

Eurex Clearing Prisma

Portfolio-based risk management



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Delivering innovation
with portfolio-based risk
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Eurex Clearing Prisma: Delivering innovation with portfolio-based risk management

Eurex Clearing is a leader in clearing technology and state-of-the-art customer solutions. We were first to introduce both real-time risk calculation and real-time risk-data provision, and we continue to set industry standards in risk management.

With our portfolio-based risk management approach – Eurex Clearing Prisma – we offer an innovative way to help customers maximize collateral efficiency.

Eurex Clearing Prisma maintains reliable counter cyclical margin levels in even the most challenging situations through a transparent and risk-sensitive methodology. It also delivers synergies through risk netting effects for listed, OTC and between listed and OTC positions.

It also promises flexibility when introducing new products as well as opportunities for greater capital efficiency, all with the robustness and reliability the market has come to expect from Eurex Clearing. As with everything we do, Eurex Clearing Prisma has been developed in conjunction with customers around the world to enable maximum benefits – and to ensure regulatory compliance – for all market participants. It is a solution that prioritizes safety, efficiency and integrity.

Eurex Clearing Prisma calculates combined risks across all markets cleared by Eurex Clearing. Cleared products that share similar risk characteristics are assigned to the same so-called

Liquidation Group, which results in more comprehensive risk calculations enabling cross margining across positions within any Liquidation Group. Our margining method and default management process are closely aligned.

Eurex Clearing is optimizing post-trade activity for all market participants – so you can be prepared for new regulations, respond faster to challenging market conditions and feel confident that you are clear to trade.

About Eurex Clearing

Eurex Clearing is one of the leading central counterparties globally – assuring the safety and integrity of markets while providing innovation in risk management, clearing technology and client asset protection. We clear the broadest scope of products under a single framework in Europe – both listed products and OTC – and offer the world's widest spectrum of eligible collateral.

Eurex Clearing serves more than 170 Clearing Members in 16 countries, managing a collateral pool of around 51 billion euros and processing gross risks valued at almost 15.7 trillion euros every month.

Eurex Group is comprised of Eurex Exchange, the International Securities Exchange, the European Energy Exchange, Eurex Clearing, Eurex Bonds and Eurex Repo.

Eurex Group is owned by Deutsche Börse AG (Xetra: DB1).

www.eurexclearing.com

Introduction to Eurex Clearing Prisma

In order to facilitate the transition to Eurex Clearing Prisma, we are introducing the new margin method in multiple steps.

During the migration period, Eurex Clearing Prisma and the Risk-based Margining method will run in parallel, allowing Clearing Members to migrate to the new risk method at their own pace. Throughout this period, Clearing Members will be able to decide individually when to migrate their portfolios on a Liquidation Group and position account basis.

Eurex Clearing's Prisma methodology¹ features concepts that build on existing principles and procedures in order to achieve enhanced precision and maximize use of collateral. The following section explains, among others, Liquidation Groups, a key element of the portfolio-based margining system that enables Eurex Clearing to deliver synergies such as cross margining. It also describes how the default management process is designed to accommodate the concept of Liquidation Groups. In a subsequent section the brochure explains the margin calculation method.

Liquidation Groups

A Clearing Member's portfolio typically features a heterogeneous structure, size and/or complexity. Given this complexity, and due to the general handling principles laid out in our default management process, it is usually impossible to liquidate an entire portfolio in one single transaction. Therefore, Eurex Clearing has introduced the concept of Liquidation Groups.

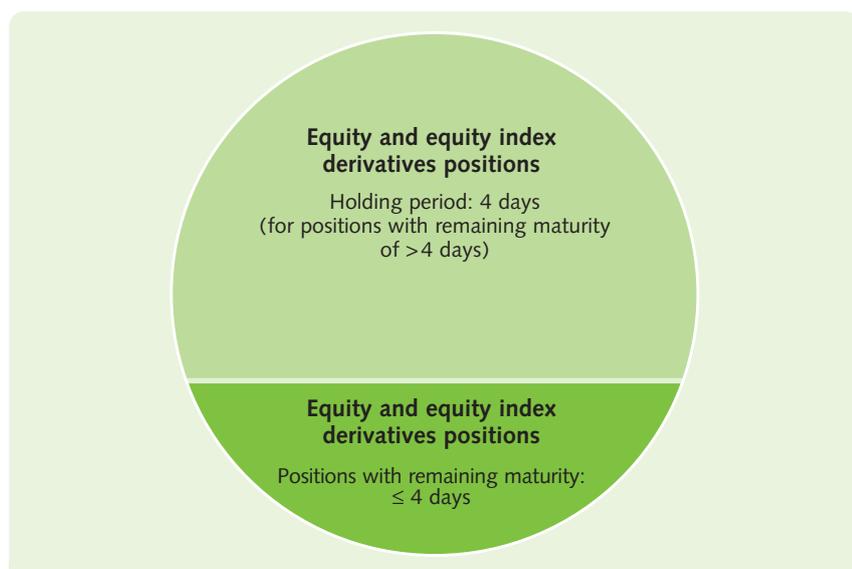
A Liquidation Group combines products that share similar risk characteristics across all markets cleared by Eurex Clearing. Liquidation Groups serve as a cornerstone of the portfolio-based risk management method. The composition of each Liquidation Group is reviewed on a regular basis and adjusted due to market requirements. Together with its Clearing Members, Eurex Clearing decides on the composition of Liquidation Groups.

