clearing services, exchange technology, information and public company services across six continents.

The European arm of Nasdaq includes the stock exchanges in Copenhagen, Stockholm, Helsinki, Reykjavik, Tallinn, Riga and Vilnius, and two central securities depositories in the Baltics and on Iceland. Derivatives operations are conducted organizationally in the business area Market Services, which runs the stock exchanges in Stockholm, Helsinki, Copenhagen and Reykjavik, the derivatives exchanges in Stockholm and Oslo, and the derivatives clearing house Nasdaq Clearing.

1.1 NASDAQ

Nasdaq is a leading global provider of trading, clearing, exchange technology, listing, information and public company services. Through its diverse portfolio of solutions, Nasdaq enables customers to plan, optimize and execute their business vision with confidence, using proven technologies that provide transparency and insight for navigating today’s global capital markets. As the creator of the world’s first electronic stock market, its technology powers more than 90 marketplaces in 50 countries, and 1 in 10 of the world’s securities transactions. Nasdaq is home to approximately 3,900 total listings with a market value of approximately $13 trillion.

The Market Services business comprises six exchanges in the US, as well as eight exchanges, seven growth markets, one interest rate derivatives trading venue, two central security depositories and one derivatives clearing house in Europe, and a global commodities business that provides access to the world’s largest power derivatives market and one of Europe’s leading carbon markets. The commodities offering also includes natural gas, fuel oil, iron ore and seafood.

Nasdaq Nordic serves as a central gateway to the Nordic and Baltic financial markets, with over 900 listed companies on the main markets and the growth markets, Nasdaq First North.

1.2 NASDAQ CLEARING

Nasdaq Clearing is a leading, EMIR authorized, clearing house providing central counterparty clearing of futures and options listed at Nasdaq Derivatives Markets (Nasdaq Stockholm AB), Nasdaq Commodities (Nasdaq Oslo ASA) and Fish Pool (Fish Pool ASA) as well as OTC Rates and Repo clearing.

Nasdaq Clearing is authorized and supervised as a multi-asset clearing house by the Swedish Financial Supervisory Authority, and is also authorized to conduct clearing operations via its Norwegian branch Nasdaq Oslo by the Norwegian Ministry of Finance. As the first CCP in Europe, Nasdaq Clearing received authorization under Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories (“EMIR”) in March 2014.
1.3 BRIEF HISTORY

1.3.1 EQUITY AND FIXED INCOME DERIVATIVES

Trading in standardized equity and fixed income derivatives began in Sweden in 1985 when OM started its operations. OM was founded as a for-profit, privately owned derivatives exchange and was the first exchange to offer electronic trading integrated with clearing and settlement. Standardized American style call options on six Swedish stocks were the first contracts traded and Sweden thereby became the sixth country in the world to introduce standardized options trading.

In 1989, OM opened the London based derivatives exchange OM London Exchange and launched the world’s first electronic link-up of exchanges with real-time trading and clearing. In 1997, the link was extended to Oslo Børs and VPS Clearing (at that time Norsk Opsjonsentral A/S), and LEC (Linked Exchange Clearing) was established. LEC was the world’s first derivatives link for real-time trading and clearing between independent exchanges and clearing houses. In 2001, Copenhagen Stock Exchange and FUTOP Clearing Center joined the LEC cooperation. OM London Exchange was later replaced by EDX London and LCH Clearnet. The LEC agreement was terminated March 2008 and the cooperation came to an end in December 2009. From that point on, all members trade and clear directly with Nasdaq Stockholm AB/Nasdaq Clearing AB and approximately 50% of the members are located outside the Nordic region.

Derivatives trading in Finland started when SOM (Finnish Securities and Derivatives Exchange/Clearing house) was established in 1987 and served as an integrated exchange and clearing house for the trading and clearing of standardized derivatives instruments. In 1997, the Helsinki Stock Exchange Ltd and SOM Ltd merged to form HEX Ltd. In November 1998, HEX began cooperating with Eurex AG in derivatives trading. The most actively traded Finnish derivatives started to be traded on the Eurex trading platform and all other Finnish derivatives at OM. In 2003 OM and HEX, including the Tallinn and Riga exchanges, merged and established OMX. The acquisition of the Vilnius Stock Exchange took place in 2004.

Trading of standardized derivatives in Denmark started in 1988 when The Guarantee Fund for Danish Options and Futures began its operations as a clearing house. All derivatives instruments were traded on the Copenhagen Stock Exchange. The Guarantee Fund for Danish Options and Futures was founded in 1997 and the Guarantee Fund merged with Copenhagen Stock Exchange to form the FUTOP Clearing Center. In 2005 OMX and the Copenhagen Stock Exchange merged.

In 2006 OMX and Iceland Stock Exchange merged, and Icelandic derivatives were introduced to the market in May 2007. Since the end of 2008, Icelandic derivatives are no longer offered.

Since September 2009, Nasdaq also offers trading in Norwegian single stock and index derivatives.

Today, all trading and clearing of options and futures within the Nasdaq Nordic market is fully integrated and conducted through Nasdaq Stockholm AB and Nasdaq Clearing AB respectively.

1.3.2 COMMODITIES

Nasdaq Commodities Europe dates back to 1991, when the Norwegian Parliament (Stortinget) resolved to deregulate the market for power trading by passing of a new energy act. As a consequence of the new legislation, Statnett Marked AS was established as a subsidiary to Statnett SF, which is the Norwegian transmission system operator (TSO). The company was set to operate the newly formed Norwegian power market.

In 1995, the financial market was established. Market participants could initially enter into transactions in futures contracts. Forward contracts were introduced in 1997.
In 1996, Norway and Sweden set up a common market for electricity and the Swedish TSO, Svenska Kraftnät, became a co-owner; the company was renamed Nord Pool ASA. Nord Pool ASA was the world’s first multinational exchange for trading and clearing of financial power contracts. Finland was integrated into the Nordic power exchange area in 1998, and Denmark followed in 1999 and 2000.

Electricity derivatives contracts with cash settlement were introduced in 2001, and Nord Pool ASA was licensed as a regulated exchange in 2002. At the same time, the clearing business was demerged into a separate company, Nord Pool Clearing ASA, which became licensed as a clearing house. The physical market activities were then demerged into a separate company, Nord Pool Spot AS, co-owned by Nord Pool ASA and the four Nordic TSOs.

The Nord Pool market established itself as the world’s largest and most efficient power market, offering unprecedented transparency and liquidity for market participants. It also helped develop other energy markets in Europe and worldwide.

Nord Pool ASA started listing European Union Allowances (EUAs) as standardized exchange contracts early 2005, thereby pioneering the exchange trading of carbon credits. Trading in project-based Carbon Emission Reduction units (CERs) was introduced in 2007, becoming the first exchange market for CERs.

In 2008, Nasdaq acquired Nord Pool Clearing ASA and Nord Pool Consulting AS from Nord Pool ASA. The acquired companies were later merged into Nasdaq Stockholm AB, and Nord Pool ASA became part of Nasdaq in 2010. Nord Pool Spot AS remains separate from the group and is still in TSO ownership. The acquired companies form the division of Nasdaq which is now called Nasdaq Commodities.

Nasdaq Commodities and Nord Pool Spot AS were chosen by the Futures & Options Association (FOA) in 2008 to set up a spot and cash-settled derivative wholesale power market with a full range of clearing services for the UK.

In 2012, Nasdaq acquired NOS Clearing. NOS Clearing ASA, the leading clearing house for the freight market and a specialist clearing provider to the commodities markets, was integrated into Nasdaq Clearing in April 2014.
CHAPTER 2

MARKET PARTICIPANTS

Market participants are admitted to Nasdaq Clearing AB as members of the clearing house. Nasdaq Stockholm AB offers exchange membership for trading exchange-traded equity derivatives and fixed income products. Nasdaq Oslo ASA offers exchange membership for trading commodities derivatives. Exchange members of Nasdaq Stockholm AB can also access commodities products under the Nasdaq Stockholm AB membership, through the link from that exchange to Nasdaq Oslo ASA.

2.1 MEMBERS

A member, typically a bank or investment firm, can be an exchange member trading at the exchange and/or a clearing member with the clearing house. A non-clearing member needs to have a clearing agreement in place with a member of the clearing house (CCP member).

2.1.1 MEMBERSHIP TYPES

The following membership types have access to the clearing house, except the non-clearing member (NCM) that needs to have a clearing agreement in place with a CCP member.

+ **GENERAL CLEARING MEMBER (GCM)**
  Clears on its own behalf and on behalf of clients and NCMs.

+ **DIRECT CLEARING MEMBER (DCM)**
  Clears on its own behalf and on behalf of clients (not NCMs).

+ **CLEARING MEMBER COMMODITIES (CM)**
  Clears on its own behalf and on behalf of clients (not NCMs).

+ **DIRECT CLEARING AGENT (DCA)**
  Clears on its own behalf and on behalf of Direct Clearing Clients.

+ **NON CLEARING MEMBER (NCM)**
  The NCM has an exchange membership agreement with Nasdaq Stockholm AB or Nasdaq Oslo ASA and clears via a GCM.
2.1.2 MEMBER AND CLIENT REQUIREMENTS
The minimum standards and requirements for each membership type and for direct clearing clients can be found in the relevant rules. Members must meet eligibility requirements regarding management, organization, technical setup and risk management routines. Moreover, members and direct clearing clients must also meet financial and legal requirements.

2.1.3 MEMBERSHIP MONITORING
The Nasdaq Clearing risk management department monitors the financial conditions of all participants on an ongoing basis and establishes specific risk limits for each participant. After membership approval, each participant agrees to provide updated financial information in accordance with the rules.

2.2 CLIENTS
Clients may, depending on the member’s offering, choose to have or to not have a direct legal relationship with Nasdaq Clearing. Clients can be individually or collectively segregated to varying degrees.

For clients not wishing to be individually segregated, the following client categories are available:

+ **OMNIBUS CLIENT**
+ **SINGLE CLIENT (AVAILABLE IN THE FINANCIALS MARKET)**
+ **INDIRECT PLEDGING CUSTOMER (AVAILABLE IN THE FINANCIALS MARKET)**

For clients that want individual segregation, the following categories are available:

+ **INDIVIDUAL CLIENT SEGREGATED ACCOUNT (ICA) CLIENT**
+ **DIRECT CLEARING CLIENT**

For more information on the client account offering, please see Chapter 3.
CHAPTER 3

CLEARING MODEL

Using a single membership, members of Nasdaq Clearing can clear both exchange traded and OTC derivatives in equities, fixed income and commodities. This means increased capital efficiencies for members and clients, through offsets between all asset classes and streamlined settlement flows. This is key in the ambition to create legal and operational efficiency for clients, members and the clearing house.

Nasdaq Clearing offers several different solutions for house and client trading and clearing, including both agent and principal clearing. Omnibus accounts and individual client accounts are set up with segregation from house accounts as well as from other client accounts.

In the agent clearing model, the client of a CCP member has limited counterparty risk towards the member due to the direct relationship between the client and the clearing house.

Clients using the principal clearing model do not have a direct relationship with the clearing house. This implies that there is counterparty risk between the client and the member. Nasdaq Clearing always assumes counterparty risk between the buyer and the seller. But where principal clearing is used, the clearing house assumes the counterparty risk towards the member and not the client.

The clearing model and account structure is designed in accordance with the requirements that the regulators impose on central counterparties (EMIR), while also offering structures that are efficient from the perspectives of segregation, portability, operations and capital requirements.

3.1 A HARMONIZED CLEARING MODEL

Nasdaq Clearing has a harmonized clearing model and account structure for equities, fixed income and commodity derivatives products.

The figure below shows the model.

Figure 1 - The account model of Nasdaq Clearing

Please note that there are additional technical account alternatives. Please see section 3.6 for more information.
3.2 ACCOUNT STRUCTURE

The matrix below presents an overview of the account structure. The account structure is EMIR compliant for both financial and commodities members.

**Figure 2 – Account structure overview**

<table>
<thead>
<tr>
<th>Direct Clearing Client (DCC)</th>
<th>Available asset classes</th>
<th>Position</th>
<th>Client by client segregation</th>
<th>Margin - Cross margining and segregation accounts</th>
<th>Default fund - Member / Client liability for contribution to Collateral</th>
<th>Collateral Client / House segregation</th>
<th>Settlement funds segregation</th>
<th>Agreements between Client and RONK</th>
<th>EMIR Prudential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual client segregated account (ICA)</td>
<td>All</td>
<td>Yes</td>
<td>Yes</td>
<td>Client</td>
<td>-</td>
<td>Yes</td>
<td>Client by client</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Indirect Pledge (IDP) account *</td>
<td>All</td>
<td>Yes</td>
<td>Yes</td>
<td>Member</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Single-client account</td>
<td>All</td>
<td>Yes</td>
<td>Yes</td>
<td>Member</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Omnibus account *</td>
<td>All</td>
<td>No</td>
<td>Yes</td>
<td>Member</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>House account</td>
<td>All</td>
<td>N/A</td>
<td>Yes</td>
<td>Member</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* Net Omnibus Segregated Account, Gross Omnibus Segregated Account and Indirect Pledge Account are offered for Indirect Clearing

3.3 SEGREGATION

Nasdaq Clearing offers best-in-class segregation for clients that want limited risk towards members.

EMIR sets regulatory requirements on clearing houses to, at a minimum, segregate positions and collateral between the CCP and its members and also between members. The CCP should offer to segregate member positions and collateral from that of its clients (omnibus client segregation) and the CCP should also offer to segregate one client’s positions and collateral from that of another client (individual client segregation). Further, the CCP should offer to segregate positions and collateral between clients and indirect clients for clearing members providing indirect clearing services according to requirements in MiFIR and EMIR.

Nasdaq Clearing has a full range offering, both to CCP members and clients, in terms of segregation of positions, settlement and collateral.

Members and clients have the possibility to choose between basic segregation between members and clients (minimum level according to EMIR) and advanced account types where the counterparty risk is between the clearing house and client, including the option where collateral is posted directly to the clearing house by the client.
The model offers six different account types, one for members’ own positions, three where segregation is between member and clients and two where segregation is on a client by client level. The Omnibus and Indirect Pledge account types also allow for indirect clearing arrangements.

Settlement for client and house is also carried out independently and segregated from each other i.e. client and house settlement transactions are not comingled from a transaction point of view. For more information on cash settlement, please see section 5.1.

The figure below shows Nasdaq Clearing’s clearing and account model, from a segregation point of view. Position, margin requirements, collateral and cash settlement are recorded in separate records and maintained for respective account type offered (Error! Reference source not found.) but client variation margin and cash settlement transactions are aggregated with other client variation margin and cash settlement transactions to one client transaction per currency (Error! Reference source not found.).
3.4 PORTABILITY

Portability means the ability to transfer client positions and collateral from one member to another, in a situation where the first member has defaulted.

Nasdaq Clearing offers best-in-class portability which enables, as far as possible, the client to continue trading and clearing, via another member, without interruption and without having to put up new collateral.

In order to successfully and quickly port positions and collateral from a defaulting member to a back-up member, it is crucial that the clearing house is able to, in a very short timeframe, determine client obligations, market value of positions and value of posted collateral.

Nasdaq Clearing offers a number of alternatives with different levels of segregation and pre-defined portability arrangements. In other words, different levels of client protection are available in the event of a member defaulting.

There are a number of key factors to take into account when deciding on the model for a client. To choose a clearing account with individual client segregation will increase the likelihood of successful porting compared to a clearing account with client/house segregation. All rights and obligations are ported to the back-up member, partial porting is not possible, so a backup member has to be found that is willing to take on all obligations linked to an account, i.e. possibly including multiple clients.

Porting procedures are further described in Chapter 10.

3.4.1 BACK-UP MEMBER

To have an agreement with a back-up member prior to the default is an important factor in increasing the likelihood of porting positions and collateral since there will be limited time to negotiate an agreement with a back-up member in a default situation.

3.5 CLEARING ACCOUNT MODEL

The model offers seven different clearing account types, one for members’ own positions, three where the segregation is between house and clients and two where the segregation is at a client-by-client level. The Omnibus and Indirect Pledge account types also allow for indirect clearing arrangements. There are a number of technical and operational alternatives in each category and detailed specifications are presented in each section.

Figure 5 - The account types of the clearing account model
1. House: House accounts for members’ own positions.
2. Omnibus: Several clients per clearing account, netting of client positions is possible. There is no legal relationship between clients and the clearing house.
3. Single-client: One client per clearing account, no netting of positions with other clearing accounts, for example used by NCMs. There is no legal relationship between the client and the clearing house.
4. Indirect Pledge (IDP): One client per clearing account, no netting of positions with other clearing accounts. The client has a direct legal relationship with Nasdaq Clearing but the CCP member posts collateral to the clearing house. Only indirect pledging customers can use this account type.
5. ICA: One client per clearing account, no netting of positions with other clearing accounts. There is no legal relationship between the client and the clearing house and the member posts collateral on a segregated client custody account.
6. Direct Clearing Client: One client per clearing account, no netting of positions with other clearing accounts. The client has a direct legal relationship with Nasdaq Clearing and the client posts collateral directly towards the clearing house.
3.5.1 HOUSE ACCOUNT

A house clearing account is an integrated trading and clearing account for the member’s trading and clearing on its own behalf. The member may not use the house clearing account for trading and clearing of transactions in respect of entities within the same group of companies as the member.

There are a number of technical and operational options for members e.g.:

- One or several clearing accounts for administrative purposes
- Cross margining between all or a selection of house clearing accounts
- Automated position netting within one clearing account

3.5.2 CLIENT ACCOUNTS – CLIENT/HOUSE SEGREGATION

In this category, Nasdaq Clearing offers three different alternatives for members and clients; omnibus, single-client and indirect pledge accounts. The purpose is to ease administration, reduce operational risk and offer basic segregation to support porting in the event that a member defaults. Positions, collateral and settlement are segregated between the member and its clients. For further administrative efficiency there is an option to connect several sub-accounts (portfolios) to each clearing account.

+ OMNIBUS ACCOUNT

The omnibus account is an integrated trading and clearing account for the aggregated positions of several clients. Members can choose to set up several omnibus accounts for administrative purposes. The CCP member is fully liable for all contract obligations.

Omnibus clients do not have a legal relationship with the clearing house.

Positions and collateral are segregated between house and client but not client-by-client.

By default, no automated position netting is performed for this account. If netting is required, the member is responsible for initiating netting within the account.

Cross margining and offsets are calculated within each account.

The CCP member contributes to the default fund.

Cash Settlement transactions are recorded on the account before being netted with other client cash settlement amounts.

If the CCP member defaults, positions can be ported to a backup member without the involvement of the bankruptcy administrator, provided that all clients in the omnibus account have appointed the same back-up member.

+ SINGLE-CLIENT ACCOUNT

The single-client account is an integrated trading and clearing account for one individual client, e.g. a non-clearing member. There is only one client for each account. There is no netting of positions between accounts.

The client does not have a legal relationship with the clearing house.

The CCP member is fully liable for all contract obligations.

Positions are segregated client-by-client. Collateral is segregated between house and clients but not client-by-client.

Cross margining and offsets are calculated within a single-client account, but not between accounts.

The CCP member contributes to the default fund.
Cash Settlement transactions are recorded on the account before being netted with other client cash settlement amounts.

**INDIRECT PLEDGE (IDP) ACCOUNT – EQUITY AND FIXED INCOME ONLY**

The indirect pledge account is an integrated trading and clearing account with common functions for trading and clearing that cannot be connected to other clearing accounts.

There is a legal tri-party agreement between the IDP customer, a CCP member and Nasdaq Clearing. The CCP member and the IDP customer are jointly liable for all obligations towards the clearing house.

Positions are segregated client-by-client. Collateral is segregated between house and clients but not client-by-client.

Cross margining and offsets are calculated within an IDP clearing account but not between accounts.

The CCP member contributes to the default fund.

Cash Settlement transactions are recorded on the account before being netted with other client cash settlement amounts.

**3.5.3 INDIVIDUAL CLIENT SEGREGATION**

In this category, Nasdaq Clearing offers two different alternatives for members and clients; individual client segregated accounts and direct clearing client accounts. The purpose is to offer best-in-class segregation and porting functionality in the event of the member defaulting and in addition ease administration and reduce operational risk. Positions and collateral are fully segregated, on a client-by-client basis. For further administrative efficiency, there is an option to connect several sub-accounts to each clearing account. This means that Nasdaq Clearing is able to support members with position, margin and settlement calculations on the clients’ client level, i.e. indirect clearing.

These account types have been designed to increase the likelihood of being able to port the client positions and collateral in the event of the default of the CCP member. In order to achieve this, the client is recommended to have prior arrangements with a back-up member.

**INDIVIDUAL CLIENT SEGREGATED ACCOUNT (ICA)**

The individual client segregated account is an integrated trading and clearing account for one individual client where positions and collateral are fully segregated in order to offer portability arrangements. Typically, NCMS and larger institutions use this clearing account.

There is no direct legal relationship between the client and the clearing house.

The CCP member is fully liable for all contract obligations.

The CCP member is required to open a specific custody account with the clearing house in relation to each ICA client. The account is in the name of the member. The member is responsible for posting collateral to this account.

Positions and collateral are segregated client-by-client.

Cross margining and offsets are calculated within an individual account but not with other clearing accounts.

The CCP member contributes to the default fund.

Cash Settlement transactions are recorded on the account before being netted with other client cash settlement amounts.

If the CCP member defaults, positions and collateral can be ported to a backup member without the involvement of the bankruptcy administrator.
DIRECT CLEARING CLIENTS (DCC)

A Direct Clearing Client is an entity that has been approved by Nasdaq Clearing to register clearing transactions in its own name and on its own account.

The Direct Clearing model has direct legal relationship with Nasdaq Clearing via a tripartite agreement between Nasdaq Clearing, the Direct Clearing Client and a Direct Clearing Agent.

The Direct Clearing Client is Nasdaq Clearing’s counterparty even if it acts through a clearing member who is the Client’s Agent. The model combines features of a clearing membership and a normal client relationship with a clearing member.

The Direct Clearing Client takes full responsibility for providing collateral and for paying cash settlement amounts that are due to Nasdaq Clearing and keeps legal and beneficial collateral ownership.

The Direct Clearing Agent may post the default fund and loss sharing pool contributions on behalf of the Direct Clearing Client to Nasdaq Clearing.

Notwithstanding this, the responsibility to provide the default fund and loss sharing pool contributions remains with the Direct Clearing Client.

Direct Clearing Client’s positions and collateral are fully segregated from the Clearing Member and there is a one-to-one relationship between each Direct Clearing Client’s account and custody account.

The physical settlement flows of Direct Clearing Client are separate from the settlement flows of its Direct Clearing Agent, meaning that the Direct Clearing Client has its separate Delivery account.

All communication between Nasdaq Clearing and the Direct Clearing Client takes place through the Direct Clearing Agent.