Within each of these Liquidation Groups, positions can further be divided into so-called "Liquidation Group splits" in the event that some positions must follow a different liquidation timeline. The need for varying timelines is related to one of these factors:

- Positions that are near to expiration (i.e. options or near-to-maturity futures or bonds) might have to be liquidated with priority in case of a Clearing Member default.

¹ Please visit the Eurex Clearing Prisma User Guide, which is available on Eurex Clearing's website www.eurexclearing.com, for more detailed information on specific topics.

Liquidation Group equity derivatives – potential splits



- Interest rate positions in the listed area (i.e. Euro-Bund Futures or EURIBOR futures) can follow different liquidation timelines depending on whether they are used to hedge interest rate swaps positions or not by applying the Margin Optimizer. This optional feature allows for reducing the overall risk and achieves margin and collateral efficiency (please visit page 17 for further details).

A complete Liquidation Group split can be hedged by Eurex Clearing, priced by Clearing Members and then be auctioned within a reasonable period of time.

General principles for Liquidation Groups:

- Portfolio risk margin offsets are only granted within pre-defined Liquidation Groups.
- Each Liquidation Group has a fixed holding period that reflects the time estimated to analyze, hedge and liquidate the respective products. A pre-defined holding period can be between two to five days, depending on the Liquidation Group, and is at the same time the basis for the margin calculation.

The diagram below illustrates the currently existing Liquidation Groups across some markets cleared by Eurex Clearing.

Currently available Liquidation Groups

Liquidation Group	Products	Currency
Liquidation Group Equity Derivatives	Equity (index) derivatives	EUR, CHF, GBP, USD
Liquidation Group Fixed Income Derivatives	Interest rate swaps Listed fixed income derivatives Listed money market derivatives	EUR, CHF, GBP, USD, JPY

Default management

As one of the world's leading Clearing Houses, we play an important role in the global effort to maintain stability in financial markets. We recognize our responsibility to help mitigate systemic risks should the default of a Clearing Member occur. We managed the recent financial crisis effectively, not least because we had robust procedures in place to deal with a Clearing Member default and were prepared to act when the need arose. We maintain our readiness to act in similar situations by continuously updating our safeguards and introducing innovative product offerings that increase the safety of our clients and of the Clearing House.

Default procedures

Aware that each default scenario is unique, we maintain flexibility in our procedures in order to accommodate the individual features of each default consistent with local and global regulatory standards. Our procedures provide a transparent and adjustable framework that is applied depending on the circumstances of the scenario at hand.

The default management process is designed in a way which enables Eurex Clearing to handle portfolios in different Liquidation Groups individually. While it is likely that the liquidation with respect to different Liquidation Groups is likely to be conducted overlapping in time, the concrete measures applied can differ.

Despite the individual nature of every situation, explicit trigger events for a Clearing Member's default have been defined, regardless of product or cleared market. In the case that a Clearing Member has been declared to be in default, the Clearing Member's proprietary positions and its client positions may be treated differently.

Client positions

When a Clearing Member defaults, one of our principle objectives is to protect customers and to minimize the impact on clients and their positions. We are committed to ensuring that clients and their positions can be transferred to a new, solvent Clearing Member quickly and smoothly, wherever possible.

Our risk management and clearing procedures have proved to be robust even in times of acute distress in financial markets. However, the recent crisis also highlighted that in the event of a Clearing Member default greater transparency and legal certainty with respect to the treatment of client positions and assets are critical to ensure the highest degree of protection for our Clearing Members and their customers. As one part of our continuous efforts to optimize our default management processes, we address the segregation and portability needs of our customers to help better prepare for a default event.

Default management process

Our default management process is comprised of set procedures designed to facilitate the orderly liquidation of even large and complex portfolios.

The following briefly describes key components of the default management process:

- **Default Management Committees:** Default Management Committees (DMCs) advise and assist the Clearing House with respect to any relevant matter of the default management process, most importantly hedging of the portfolio and the preparation of auctions. Each DMC is staffed with professional employees of pre-selected Clearing Members. They have sufficient trading and risk expertise in the products belonging to the respective Liquidation Group(s) for which the Default Management Committee is convened. Default Management Committees will be convened in case of a Clearing

Member default and for regular default simulations (once or twice per year).