3.5.4 INDIRECT CLEARING ARRANGEMENTS

Clearing Members providing indirect clearing services are required to segregate positions and collateral of their clients from their indirect clients. Nasdaq Clearing offers the below segregation models for indirect clearing in line with the requirements under MiFIR and EMIR.

Net Omnibus Segregated Account (NOSA)

Gross Omnibus Segregated Account (GOSA)

Indirect Pledge Account for indirect clients

For the general provisions of the accounts, please see the respective description for Omnibus, Single-client and Indirect Pledge Accounts above.

3.6 TECHNICAL ACCOUNTS

In addition to the accounts described above, further technical accounts are available to facilitate the members’ and clients’ clearing arrangements. Any additional technical accounts are set up within the relevant clearing account so as to meet segregation requirements under the Clearing Rules and EMIR.
DAY ACCOUNT
A day account is a trading account for the temporary registration of transactions. A transaction is registered on a CCP member’s day account unless another account is indicated by the member. These transactions shall, as soon as possible, be transferred to the proper account. Any contract registered on the day account when the clearing system closes is automatically transferred to the member’s interim account or another compilation account stated by the member. The account does not have automatic position netting.

INTERIM ACCOUNT
An interim account is an integrated trading and clearing account for the temporary registration of transactions. The account does not have automatic position netting.

SUB-ACCOUNTS
To reduce operational risk and ease the post-trade administration, it is possible to connect sub-accounts to a client clearing account. A sub-account is an account opened by the CCP member for administrative purposes only. It is possible to trade directly on the sub-account and the position will remain on that account. On the sub-account, the member will benefit from having easily accessible historic trade information. Expiration and all types of post-trade flows are calculated on the sub-account for informational purposes only.

ALLOCATION ACCOUNT (ONLY APPLICABLE FOR FINANCIALS MEMBERS)
An allocation account is a trading-only account that propagates the position to a specified clearing account with a CCP member. Several allocation accounts can be linked to one single clearing account. To open an allocation account and link it to a clearing account with another CCP member, the executing and CCP members must enter into an allocation agreement. The executing member is fully liable for intraday positions on allocation accounts.

LIQUIDITY PROVIDER ACCOUNTS (ONLY APPLICABLE FOR FINANCIALS MEMBERS)
For clients acting as liquidity providers, one or several liquidity provider accounts are set up under a liquidity provider member ID designated for this client. A client must have the right to use sponsored access in order to be a liquidity provider.
CHAPTER 4

PRODUCTS

Nasdaq offers marketplace and clearing services for a broad range of products including derivatives on stocks, indices, fixed income and commodity instruments. The products are specified below. For additional information and contract specifications please see the web site and the respective rulebook.

4.1 EQUITY

Nasdaq Clearing offers clearing of futures and options listed at Nasdaq Derivatives Markets (Nasdaq Stockholm AB).

Nasdaq Derivatives Markets offers exchange listed and OTC equity derivatives including futures and options on Swedish, Norwegian, Finnish and Danish shares, futures and options on the OMXS30, OMXO20, OMXC20 Cap and OMXSB indexes and options on ETFs and binary options.

4.1.1 ON-REQUEST MARKET (OR)

The “on request” market provides trading in forwards and options on single Finnish stocks. Within this market, not all stocks have automatic generation of new series with new strike prices, but are instead generated “on-request” by members. The market allows members to request listing of forwards and options on most Finnish stocks on an “on request” basis. This method allows members to trade exchange-traded series on Finnish stocks with the possibility to set strike price and maturity.

4.2 FLEXIBLE EQUITY DERIVATIVES

Nasdaq Clearing offers an extensive suite of flexible derivatives allowing participants to create tailored contracts to match their needs. Flexible contracts combine the flexibility and anonymity of the OTC market with the security and efficiency of the standardized market.

Market participants can clear a wide variety of derivatives differing on one or more terms or conditions from standardized instruments (regarding underlying security, exercise price, expiration day or type of contract). It allows investors to take advantage of derivatives, even if the portfolio requires features that the standardized market cannot offer. Investors will still have the advantages of clearing, such as corporate action surveillance, recalculation handling, cross margins between tailored and standardized contracts—as well as post-trade information in Nasdaq’s clearing system. Flexible contracts combine the flexibility and anonymity of the OTC market with the security and efficiency of the standardized market. Thus, the investor can design contracts which fit their investment strategies and goals.

Flexible contracts are offered on the following:

- Forwards and options on single Swedish, Finnish, Danish and Norwegian stocks
- Futures and options on a variety of tradable indices, such as OMXS30, OMXO20, OMXC20CAP and VINX30, the 30 most traded stocks in Sweden, Finland, Denmark, Norway and Iceland
- Forwards and options on custom-made indices
- Options on fixed income forwards

Other types of instruments and contract bases may also be considered as flexible derivatives upon request. However, only customized financial instruments with an underlying security that has been subject to risk analysis (and formally confirmed and approved by Nasdaq) are eligible for clearing.
4.3 FIXED INCOME

+ Futures and Options
Nasdaq Clearing offers clearing of futures and options listed at Nasdaq Derivatives Markets (Nasdaq Stockholm AB).
Nasdaq Derivatives Markets offers fixed income derivatives on Swedish, Danish and Norwegian bonds and rates, including futures and options on Swedish Government bonds, Swedish and Danish Mortgage bonds, contracts on the STIBOR, CIBOR, NIBOR rates and futures on the Swedish Central Bank’s policy rate.

+ NASDAQ OTC RATES CLEARING
Nasdaq OTC Rates Clearing is a service for clearing of Interest Rate Swaps, Overnight Index Swaps and Forward Rate Agreements denominated in SEK, DKK, NOK and EUR. The service is part of the common clearing platform and regulatory framework. Nasdaq Clearing’s clearing model for OTC Rates supports both self-clearing and client clearing.

+ NASDAQ REPO CLEARING
Nasdaq Repo Clearing is a service for clearing of Repo transactions on bonds listed at Nasdaq Stockholm and Nasdaq Copenhagen. The service is part of the common clearing platform and regulatory framework. Nasdaq Clearing’s clearing model for Repo Clearing supports both self-clearing and client clearing.

4.4 COMMODITIES
Nasdaq Clearing offers clearing of futures and options listed at Nasdaq Commodities (Nasdaq Oslo ASA) and Fish Pool (Fish Pool ASA).
Nasdaq Commodities offers a broad suite of commodities products including pan-European Power and Natural Gas, Electricity Certificates, Renewables (wind) and Carbon Emission Markets.
Fish Pool offers products for price hedging of Seafood.
CHAPTER 5

CLEARING OPERATIONS

Nasdaq Clearing carries out expiration procedures, cash settlement and physical settlement that arise from contractual responsibilities. These procedures are described below.

5.1 DAILY CASH SETTLEMENT

The daily cash settlement is the cash flow covering all payments that need to be settled in full each business day. The daily cash settlement corresponds to the amount to cover for a participant’s change in variation margin (mark-to-market settlement) for futures style products and to cover premiums, fees and other cash settlement except those directly related to physical settlement. Daily cash settlements are always settled in the respective instrument currency.

Daily cash settlement has several components:

- Variation margin – the mark-to-market value
- Premiums – premiums for options
- Fees – exchange and clearing fees

Cash settlement obligations with respect to contracts cleared with Nasdaq Clearing are settled in DKK, EUR, GBP, NOK, SEK and USD and are all settled through the collateral management system’s cash optimization feature, see Chapter 6 for more information.

5.2 PHYSICAL SETTLEMENT

As a central counterparty, Nasdaq Clearing guarantees all deliveries, independent of the original counterparty’s delivery or payment ability. However, the clearing house does not undertake the responsibility to fulfill the transaction on the original settlement day if the original counterparty cannot fulfill its obligation. In that case, Nasdaq Clearing has the right to buy securities and charge a delay fee for failed delivery or take other steps to complete the delivery, in accordance with the rules.

5.2.1 SHARES

Delivery of shares is made on the second business day after expiration or exercise through Nasdaq Clearing’s accounts in the respective CSD as listed below. The principle “delivery versus payment” (DvP) applies for all deliveries of underlying securities due to expiration or exercise. CCP members having a delivery undertaking as a result of exercise or expiration must ensure that sufficient delivery capacity exists with respect to the relevant deliverable instrument.

- Swedish shares – Euroclear Sweden
- Finnish shares – Euroclear Finland
- Danish shares – VP Securities Denmark
- Norwegian shares – VPS Norway
5.2.2 FIXED INCOME

Delivery of Swedish fixed income instruments takes place in Euroclear Sweden and delivery of Danish fixed income instruments takes place in VP Securities Denmark. On the expiration day, Nasdaq Clearing provides the CCP member with settlement instructions on what is to be delivered in one or several instruments included in a contract base. Settlement of fixed income products is netted to blocks no larger than SEK/DKK 500 million in nominal value.

5.2.3 ALLOWANCES AND ELECTRICITY CERTIFICATES

Delivery of emission allowances and electricity certificates related to the exercise of DS Futures and Futures contracts take place over Nasdaq Clearing’s accounts with the relevant registries. Open positions at the end of the final trading day will be subject to physical settlement.

5.3 EXPIRATION AND EXERCISE

Nasdaq Clearing offers clearing of American and European style options. Equity options involve delivery of shares, while index options are cash settled. European style Commodity options involve delivery of the underlying future. This section only reflects the expiration process for options. Options may be exercised through premature, standard, or automatic exercise. Premature and standard exercise is normally applied where American options are involved and automatic exercise when European options are involved.

<table>
<thead>
<tr>
<th>Premature Exercise</th>
<th>Standard Exercise</th>
<th>Automatic Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premature exercise is carried out if the holder of American-style contract requests exercise, which can be done during the lifetime of the contract at the times specified in the rules and regulations for derivatives. The clearing member can electronically request exercise in the clearing system or by fax to the clearing organization.</td>
<td>Standard exercise occurs when the clearing organization, on the expiration day and on behalf of the clearing member or end-customer, exercises contracts with a minimum intrinsic value according to the clearing organization. The clearing member or end-customer holding positions must notify the clearing organization in writing if they oppose standard exercise.</td>
<td>Automatic exercise occurs when the clearing organization, on the expiration day, exercises the derivative contract on behalf of the counterparty which, in the clearing organization’s opinion, has a minimum intrinsic value. In conjunction with automatic exercise, the member or end-customer may not waive the right to be the subject of exercise.</td>
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COLLATERAL MANAGEMENT

To fulfill its obligations to Nasdaq Clearing, each counterparty is required to post sufficient collateral to cover its margin requirement on a daily basis and, if deemed necessary, intra-day. Margin requirements are calculated based on a specific counterparty’s trades and positions, and are determined by risk models specifically designed by Nasdaq Clearing’s Risk Management department, to avoid the risk of the clearing house incurring a loss in a default.

6.1 OVERVIEW

The Collateral Management Service (CMS) is the service managing collateral and payments for clearing on Nasdaq Financial and Commodities derivatives markets. The service manages both cash and non-cash collateral for covering margin requirements as well as cash transactions for daily cash settlement. The collateral flows are managed in an advanced collateral optimization process taking into account both cash and non-cash collateral to optimize each participant’s use of collateral and to minimize the number of cash transactions to and from the service.

Participants hold custody accounts with Nasdaq Clearing for use with the service and all custody accounts in the service can hold both cash and non-cash collateral integrated on the same account.

Cash and securities collateral will be held as:

- Cash – title transfer reflected on the participant’s custody account
- Securities – pledged on participant’s custody accounts

Collateral posted to Nasdaq Clearing can be segregated by

- House/Client
- or on a client-by-client basis,

based on the participant’s account setup.

The process of valuation and evaluation of collateral is fully automated and is done per segregation category (e.g. for house, client and individual clients respectively). Posted collateral is valued daily using market prices taking into account applicable haircuts and pending transactions, and is then evaluated to make sure the collateral value is sufficient to cover the participant’s margin requirement(s). In the case of a deficit a direct debit transaction is executed to cover the shortage and in the case of a surplus a credit instruction is automatically executed (subject to settings on each account).

Participants must hold bank accounts in Nasdaq’s payment system in each applicable currency for managing cash transfers to and from the service. With use of the cash optimization feature and the payment system the flow of cash collateral is fully automated.

To further control the flow of collateral, participants can also instruct collateral transactions outside the automated flow. Posting of supplementary cash collateral to a custody account is achieved by depositing cash to specified account in the payment system. Posting securities to a custody account is done through one of the CSDs/ICSDs connected to the collateral management service. Participants do not need to be a direct member of a CSD or ICSD, but can use a settlement agent for executing securities transactions.
6.2 COLLATERAL

Collateral refer to assets posted to Nasdaq for the purpose of covering margin requirements (cash collateral will also be used to cover daily cash settlement requirements). Participants can post both cash and non-cash assets as collateral. All collateral is subject to eligibility criteria and discounting (haircuts) according to the from time to time applicable collateral list. To fulfil its obligations each participant is required to hold sufficient collateral with Nasdaq to cover its margin requirement(s).

Cash and securities collateral are held as:

- Cash – title transfer reflected on the participant’s custody account
- Securities – pledged on the participant’s custody account
6.2.1 ELIGIBLE COLLATERAL

Eligible collateral is found in the rules and regulations of the respective market. For the Nasdaq Financial Markets, the collateral list can be found under the clearing rules appendices section (Appendix 14) of the Clearing Rules of Nasdaq Derivatives Market. For Nasdaq Commodities, the collateral list can be found under the clearing appendices section (Appendix 10) of the Clearing Rules of Nasdaq Commodities.

The collateral list includes general conditions for eligible collateral and principles regarding valuation, concentration limits, haircuts etc.

6.2.2 COLLATERAL VALUATION

Collateral held on custody accounts in the collateral management service are continuously valued.

The prices used for valuation are retrieved from an external price vendor. Securities posted as collateral are valued using the previous business day’s prices. For shares and other securities traded on markets with a market close before 18.30 CET, the end of day price is used. Securities traded on markets with a market close after 18.30 CET are valued using a price taken from the price vendor at 18.30 CET. If a price for the previous business day is not available, e.g. due to a bank holiday, the latest available price is used. In case of a corporate action event that will have an impact on the price of a security, the valuation price is adjusted accordingly after closing on the day before the ex-date.

European Union Allowances (EUA) and El-Certs posted as collateral (pre-delivered assets) are valued using the previous business day’s price for the nearest futures/forward contract.

The prices retrieved at market close (or 18:30 CET where applicable) are used for valuation of collateral instruments during the following business day including end-of-day valuation, intraday valuations and intraday margin calls.

6.3 CASH OPTIMIZATION

The collateral management service combines payments in respect of cash collateral and daily cash settlement into one optimized flow. For a specific custody account this is done using the following principles:

- Cash collateral on the account is used to cover daily cash settlement requirements (per currency)
- Positive daily cash settlement is recorded on the account to cover margin requirement (per currency)
- Direct debit instructions are created for the account if
  - a daily cash settlement requirement still remains after subtracting cash collateral
  - there is a total collateral deficit on the account in the base currency
- Credit instructions are created for the account (with same day value) if there is a total collateral surplus in the base currency after the daily cash settlement is finalized – the credit instructions can include both automatic cash collateral call backs and positive cash settlement

6.4 DAILY CYCLE

The daily cycle, illustrated in the figure below, provides an overview of the daily events and when they occur.

At 19:25 CET the end-of-day clearing process, including calculations of daily cash settlement and margin requirements starts. The result of the calculations are available to participants at approximately 21:30 CET. Clearing reports are then produced and are available to participants by 07:00 CET on the following day.

The final calculation for cash optimization is run at 09:30 CET. This is the deadline for manually altering collateral positions before direct debit instructions are sent.
Direct debit payment instructions are sent at 09:45 CET to the participant’s bank account. The participant must ensure that the necessary balance is available on the account for the direct debit. If the direct debit fails, any call backs of collateral will be stopped.

At 11:00 CET the end-of-day margin requirement is evaluated against the participant’s collateral value.

At 14:00 CET, credit payment instructions are sent to the participant’s bank account. Any direct debit instruction sent to the participant in the morning needs to be completed before any credit instructions (e.g. cash call backs) are executed.

Figure 7 - Daily Cycle

- **19:25 CET**
  - All markets closed

- **21:00 CET**
  - End of day margin requirements ready

- **09:30 CET**
  - Collateral receipt cut-off time. Deadline for manual collateral postings to affect the cash optimization calculation

- **11:00 CET**
  - End of day margin delivery time

- **20:00 CET**
  - Daily cash settlement calculation ready

- **21:30 CET**
  - Cash optimization calculation ready

- **09:45 CET**
  - Direct debits are sent for daily cash settlement requirements and cash collateral deficits

- **14:00 CET**
  - Credits are sent for positive daily cash settlement and cash collateral surplus
CHAPTER 7

PAYMENT SYSTEM

Cash transactions created in the collateral management system through its cash optimization feature are executed in Nasdaq Clearing’s payment system. The payments system utilizes direct debit instructions and credit instructions to automate cash flows and to enable full straight through processing of cash transactions.

To enable automated payments between the participants and the clearing house through the payment system each participant opens bank account(s) with one or more settlement banks approved by Nasdaq Clearing. Bank accounts will need to be set up for each eligible currency in which the participant is active.

In order for Nasdaq to be able to debit the participant’s account(s), the participant authorizes (i) Nasdaq Clearing to issue payment instructions, and (ii) the relevant settlement bank(s) to debit the participant’s account(s) in accordance with such instructions. Such authorizations are obtained for each bank account by the following arrangements:

- under the Clearing Rules (or alternatively under a separate written and signed mandate), each participant authorizes Nasdaq Clearing to issue instructions to debit the participant’s bank account(s), and
- by issuing a power of attorney in favour of the settlement bank, the participant authorizes the settlement bank to debit the participant’s bank account(s) in accordance with Nasdaq Clearing’s instructions.

Payments are executed on fixed points in time during the collateral management service’s daily cycle as described above.

7.1 APPROVED SETTLEMENT BANKS

All payments in the payment system go through accounts with one of Nasdaq Clearing’s approved settlement banks. The current list of approved settlement banks is available at Nasdaq Clearing’s website.1

Participants are required to hold a bank account with an approved settlement bank for each currency they settle in and different banks may be engaged for each currency. For each bank account, the participant needs to complete a power of attorney with the settlement bank.

POWER OF ATTORNEY

Clearing participants must sign a power of attorney with its settlement bank for each bank account used for daily cash settlement and collateral. The power of attorney is an agreement between the clearing participant and the settlement bank and gives the settlement bank the right to debit the participant’s bank account on behalf of Nasdaq Clearing.

7.2 CONCENTRATION BANKS

A concentration bank acts as an intermediary between the approved settlement banks, i.e. exchange of payments are performed at the concentration bank between the approved settlement banks.

For payments in SEK, DKK, EUR and GBP; the Swedish Riksbank, the Danish Nationalbank, the Bank of Finland and the Bank of England respectively are engaged as concentration banks. For other currencies, a commercial bank is engaged as concentration bank.

CHAPTER 8

RULES AND REGULATIONS

The clearing activities of Nasdaq Derivatives Markets and Nasdaq Commodities are organized within Nasdaq Clearing AB, a private limited company incorporated in Sweden and subject to Swedish company law.

Nasdaq Clearing is authorized by Finansinspektionen, the Swedish Financial Supervisory Authority, to provide clearing services under EMIR. Finansinspektionen is also the competent authority under EMIR and supervises the clearing house.

8.1 LEGAL FRAMEWORK

In Sweden, clearing is primarily governed by the following acts:

+ Securities Market Act (2007:528)
+ Financial Instruments Trading Act (1991:980)
+ Rights of Priority Act (1970:979)
+ Swedish Bankruptcy Act (1987:672)

In addition to the above-mentioned acts and Norwegian legislation applicable in respect of the Oslo Branch of the Company, Nasdaq Clearing AB has issued Rules applicable to its clearing activities in Nasdaq derivatives markets and Nasdaq commodities market.

The Rules, together with the membership agreements, constitute the contractual framework governing the relationship between Nasdaq Clearing AB and its members. The Rules become binding for members through the execution of the member agreement.

The governing law for the contractual relationships between Nasdaq Clearing AB and the respective member is:

- Swedish law (for Nasdaq derivatives markets); and
- Norwegian law (for Nasdaq commodities market).

8.2 THE LEGAL STATUS OF NASDAQ CLEARING AB

As noted above, Nasdaq Clearing is authorized by Finansinspektionen to provide clearing services under EMIR. Finansinspektionen is also the competent authority under EMIR and supervises the clearing house.

The clearing system has been approved by Finansinspektionen as a settlement system according to Systems for the Settlement of Obligations on the Financial Market Act and as such notified to the European Securities and Markets Authority (ESMA). The Norwegian Financial Supervisory Authority has also approved the clearing system under corresponding Norwegian legislation.

Nasdaq Clearing AB has arrangements in place with relevant Central Securities Depositories in accordance with applicable laws and regulations.
8.3 RULES OF NASDAQ CLEARING AB

The Rules of Nasdaq Clearing AB:

› Nasdaq Derivatives Markets:

› Nasdaq Commodities:
CHAPTER 9

COUNTERPARTY RISK MANAGEMENT

Nasdaq Clearing handles traditional business risks, as well as specific risks that are unique to the derivative clearing services it provides. The most noteworthy of these risks, with respect to the risk of loss, is counterparty default, the risk that one or several market participants will default on their obligations to the clearing organization.

The ability of Nasdaq Clearing to manage overall counterparty risk is dependent upon several factors including a sound legal foundation, proactive risk management and controls of collateral, the clearing operations, the financial strength of the clearing organization.

Nasdaq Clearing relies on a multi-asset risk system, Genium Risk, and customized margin methodologies per individual asset class. The margin calculation determines the appropriate amount of required collateral to compensate for the counterparty risk it assumes in its capacity as a clearing organization. The validity of the margin methodologies is supported by regular back testing, sensitivity testing and validation.

Nasdaq Clearing also relies on a proprietary capital-at-risk calculation model and system (CCaR) to serve as the main driver in establishing an appropriate level of default fund and overall clearing capital. CCaR generates implied “loss given default” calculations based on extreme stress counterparty default assumptions. These are well defined, extreme stress, risk parameter assumptions applicable to an extensive range of market price movement scenarios along with well-defined counterparty default assumptions. (See Chapter 11 for more details on margin methodologies and Chapter 12 for more details on CCaR).
9.1 COUNTERPARTY RISK

Counterparty risk is the risk that one party in a transaction will not be able to fulfill its obligations. In return for collateral, the clearing organization assumes the obligations under each derivative contract that has been accepted, thus minimizing the counterparty risk. Nasdaq Clearing therefore enters as counterparty for both the buyer and the seller.

Nasdaq Clearing’s collateral requirements are calculated based on the specific counterparty’s clearing positions. The collateral requirements are determined by risk models used to calculate an individual counterparty’s daily margin requirements and intraday margin calculations. The risk models and methodologies applied within Nasdaq have been specifically designed by the Clearing Risk Management department to address near worst-case scenarios.