- **Hedging:** The purpose of hedging within the default management process is to enable Eurex Clearing to reduce market and potential cash-flow risks. Furthermore, hedging reduces the portfolio's sensitivity to market moves and stabilizes it for auctions.
- **Independent sale:** In order to grant sufficient flexibility during a default situation, positions or groups of positions can be sold independently to individual Members, i.e. positions of the defaulted Clearing Member are re-established by the Clearing House either on-exchange or OTC, as an alternative to the auction process.
- **Auction process:** The Liquidation Group-specific auction process is the main component of the default management process. An auction

enables Eurex Clearing to rapidly transfer risk in bulk to willing absorbers, establishing fair market prices for the particular portfolios.

Overview – default management process



Lines of defense

We guarantee the fulfillment of every transaction in every market for which we provide clearing services. To ensure that we are able to keep this promise, we set up a multi-level safety system called our "lines of defense". While the mainstay of this safety system is the margin which Clearing Members have deposited as collateral for open positions, our lines of defense consist of several additional layers of financial resources, namely:

- the defaulted Clearing Member's Clearing Fund contribution,
- own resources of Eurex Clearing and the
- Clearing Fund contributions of all other non-defaulted Clearing Members.

Segmented Clearing Fund

Eurex Clearing maintains a segmented Clearing Fund, consisting of multiple Liquidation Group-specific Clearing Fund segments (CFS), and the sum of all CFSs is the overall Clearing Fund.

When liquidating a particular portfolio, only funds of the CFS assigned to the respective Liquidation Group can be used to cover losses, unless there is a known surplus from other Liquidation Groups for which the default management process has already been finished. As such, the segmentation of the Clearing Fund ensures that those Clearing Members' contributions are used first, which have been active in the Liquidation Group(s) that losses arise from.

Meanwhile, the segmentation still maintains the capital efficiencies of one joint Clearing Fund, as compared to multiple asset class specific Clearing Funds.