Nasdaq Clearing always acts as seller to the buyer and as buyer to the seller which is why its portfolio is perfectly matched. Market risk, which is defined as the risk of loss from fluctuations in market price, is maintained at zero unless a counterparty defaults on its obligations or if operational errors occur that affect the balanced position of Nasdaq Clearing. If market risk occurs because of an operational error, the internal operational procedure is to close down the position immediately to minimize the potential market risk. Counterparty default events are managed by the Nasdaq Clearing Default Committee. Default management is covered in detail in Chapter 10.

9.2 CLEARING RISK MANAGEMENT DEPARTMENT

The Clearing Risk Management department within Nasdaq Clearing is primarily responsible for managing counterparty risks. This is accomplished through a comprehensive counterparty risk management framework made up of policies, procedures, standards and resources. These resources are human, informational and technological. These resources and the framework that is applied are essential to the accurate measurement, reasonable control and desired level of protection from all identifiable counterparty risks, as well as all operational risks arising within the Risk Management’s scope of responsibility. The framework is also designed to meet the counterparty risk management and related corporate governance objectives of Nasdaq Clearing.

The day-to-day work is dedicated to achieving the following goals:

› Assess and manage the counterparty risk associated with Nasdaq’s existing and/or new products and services
› Ensuring that executive management and relevant Boards of Directors are appropriately informed of all significant counterparty risk control issues which occur
› Maintaining compliance with international industry standards specific to risk management
› Making continuous improvements to the Nasdaq Clearing counterparty risk management framework

The Clearing Risk Management department manages changes in counterparty risk exposures against a range of risk limits on a daily and intraday basis. The Clearing Risk Management department relies on well-established margin methodologies, which are validated regularly by automated back testing, sensitivity testing and validation. The Clearing Risk Management department also monitors and responds to noteworthy changes in risk exposure and changes in the financial markets, which can affect the risk profile of the counterparties.

The Clearing Risk Management department responsibility also includes:

› Screening of the creditworthiness and financial performance capacity of:
  - Clearing members and Direct Clearing Clients
  - Settlement banks, custodian banks, and liquidity providers
  - Collateral issuers
› Responding to regulatory authority and other significant stakeholder inquiries concerning Nasdaq Clearing’s counterparty risk management framework
› Providing analysis and recommendations on counterparty risk issues relating to new markets and products.
› Analyzing and recommending what shall be approved as eligible collateral
9.3 COUNTERPARTY RISK MANAGEMENT FRAMEWORK

The following depicts the overall counterparty risk management framework that the Clearing Risk Management department applies in its approach to managing counterparty risk within Nasdaq Clearing. This overall framework is purposely designed to incorporate continuous improvement to the methods used in professionally managing counterparty risk.

9.4 RISK MANAGEMENT PROCEDURES

The following procedures within the Clearing Risk Management department are worthy of specific emphasis and comment:

- Procedures for handling parameter breaches
- Intraday risk reporting and monitoring
- Intraday margin calls
- Pre-novation checks
- Blocking of trades and offsetting trades

9.4.1 PARAMETER BREACHES

Each morning, the Clearing Risk Management department is made aware of any risk interval parameter breaks, or situations where the change in day-to-day market prices has exceeded the approved risk interval parameter level for any underlying instrument. The following is tracked when a parameter break occurs:

- The day-to-day price movement of the underlying instrument that has resulted in a parameter breach
- The approved parameter of the underlying instrument
- The change in price relative to the parameter
- The volume of outstanding contracts for the respective underlying product

When a risk interval parameter break occurs, the respective affected counterparty accounts are reviewed in detail, the cause of the price movement is also reviewed and a decision is taken by the Clearing Risk Management department as to what action, if any, is required, immediately or during the course of the day in response.
9.4.2 INTRADAY RISK MONITORING

Intraday risk reports are generated every hour (starting at CET 09:00 and ending at CET 18:00) or more often if deemed necessary. Each intraday margin calculation reflects any clearing member’s or direct clearing client’s change in exposure, with updated positions and real time prices, during the clearing day. In case of a breach by a participant of the intraday risk limit, Clearing Risk Management will issue a margin call.

Different types of risk limits and alarms are established by the Clearing Risk Management department. It is also worth noting that breaching of a risk limit is not grounds for default; it simply serves as one of many early warning measures applied by the Clearing Risk Management department.

9.4.3 INTRADAY MARGIN CALLS

Nasdaq Clearing has both the authority and the capacity to calculate and require intraday margin in order to maintain a desired level of margin coverage. The Clearing Rules stipulate that the new margin requirement shall enter into force immediately and be met by the participant no later than 90 minutes after the clearing house notified the clearing member that a new margin requirement has been calculated.

9.4.4 PRE-NOVATION CHECKS

Trades in certain products are subject to pre-novation checks by Nasdaq Clearing prior to acceptance for clearing. A pre-novation check means that Nasdaq Clearing will verify that sufficient collateral is in place on the Clearing Member’s account in order to accept the trade for clearing.

9.4.5 BLOCKING OF TRADES AND OFFSETTING TRADES

Excluding default events (covered under Default History section of this document), Nasdaq Clearing has not found it necessary to exercise its right to block the trades of any counterparty since 2000. There have been instances where counterparties have been contacted and instructed to discontinue any additional trades in a given instrument in order to limit the concentration risk of a specific position, or to prevent an increase in a position of the counterparty in question. In all such instances, the counterparties have complied and cooperated in full with Nasdaq Clearing’s instructions.

There have also been instances where counterparties have been requested by the Clearing Risk Management department to offset trades to reduce the current margin requirement to a level where the counterparty is capable of delivering margin.
CHAPTER 10

DEFAULT MANAGEMENT

The rules governing when a CCP member or customer is considered to be in default are stated in section 1.8 in the Clearing Rules of Nasdaq Derivatives Markets and in section 8 in the General terms of the Clearing rules of Nasdaq Commodities.

10.1 DEFAULT RULES

CCP members, indirect pledging customers (IDP) or Direct Clearing Clients (DCC) are considered to be in default in either of the following circumstances:

- They breach the Rules of Nasdaq or other regulations regarding Nasdaq’s exchange and clearing operations.
- In the judgment of Nasdaq Clearing, there is a substantial risk that the CCP member or client will breach these rules or other regulations regarding the exchange or clearing operations.

If exchange members, CCP members or IDP/DCC clients are in default, Nasdaq Clearing has the right to take one or more of the measures below, at the expense of the defaulting party and without necessarily consulting the defaulting party in advance:

- Withhold settlement or delivery due to the defaulting party.
- Offset settlements or deliveries due to the defaulting party against settlements or deliveries due to Nasdaq Clearing.
- Refuse exchange transactions, registration, and the settlement of contracts, in their entirety or in part, to the extent that is deemed necessary to avoid sustaining damage. In this respect, Nasdaq Clearing has the right to buy or sell contracts on behalf of the defaulting CCP member or client, and to forcibly settle the defaulting CCP member or client’s contracts in advance.
- Seize and realize collateral provided.
- Purchase deliverable instruments and also, where the covering purchase is caused by a delay or lack of delivery from a CCP member or client (or if, in Nasdaq Clearing’s judgement, there exists a risk for delay or lack of delivery) to revoke the delivery and receive payment corresponding to the difference between Nasdaq Clearing’s costs for the covering purchase, together with the fees for the delay in or lack of delivery, and the exercise price or forward price of the contracts in question.
- Sell the contract base and, where a sale is caused by a delay in, or lack of, settlement by the CCP member or client (or if, in Nasdaq Clearing’s judgment, there exists a risk of delay or lack of settlement), revoke the settlement and receive payment corresponding to the difference between the proceeds realized and the exercise price, futures price or equivalent cost for the relevant underlying instrument, together with the fees for default settlement.
- Exclude the exchange member, CCP member or client from Nasdaq through the termination of their respective member or client agreements. Upon termination of an exchange member or CCP member, Nasdaq Clearing may forcibly settle those contracts into which the exchange member or CCP member has entered on its own behalf.
- In respect of customer portability, Nasdaq Clearing has arrangements in place to transfer clients’ positions. Should such transfer not be possible or deemed to take too long time to execute, Nasdaq Clearing will close out the open positions. The decision on what is constituted as acceptable time frame is taken by the Clearing Default Committee and depends on the risk profile of each individual portfolio. A participant’s proprietary positions will be forcibly closed out in case of a participant default.
Option contracts in Freight and Seafood may be subject to forced termination in accordance to the relevant contract specification. The forced termination may be applied to all or parts of the positions at a forced termination contract price/premium calculated by Nasdaq Clearing.

10.2 DEFAULT PROCESS

The Nasdaq Clearing Default Committee is the single decision-making authority within Nasdaq Clearing, for evaluating default situations and events and deciding which—if any—actions will be taken as permitted under its Rules as well as any applicable legal agreements. The Default Committee is made up of the following representatives, in order to help ensure that all decisions are well informed.

The Default Committee shall include the following ordinary members:

+ President of Nasdaq Clearing AB
+ Chief Risk Officer (chairman)
+ Head of Risk Operations
+ Chief Technology Officer
+ Chief Operating Officer
+ Chief Compliance Officer

Furthermore, the Default Committee shall also include associate members as follows:

+ Representative of Legal
+ Representative from Clearing Operations
+ Representative of Group Risk Management (observer)
+ Representative of Communications (observer)
+ Representatives from Treasury

Associate members may assist in matters handled by the Default Committee, by sharing expert knowledge, but they do not participate in the decision-making process. Associate members will be invited to a meeting of the Default Committee as needed.

The Default Committee has the mandate to act in every possible way to reduce the risk in the portfolio. This means that Default Committee is authorized by the Board of Directors to choose whatever solution adequate to reduce or eliminate the risk exposure. In this respect, there are different ways to reduce and eliminate the risk exposure:

› Open new trades/positions to create synthetic hedges (does not need to be a perfect hedge as long as it has a substantial risk reducing effect)
› Close out trades
› Hold risk neutral positions (RNP) unchanged
› Create new RNPs through open up new positions in overlapping products
› Neutralize exposure by making RNP look-aliases
› Prioritizing close out based on a risk assessment

The Default Committee decides the progress in the close-out trades/risk reduction but the progress will be depending of internal and external factors. The Default Committee shall consider all possible ways to close down positions:

› Close out trades through the OTC market via brokers
› Directly towards CCP members; open or closed “auction sale”, collect binding bid/ask prices from CCP members
› Supervised close out, let the defaulting party do the close out trades itself
› Close out trades through the exchange, depending on liquidity and impacts on market prices
10.3 PORTABILITY – ASSUMPTIONS AND PROCESS

In order to successfully and quickly port positions and collateral from a defaulting member to a back-up member, it is crucial that the clearing house is able to, in a very short timeframe, determine client obligations, market value and value of posted collateral.

Nasdaq Clearing offers a number of clearing model alternatives with different levels of segregation and pre-defined portability arrangements. In other words, different levels of client protection are available in the event of a member defaulting.

There are a number of key factors to take into account when deciding on the model for a client, for example:

+ CHOSEN CLEARING ACCOUNT/CLEARING MODEL

To choose a clearing account with individual client segregation will increase the likelihood of successful porting compared to a clearing account with client/house segregation.

In Nasdaq Clearing’s unique Direct Clearing Client (DCC) model there are no margin obligations to consider for a back-up member, only administration obligations. This gives this model a great advantage compared to other models where client obligations are part of the porting process.

+ BACK-UP MEMBER

To have an agreement with a back-up member prior to the default is an important factor in reducing the risk of failing to port positions and collateral since there will be limited time to negotiate an agreement with a back-up member in a default situation.

Be aware that the porting processes presented shall be regarded as guidelines and not a fixed processes since Nasdaq Clearing, members and clients might be forced to act differently due to specific market conditions.

10.3.2 PORTING PROCESS - DIRECT CLEARING CLIENT ACCOUNT

The assumption is

\[ \text{The defaulting member’s administrator will put all transactions (both house and client) on hold once the member is in default.} \]
\[ \text{All positions for a particular client are ported to a back-up member. Partial porting is not possible.} \]
\[ \text{There is no need to port collateral since collateral is held in a specific DCC client custody account.} \]

Porting process

1. Nasdaq Clearing declares a member in default. It will then publish a statement to that effect on the Nasdaq Clearing’s website. The information will also be made available via the Nasdaq Clearing subscription service.
2. The DCC client is responsible for contacting the back-up member with a porting request to accept positions according to the agreement between the client and the back-up member.
3. The back-up member is responsible for contacting Nasdaq Clearing with a porting request from the back-up member to port client positions.
4. Porting.
5. Nasdaq Clearing will port positions to the back-up member. No close-out and re-open mechanism is needed.
   a. Porting of positions and collateral will be processed by Nasdaq Clearing on the business day following the day when Nasdaq Clearing receives the porting request from a backup member.
   b. Nasdaq Clearing issues confirmation to the client, the back-up member and the defaulting member.
6. Default fund
   a. There is no need to call for additional contributions since there is no change in the relationship between Nasdaq Clearing and the DCC client.
10.3.3 PORTING PROCESS - ICA ACCOUNT

1. Nasdaq Clearing declares a member in default and publishes a statement to that effect on the Nasdaq Clearing website. This information will also be made available via the Nasdaq Clearing subscription service.

2. The ICA client is responsible for contacting the back-up member with a porting request according to a back-up agreement between the client and the back-up member.

3. The back-up member is responsible for contacting Nasdaq Clearing with a porting request from the back-up member to port client positions and collateral.

4. Nasdaq Clearing will determine the value of collateral posted in relation to an ICA client.

5. Nasdaq Clearing will determine the total obligation in relation to the ICA client:
   a) the market value of all positions (intraday positions included)
   b) whether there is any unsettled MtM
   c) whether there are any unsettled premiums
   d) whether there are any unsettled securities settlements
   e) whether there are any unsettled fees
   f) whether there are any unsettled final cash settlements

   The total ICA obligation is the sum of a – f.

6. Nasdaq Clearing determines if there is sufficient collateral to cover all ICA obligations based on information in steps 4 and 5.

7. Nasdaq Clearing contacts the back-up member with details of the account. The back-up member must take on all ICA obligations determined in step 5, there is no option for back-up members to only take on partial ICA positions.
   - The back-up member will have the opportunity to:
     + Accept the porting request, or
     + Contact client and call for additional collateral from the client and then accept the porting request.
   - Porting to back-up member:
     + Nasdaq Clearing will port positions to the back-up member. No close-out and re-open mechanism is needed.
     + Nasdaq Clearing will port collateral to the back-up member.
     + Porting of positions and collateral will be processed by Nasdaq Clearing on the business day following the day when Nasdaq Clearing receives the porting request from a backup member.
   - Reject the porting request:
     + Payment to ICA client
       1. Nasdaq Clearing will close the ICA account using close out netting.
       2. Nasdaq Clearing will use posted collateral to cover all obligations in relation to the ICA client.
       3. Nasdaq Clearing will pay out any excess value or excess collateral to ICA client.
8. Default fund:

- Nasdaq Clearing calls for additional contributions from the back-up member if necessary.

### 10.4 DEFAULT HISTORY

Since Nasdaq Clearing began its derivatives clearing operations, thirteen (13) clearing participants have experienced financial difficulties resulting in the participant being declared in default.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 1989</td>
<td>A Swedish-based market maker member experienced liquidity problems due to trading losses. After all positions had been closed, the market maker had an unpaid settlement amount for options amounting to SEK 736,000, which was covered by Nasdaq Clearing's equity reserves.</td>
</tr>
<tr>
<td>January 1991</td>
<td>A Swedish-based sole market maker had insufficient capital due to losses in stock options. The posted collateral was seized to cover the closeout costs. Nasdaq Clearing did not incur any loss due to this default.</td>
</tr>
<tr>
<td>March 1993</td>
<td>The Swedish-based brokerage firm Orion Fondkommission AB was placed into bankruptcy and Nasdaq Clearing's required margin covered all the costs associated with the closing of the counterparty's positions. Nasdaq Clearing did not incur any loss due to this default.</td>
</tr>
<tr>
<td>November 2001</td>
<td>UK-based Enron Europe Trading Ltd, a member of the UKPX, experienced serious financial difficulties. The OMLX and the Nasdaq Clearing acted early in the progression that led to the bankruptcy of Enron's parent company, Enron USA. When Enron was placed into default, costs of GBP 4,442 were incurred when the position was closed out. These costs, together with some miscellaneous items, were fully covered by the posted collateral. Neither Nasdaq Clearing nor OMLX incurred any loss due to this default.</td>
</tr>
<tr>
<td>November 2001</td>
<td>The Commodities Markets clearing member Enron Capital &amp; Trade Resources International Corp (ECTRIC), a wholly owned subsidiary of Enron Corp. and incorporated under US legislation, experienced serious financial difficulties. Nasdaq Clearing acted early in the progression that led to the bankruptcy of Enron's parent company, Enron USA, and put ECTRIC in default due to ECTRIC not being able to meet extraordinary margin call issued. Nasdaq Clearing initiated immediate closeout of the portfolio, which was closed by day end. The closeout cost was fully covered by the collateral posted by ECTRIC. Nasdaq Clearing did not incur any loss due to this default.</td>
</tr>
<tr>
<td>October 2002</td>
<td>A clearing member on the Commodities markets was declared in default after the company did not meet a daily margin requirement. As the clearing member was not in bankruptcy, the member was put into default administration—meaning the default was not communicated to the market and the Clearinghouse let the clearing member close down their exposure under the Clearinghouse's supervision. The clearing member was kept anonymous during the default process, the closeout cost was fully covered by the collateral pledged by the clearing member, and NA Nasdaq SDAQ.</td>
</tr>
</tbody>
</table>

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2 Enron Europe Trading Ltd and TXU Europe Energy Trading Ltd. were clearing members of UKPX (the UK Power Exchange), a division of the former OMLX (OM London Exchange Ltd.) which at the time was a London-based, wholly-owned subsidiary of Nasdaq Clearing. Because part of Nasdaq Clearing's clearing capital also covered the liabilities of the OMLX and UKPX's operations, and as there is only one Default Committee within Nasdaq Clearing authorized to manage counterparty default events, these default incidents are included in the overview of the default history of Nasdaq Clearing.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 2002</td>
<td>UK-based TXU Europe Energy Trading Ltd. was placed into default after the company filed for administration protection. Default proceedings were initiated; the member’s positions were taken over by the clearing organization and liquidated during the trading day. The amounts resulting from position liquidation totaled SEK 204,000. The full settlement amount was paid from excess cash. Neither Nasdaq Clearing nor OMLX(^3) incurred any loss due to this default.</td>
<td>Clearing did not incur any loss due to this default. Later, the defaulted clearing member withdrew from the market.</td>
</tr>
<tr>
<td>January 2008</td>
<td>Two affiliated indirect pledge customers of a Finnish bank simultaneously failed to meet their margin requirement pertaining to positions in stock forwards, and were subsequently declared in default. The combined margin requirement was MEUR121. The positions were liquidated within 24 hours at a cost of MEUR 98. Nasdaq Clearing did not incur any loss due to this event.</td>
<td></td>
</tr>
<tr>
<td>April 2008</td>
<td>A clearing member on the Commodities market was declared in default after the company did not meet its daily margin requirement. As the clearing member was not in bankruptcy, the member was put into default administration—meaning the default was not communicated to the market and the Clearinghouse let the clearing member close down their exposure under its supervision. The clearing member was kept anonymous during the default process, the closeout cost was fully covered by the collateral posted by the clearing member, and Nasdaq Clearing did not incur any loss due to this default. Later, the defaulted clearing member withdrew from the market.</td>
<td></td>
</tr>
<tr>
<td>October 2008</td>
<td>A direct pledge end customer filed for suspension of payments and was subsequently declared in default. The customer’s stock options portfolio, with a margin requirement of MSEK 9, was liquidated within one hour at a cost of MSEK 7. Nasdaq Clearing did not incur any loss due to this default.</td>
<td></td>
</tr>
<tr>
<td>March 2009</td>
<td>Clearing member Weavering Capital AB failed to comply with the minimum financial criteria for clearing members and was declared to be in default. Weavering Capital AB administered approximately 20 indirect pledge end-customers but had no proprietary trading book. Before the end of the day of the default, all end customers had been successfully transferred to other clearing members. Nasdaq Clearing did not incur any loss due to this default.</td>
<td></td>
</tr>
<tr>
<td>August 2010</td>
<td>HQ Bank had its banking and trading license revoked by the Swedish FSA and was declared in default. Nasdaq Clearing actively traded out of the proprietary positions and transferred (or, where necessary, liquidated) customer accounts. Nasdaq Clearing did not incur any loss due to this default process.</td>
<td></td>
</tr>
<tr>
<td>September 2011</td>
<td>MF Global UK Ltd, clearing member of both the financial and commodities markets, went into special administration due to insolvency and was declared to be in default. MF Global only had open positions on behalf of clients on the financial markets and the remaining position was closed out in one day without Nasdaq Clearing incurring any losses.</td>
<td></td>
</tr>
</tbody>
</table>

\(^3\) See 2.
| September 2018 | On September 10, 2018 the markets in Nordic and German power experienced an extreme movement in the spread. One of Nasdaq Clearing’s members had a portfolio containing a large spread position between Nordic and German Power that was negatively impacted by the fluctuations. When the member no longer could meet the margin requirement due to the losses in the portfolio Nasdaq Clearing declared the member in default. The subsequent default management resulted in a loss that exceeded the member’s margin collateral and default fund contribution, leading to a loss for Nasdaq Clearing and the Nasdaq commodities member default fund. Nasdaq Clearing is recovering funds from the defaulted member to its members, and has also been working with members and other stakeholders to implement an action plan leveraging the lessons learned from this event. |
CHAPTER 11

MARGIN METHODOLOGY

To enable a trustworthy clearing operation, reasonably conservative margins are required to avoid the risk of the clearing house incurring a loss in a default. This section describes the Nasdaq Clearing’s margin methodologies and systems.

The margin requirement should theoretically be the market value of the account. However, under normal conditions an account cannot be closed at the instant a participant defaults at the prevailing market prices. It typically takes time to neutralize the account and the value of the account can change during this period, which must be catered for in the margining methodology.

Nasdaq Clearing uses a risk system called Genium Risk. The purpose of a margin requirement system is to calculate accurate risk-based margin requirements for each counterparty account. The margin methodologies are customized and designed specifically for the different asset classes in question to generate accurate valuation and capital efficient calculations to optimize the use of members’ collateral.

11.1 CALCULATION OF RISK PARAMETERS

Since neutralizing an account in a default situation can take time, there is a lead-time from the moment a default occurs to the time at which Nasdaq Clearing is able to close the participant’s positions and when necessary, liquidate the collateral that has been pledged (so called liquidation period). For most financial products it is assumed that it takes two days on average, but up to five days for more illiquid products, to close a counterparty’s positions and liquidate related collateral in the event of a default. For commodity products the liquidation period ranges between 2-5 days. Hence, the margin parameters are calculated with considerations taken to the assumed liquidation period.

Historical price movements are in many cases not normally distributed. This could cause concern as knowledge of the distribution could enable an estimation of accurate confidence intervals for the parameters in the margin calculation. Thus, in order to avoid issues assuming normal distribution, Nasdaq Clearing instead uses a numerical method to calculate its risk parameters. An additional buffer of 25% (procyclicality buffer) is added unless the look-back period is 10 years. The confidence level when determining the risk parameters ranges from 99.2% to 99.5% depending on product.

Prices on commodities derivatives’ markets possess the same general properties as other financial instruments, including “heavy tails” and high excess. For margin calculations Nasdaq Clearing applies contemporary statistical methods with use of stable distributions as a model for the tails of relative price increments distribution. Major part of parameters is estimated within one year data horizon. Parameters of the margining model guarantee that possible losses will be covered by the member’s margin with 99.2-99.5 percent confidence.
11.2 GENIUM RISK - THE MARGINING SUBSYSTEM

Genium Risk is a subsystem integrated within the Genium INET clearing system, which is used to generate the daily counterparty margin requirements and intraday counterparty margin calculations. In the Genium INET Clearing system Nasdaq Clearing achieves full integration of the Commodity and Financial markets. Genium Risk is a multi asset risk management system that integrates OTC and standardized products, hence generating risk offsets and efficiency for members of the clearing house. Risk models and risk parameters are customized for different types of asset classes and credit risks. The following sections describe the margin methodologies used for Equities, Fixed Income and Commodities.

11.3 OMS-II – EQUITY DERIVATIVES MARGINING

OMS-II examines the portfolio as a whole to see how an adverse movement in the value of an underlying instrument would affect the value of the entire portfolio of a given counterparty. It uses a range of inputs in the margin calculation, some of which are specified below.

11.3.1 MARKET PRICE MODELS FOR OPTION CONTRACTS

The market value of an option contract at each valuation point is calculated using industry standard valuation models such as Black-Scholes, binomial method and Black-76.

11.3.2 VALUATION INTERVAL

Different values for the account must be calculated since the market often moves after collateral is pledged until Nasdaq Clearing can close a position in the event of a default situation. To do this, OMS-II varies the price for the underlying security for each series to calculate the neutralization cost. In this way, OMS-II creates a “valuation interval” for each underlying security. The size of the valuation interval depends on the length of the liquidation period (liquidation period) and the size of the historic fluctuations in the price over this liquidation period.

11.3.3 VALUATION POINTS

The upper and lower limits of the valuation points represent the worst expected movement (during the liquidation period) for the margin calculation. However, the worst-case scenario for a portfolio with different options and forwards/futures based on the same underlying instrument can occur anywhere in the valuation interval. In order to reflect this, the valuation interval is divided into a number of valuation points (currently 31).

OMS-II calculates the neutralization cost for each series with the same underlying security in each valuation point; the actual margin requirement is then based on the valuation point that rendered the highest margins, i.e. the worst-case scenario. This means that a portfolio which contains a series for which margins normally would be calculated at different ends of the valuation interval is calculated in the same valuation point. This methodology is justified since the market can only go in one direction at a time (see section 11.6).

11.3.4 IMPLIED VOLATILITY AND VOLATILITY SHIFTS

When calculating implied volatility for exchange-traded options, there are two opposing forces to consider: flexibility and stability. Using the individual implied volatility for each series theoretically allows the clearing organization to cover “smile” effects in volatility; however, the problem with obtaining accurate pricing for out-of-the-money and in-the-money series makes this method unstable.
For the most liquid underlying instruments, OMS-II calibrates a volatility surface used as input for the margin calculations. For less liquid instruments, OMS-II calculates an arithmetic average for the three closest “at-the-money” series for each expiration and underlying instrument. This is then used as market volatility. This method does not consider smile effects, but is extremely stable.

The risk for a change in volatility is taken into account by calculating the neutralization cost of an account by a higher and lower volatility than the current volatility. This ensures that the neutralization cost is calculated at each of the valuation points for three different volatility levels; low, current and high. A typical valuation interval therefore consists of 3x31 valuation points.

11.3.5 VECTOR FILES

OMS-II produces a vector file for each contract cleared. A vector file consists of a data series that is shared by all positions in the series. There are primarily two reasons to produce a vector file. The first is to achieve computational efficiency and the second is that the vector files can be distributed externally so that members can replicate the margin calculations in their own systems.

11.4 CFM - FIXED INCOME DERIVATIVES MARGINING

Desirable properties of a margin methodology are that it should mirror realistic circumstances, and at the same time be capital efficient. When margining fixed income derivatives it appears natural to utilize the correlation between different maturities along a yield curve. CFM (short for Cash Flow Margin) is a yield curve based margin methodology that captures this correlation of fixed income instruments priced against the same curve. Instead of stressing each instrument’s individual price, yield curves are stressed using their first three principal components. All instruments in an account are then evaluated against each stressed yield curve and the margin requirement is given as the combined value of these instruments calculated with the worst of the stressed yield curves. Each principal component (PC) explains part of the historical changes in yield curves.

PC1 is a parallel shift of the yield curve; PC2 is a change in slope; PC3 is a change in curvature. The main steps of the margin model are:

- Calculate a market yield curve for each currency
- Bootstrap individual credit curves from prices of selected instruments
- Change the whole yield curve to simulate future possible movements of the curve
- Use the three first principal components (PC) as three independent changes to the yield curve
- A total number of 125 future yield curves are constructed
- For each curve the market value of a portfolio is calculated
- The curve that leads to the lowest market value for a portfolio is the “margin curve” for that portfolio
- Forward contracts based on Swedish fixed income instruments which are cleared by Nasdaq C1earing are hybrid futures/forward contracts. The hybrid style arises from the fact that the contract is not settled daily; instead, monthly cash settlement is carried out. This means that margin calculations for fixed income forwards must consider the bought forward price or the previous fixing value depending on whether the trade was carried out during the month or previous to the last monthly cash settlement.

11.5 SPAN® - COMMODITIES DERIVATIVES MARGINING

The Commodities derivatives margin model represents a modification of SPAN® and takes into account special properties of traded commodities and features of delivery procedures.
11.5.1 VOLATILITY CURVES

Price volatilities on the Commodities derivatives markets are crucially dependent on time to delivery. The volatility structure is formalized as a volatility curve which consists of calculated volatilities as a function of time to delivery for a given market. The volatility of a contract with a given time to delivery and delivery period is then presented as an integral of a volatility curve over the corresponding time period. Volatility curves for the commodity markets are presented on Nasdaq Clearing’s web-site and are published in a parameter file (SPAN®-file) on a daily basis.

11.5.2 SCENARIO ANALYSIS

The margin model possesses major properties of the generic SPAN® model and uses a scenario approach to determine margin levels sufficient to cover corresponding portfolio risks. The model takes into account possible price movements as well as changes in volatility, which are formalized in 16 standard scenarios. Features of the commodities derivatives markets and physical properties of delivery procedures suppose special features for portfolio netting and provide dependencies between market prices which have required special modification of the margining system.

11.6 CORRELATION BETWEEN INSTRUMENTS

<table>
<thead>
<tr>
<th>Equities (OMS-II)</th>
<th>Fixed Income (CFM)</th>
<th>Commodities</th>
</tr>
</thead>
<tbody>
<tr>
<td>For different instruments that show a high correlation to each other, there is a need for a method that takes this into consideration with respect to margining calculations. The method used by Nasdaq Clearing is called the “window method”. In this method, the scanning range limits the individual movement for each series, but there is a maximum allowed difference between the scanning points of the two series. This range can be represented as a window, hence the name. The size of this window is estimated roughly by the same method that is used to estimate scanning ranges. Daily differences between the movements of the series are calculated using one year of data. These values are then used to build a numerical cumulative distribution from which 99.2 % confidence interval is applied. Based on a given covariance, the window can display a spread demonstrating the maximum allowable difference in price.</td>
<td>Yield curves with different credit risks can show a historical relationship. Calculations of allowed correlation between two or more yield curves are based on the strength of the historical relationship between the different yield curves. Each historical curve change can be represented in terms of movements in PC1, PC2 and PC3 by applying a method of least squares solution. The method gives historical time series in terms of movements in PC1, PC2 and PC3. From each curve there will be a daily change in each Principal Components. The window size between each Principal Component is based on the maximum anticipated amount that the Principal Components can deviate from each other in terms of the number of valuation points in the valuation interval. Each day the maximum difference of the changes will be calculated and the result will end up in a spread vector. The same numerical statistical approach as presented above can be used to estimate the correlation coefficient between the commodities.</td>
<td>Due to economic and physical reasons many commodities derivatives are dependent and show high statistical dependence in price dynamics. This dependence can decrease portfolio risks, which should result in lower margin requirements. The commodities derivatives margin model takes into account dependencies between prices on derivatives with the same underlying (contract spread or time spread) as well as dependencies between different groups of products (inter commodity spread). Dependence between price increments on the derivatives with the same underlying can be estimated based on statistical properties of price processes and features of delivery procedures. The latter defines additional restrictions on the price dynamics of commodities derivatives and provides correlation coefficient to be a major factor for the estimation of the rate of dependence between</td>
</tr>
</tbody>
</table>

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4 SPAN is a registered trademark of Chicago Mercantile Exchange, Inc. and used herein under license. Chicago Mercantile Exchange, Inc. assumes no liability in connection with the use of SPAN by any person or entity.
variation between two different underlying securities. In a narrow window, prices cannot vary as much as in a broad one. As a result, high covariance causes a narrow window, and vice versa.

when calculating the risk parameters is then applied to this vector, i.e. the estimated window size is based on a 99.2% (or 99.5%) confidence interval. Instruments exposed to the same yield curve will have a logical correlation due to the fact that only one stressed curve per margin account may be chosen in the margin calculations.

corresponding price increments. The resulting decrease in margin is defined by the “window method” (see above), where the number of steps aside from the main scenario is defined by the correlation coefficient between price increments for corresponding derivatives (the higher correlation, the lower deviation from the main scenario). Correlation tables for each risk group are published in the parameter file (SPAN®-file) on a daily basis.
For further information on Nasdaq Clearing’s margin methodologies, please visit this website: http://business.nasdaq.com/trade/clearing/nasdaq-clearing/risk-management/index.html.

11.7 MARGIN SIMULATION

In the Genium INET Clearing back office application and over the open API a margin simulation facility is provided. Members can use this facility to get an indicative margin requirement on existing or fictive positions. The margin simulation calculations are based on the same methodology and parameters as the official evening margin calculations. It is however important to note that the margin simulation is based on current real time prices and simulating the same position several times may thus give different results as market prices change. The result of the simulation should be seen as an indication of the official margin requirement.

11.8 MARGIN BACK-TESTING

Comprehensive, automated margin back-testing is a key element of the validation process. Back-testing in general aims at verifying and validating that a model or method meets the requirements that were intended. The aim of Nasdaq Clearing’s automated margining back-testing functionality is to verify that the margining methodologies that Nasdaq Clearing relies upon are adequate, or in other words, that the margining results are in line with what the margining methodologies are designed to achieve.

Margin requirements are calculated each day by Nasdaq Clearing’s risk margining system Genium Risk. These calculations are based on a number of assumptions, and it is therefore of interest to investigate how well these assumptions hold up to real market events. From a risk management perspective it is crucial to verify that the margin requirements are not too low. The principle for Nasdaq Clearing’s margin back testing is therefore that for each account and margin date the market value of the account is calculated on the position from the margin date but using actual market prices over the assumed liquidation period following the margin date.

These calculations are done automatically every day for a one-year reference period for all counterparty accounts and all instruments. If the back-tested market value of an account following the margin date is less than the margin requirement, a margin breach is understood to have occurred. It should be noted that given the confidence level which Nasdaq Clearing applies in calculating risk interval parameters, margin breaches of counterparty portfolios are theoretically expected. But since risk interval parameters are calculated per underlying instrument, the diversity factor of a portfolio will determine if a margin breach occurs when a risk interval parameter is breached (a risk interval parameter breach occurs when an underlying price movement is larger than what the approved risk interval parameter accounts for). The margin back testing data that is produced is analysed on a monthly basis by Nasdaq Clearing and the result is reported to the Risk Committee and the Swedish Financial Supervisory Authority.

In addition, Nasdaq Clearing performs daily back testing and monitoring of risk parameters. Actual price movements of underlying instruments are compared each day to their corresponding margin parameters. Again, breaches are expected to happen. All breaches are logged and the reason behind the breach is noted. Based on the scale and number of breaches and the underlying reason, Risk Management decides if the risk parameter needs to be recalculated or not.

Nasdaq Clearing also performs regular model and sensitivity testing of its margin and stress test models. The purpose of such testing is to detect any weaknesses in the models even if any actual margin coverage breaches have occurred. Such model and sensitivity testing provides Nasdaq Clearing with indication if the models needs to be adjusted or if the risk management department needs to monitor certain exposures more closely.
A clearing organization is required to have financial resources as a consequence of the risks assumed in the clearing activities. This section describes CCaR, a proprietary methodology and system developed by Nasdaq Clearing to estimate the required clearing capital.

Nasdaq Clearing relies on a proprietary capital-at-risk calculation model and system, CCaR, as the main driver for establishing an appropriate level of clearing capital. The methodology is approved by the Swedish Financial Supervisory Authority and complies with the Committee on Payment and Settlement Systems (CPSS), the Technical Committee of the International Organization of Securities Commissions (IOSCO) and EMIR.

A clearing house has counterparty risk in each position that it clears. To cover that risk, the clearing house requires that all counterparties post margins. The purpose of the CCaR measure is to estimate the risk that posted collateral may be insufficient to cover the costs of closing out the positions of a defaulted counterparty. The system generates implied loss given default calculations based on assumptions on extreme price movements and levels of simultaneously defaulting counterparties. The two main differences between the assumptions in CCaR and the ones applied in the margining methodology are the following:

- Market movements in margin calculations are described as “sufficient to cover a majority of normal trading days”, while the movements applied in CCaR are designed to be “extreme but plausible”, in order to comply with IOSCO regulations on capital adequacy.
- Margins are applied to all accounts, but the CCaR value is calculated as the aggregated loss for a predefined number of simultaneously defaulting accounts in the worst extreme scenario applicable that day.

For each individual account and extreme scenario, a stressed market value is calculated and compared to the margin requirement applied to the corresponding account. The difference between the greatest stressed market value and the margin requirement is the CCaR value for that account. The CCaR value reflects the amount of Nasdaq Clearing capital that is at risk for that scenario, if that counterparty were to default.

### 12.1 Calculating CCaR Parameters

CCaR parameters set the stressed market values, on each product set, which drive clearing capital in the CCaR system. Nasdaq Clearing follows a systematic and homogeneous procedure to calculate CCaR parameters for each product line and asset class. The purpose of following an objective methodology is to measure capital contributions fairly, such that stress levels neither penalize nor favor any particular market or product. The extreme but plausible scenarios generated by these CCaR parameters are based on the long-term historical tail risk of each product and asset class with 99.9% confidence. The stressed market values for each product set are completely independent (i.e. fully decoupled) from the level of margins.
The first protection layer to ensure that Nasdaq Clearing can fulfill its obligation is its conservative margining methodology, its collateral requirements, and its pro-active risk management.

The second protection layer is its risk-bearing capital, which is its dedicated capital resources specifically designed to cover counterparty losses, i.e. to handle extreme situations where the defaulting member’s pledged collateral and other resources are insufficient. The buffer capital to cover for such a scenario is referred to as the Clearing Capital. This is made up of several tranches.

The first tranche in the Clearing Capital, which would be utilized first in the event of a counterparty default, is Nasdaq Clearing’s own funded capital. This means that Nasdaq Clearing’s own risk-bearing capital is at risk. Thus, Nasdaq Clearing has a fully vested interest in ensuring that risk management routines are applied at all times to provide for the accurate measurement, reasonable control and satisfactory protection against risks arising within the clearing organization. A certain amount of this tranche is allocated to each market (refer to 13.2 – Clearing Capital).

The second tranche of the Clearing Capital consists of member contributed default funds, one for the cleared instruments within the financial market, one for the cleared instruments within the commodity market and one for the cleared instruments in the seafood market. The member contributed default funds ensure that the clearing house and its members are aligned and share the same interest of protecting the clearing house from counterparty losses.

The third tranche of the Clearing Capital is another layer of capital provided by Nasdaq Clearing and can be utilized for defaults in all markets.
The fourth tranche of the Clearing Capital is the Mutualized Default fund, an additional layer which is provided by members, as a percentage of their contributions to the default funds for each market. This Mutualized Default fund can be utilized for defaults in all markets.

Further, the fifth tranche of the Clearing Capital is the Assessment Power, which consist of guaranteed commitments provided by the Default fund participants.

In addition to the Clearing Capital, Nasdaq Clearing holds regulatory capital to cover for other types of risks (Operational and legal risk, Investment risk and Business risk) as well as additional capital to ensure an orderly wind-down.

**REGULATORY CAPITAL WATERFALL – COVERING DEFAULT LOSSES**


### 13.2 CLEARING CAPITAL

- **Nasdaq Junior Capital.** In the event of a counterparty default where the defaulting counterparty’s posted margin and default fund contribution is not sufficient to cover the cost of closing out the portfolio, Nasdaq Clearing will absorb the first layer of loss. The Junior Capital is divided between Junior Capital for the Financial Markets, Junior Capital for the Commodities Markets and Junior Capital for the Seafood Markets.
The **Financial Market Default Fund** will function as the second layer in the event of a counterparty default where the loss has arisen in the financial market. The size of the Financial Market Default Fund is calculated to withstand a default of either the largest, or of the second and third largest counterparties combined, in an extreme but plausible scenario. The size of the default can also be influenced by the results of our comprehensive test that assumed a default across multiple clearing services, or to take into account known or anticipated changes in exposure. Contributions to the Financial Market Default Fund are only available to cover default losses in the financial market.

The **Commodities Default Fund**, will function as the second layer in the event of a counterparty default where the loss has arisen in the commodities market. The size of the Commodities Default Fund is calculated to withstand a default of either the largest, or of the second and third largest counterparty combined, in an extreme but plausible scenario. The size of the default can also be influenced by the results of our comprehensive test that assumed a default across multiple clearing services, or to take into account known or anticipated changes in exposure. Contributions to the Commodities Default Fund are only available to cover default losses in the commodities market.

The **Seafood Markets Default Fund** will function as the second layer in the event of a counterparty default where the loss has arisen in the seafood market. The size of the Seafood Markets Default fund is calculated to withstand a default of either the largest, or of the second and third largest counterparties combined, in an extreme but plausible scenario. The size of the default can also be influenced by the results of our comprehensive test that assumed a default across multiple clearing services, or to take into account known or anticipated changes in exposure. Contributions to the Seafood Default Fund are only available to cover default losses in the seafood market.

In the event of a counterparty default, **Nasdaq Senior Capital** would be used as a third layer. The size of the Senior Capital is fixed at SEK 200 million.

In the waterfall structure, the **Mutualized (combined) Default Fund**, is a buffer provided by the clearing members from both the commodities market, the financial market and the seafood market. This fourth layer would be used in the event of a default in the commodities market and/or in the financial market and/or the seafood market. In other words, it is mutualized between the three markets. The contribution is limited to 15% of each clearing member’s contributions to the Commodities, Financial and Seafood Default Funds.

**Nasdaq Clearing** holds **Assessment Power** as a final layer in the waterfall. This ultimate layer strengthens the clearing house’s contingent financial resources by committing clearing members to contribute additional capital in the event that prior levels of protection have not been sufficient to cover counterparty default(s). The commitment equals an obligation to provide additional funds up to an amount equal to 100% of each clearing member’s contribution to the Financial Default Fund, the Commodities Default Fund and the Seafood Default Fund (i.e. not including the contribution to the Mutualized Default Fund). Commitments based on the default fund contributions to the financial market are only available to cover default losses in the financial market. Commitments based on the default fund contributions to the commodities market are only available to cover default losses in the commodities market. Commitments based on the default fund contributions to the seafood market are only available to cover default losses in the seafood markets.

Nasdaq’s offering of clearing of OTC-traded interest rate derivatives requires an incentive for clearing members involved in such clearing to support the clearing house in a default involving such instruments. The incentive to support the clearing house is achieved through a member-sponsored pre-funded collateral pool only exposed to default losses from OTC-traded interest rate derivatives – the **Loss Sharing Pool**. The Loss Sharing Pool is in addition to, and without changes to, the existing regular waterfall. The Loss Sharing Pool does not for example influence the size of the default fund. In the event of a default including OTC-traded interest rate derivatives, default losses from such derivatives and other related fixed income contracts remaining after the junior capital has been exhausted shall be covered by the Loss Sharing Pool. If the Loss Sharing Pool is exhausted in a default, remaining default losses from OTC-traded interest rate derivatives will be covered by the regular waterfall (Financial Default Fund, senior capital, etc.). The Loss Sharing Pool is not subject to any assessment power or similar.
13.3 OTHER REGULATORY CAPITAL

In addition to capital held to withstand counterparty defaults, Nasdaq Clearing will also hold capital to ensure that it is adequately protected from Operational and legal risk, Investment risk and Business risk. In addition to the funds described to cover these risks, Nasdaq Clearing will hold sufficient capital to ensure an orderly winding-down or restructuring.

13.4 THE DEFAULT FUND CONTRIBUTION PROCESS

All clearing participants of Nasdaq Financial Markets, Nasdaq Commodities and Nasdaq Seafood markets contribute to the member sponsored default funds.

The operation of the Nasdaq Default Fund is part of the collateral management service. The management of collateral to cover Default Fund requirements and margin requirements is performed in the same way, but is held in separate custody accounts. For more information on CMS, please see Chapter 6.

Payments of accrued interest and coupons

Any amounts that arise due to capitalized interest and coupon payments on the Participant’s Default Fund Custody Account will be paid to the Participant according to the Standing Settlement Instruction for cash call back. Capitalized interest and coupon payments are not added to held collateral.

Interest is capitalized on the Participant’s Default Fund Custody Account on a monthly basis and coupon payments are paid to the Participant in connection with the coupon payment date of the held security.
FURTHER INFORMATION


To contact the Clearing Operations and Collateral Management team call +46 8 405 6880 or send an e-mail to clearing@nasdaq.com.

For risk management inquiries contact the Risk Management department; risk.management@nasdaq.com (for the Financial markets) or clearing.risk@nasdaq.com (for the Commodities market) or call +46 8 405 6000.


Any information herein is of general information purpose only. More detailed information on Nasdaq Clearing is provided in the Rules, each applicable membership agreement, custody account agreement and other applicable agreements and terms applicable from time to time and available on Nasdaq's web site and/or upon request.