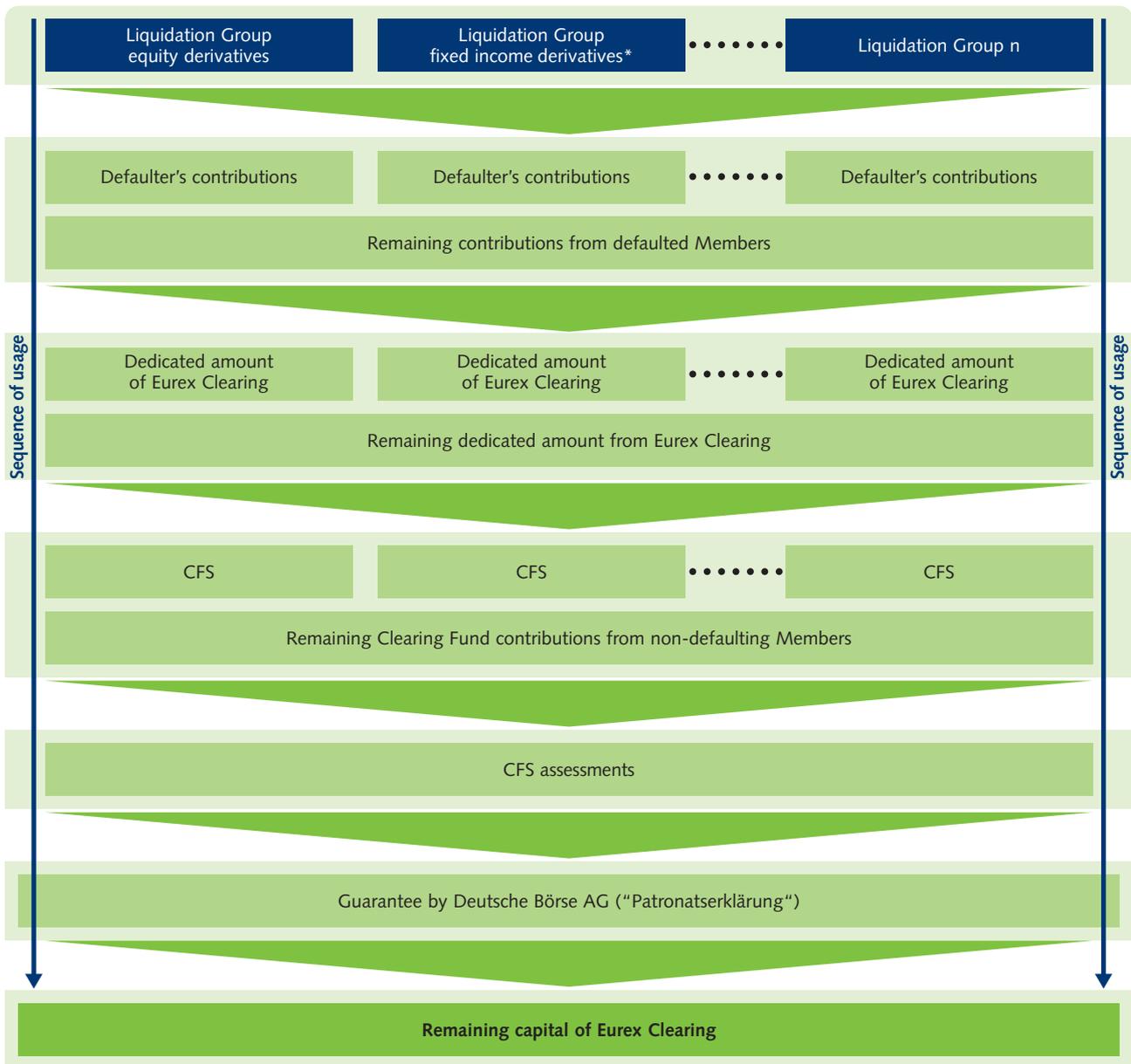
Assessments

Eurex Clearing ensures that the liability of a Clearing Member towards the Clearing House is limited. As such, Eurex Clearing's right to assess the Clearing Fund, i.e. Eurex Clearing's right to request Clearing Members to re-fill their Clearing Fund contributions once they have been utilized, is capped. In any crisis situation, each Clearing Member is only obliged to provide additional funds, up to an amount of two times its pre-funded Clearing Fund contribution.

In the event of a default, these layers are applied in the order illustrated on the next page. This way, the lines of defense help protect the marketplace as a whole and play an important role in preventing a domino effect.

As a matter of last resort, Eurex Clearing intends to implement the possibility for one Liquidation Group to be closed at the end of the lines of defense, while all other Liquidation Groups remain unaffected. This additional recovery option serves to minimize contagion risk to the maximum possible extent.

Lines of defense – sequence of usage by Liquidation Group



* Listed interest rate derivatives and OTC interest rate swaps

Setting new standards in transparency

When a Clearing Member defaults, we are careful to ensure that we take all possible steps to protect confidentiality, while we simultaneously recognize our responsibility to inform our stakeholders and the general public of the incident. In the event of a Clearing Member default we have

implemented a clear communication guideline that is strictly supervised by Eurex Clearing's management and a policy to keep stakeholders informed at all times.

Key aspects of our policy include the immediate creation of a system accessible news board message after

an official regulator announcement or a self-declaration by the defaulting Member. It consists of publishing information on the Eurex Clearing website, daily press statements, the distribution of circulars, and conference calls held with the members of our clearing committees and the risk committee.

Products covered

The qualification of product related risk is another important component of the Eurex Clearing Prisma process. This allows the Clearing House to accurately assess the overall risk of an open position as well as to determine potential cross margining synergies. As Eurex Clearing Prisma permits cross margining between products (traded on- and off-exchange) as well as across markets cleared by Eurex Clearing, this section provides an overview of the products covered under the Eurex Clearing Prisma methodology and their general characteristics.

Futures

Financial futures are always based on the firm contractual agreement

- To purchase (buyer of a futures contract)
- Or to deliver (seller of a futures contract)
- A standardized quantity of a particular financial asset (underlying instrument)²
- At a pre-determined price (price of the futures contract)
- At a standardized future point in time (delivery date)

Both parties to a financial futures contract, i.e. the buyer as well as the seller, have assumed an obligation. However, neither the buyer nor the seller is obliged to keep his position until the end of the contract's term and, consequently, to fulfill the obligation. Both have the possibility to eliminate

their risk exposure by executing an off-setting (closing) transaction. The actual fulfillment of the contract, i.e. the delivery or purchase of the underlying instrument, can therefore be avoided. Only the profit or loss arising from the difference between the entry and exit price remains. This difference is charged or credited to a cash clearing account on a daily basis by the Clearing House. This offsetting of profits and losses is called variation margin. In contrast to other kinds of margin, variation margin can only be deposited in cash. It is settled on a daily basis.

Options

The purchaser of an options contract (buyer) acquires, against payment of a premium, the right

- To buy (call option) or
- To sell (put option)
- A pre-determined amount (contract size)
- A standardized quantity of a particular financial asset (underlying instrument)²
- On (European & American style) or before (American style) a specified date (expiration)
- At a pre-determined price (strike or exercise price)

Our margin process distinguishes between two different options types and sets different margin requirements for each:

- Premium-style options
- Futures-style options

Premium-style options

For premium-style options (e.g. equity options), where the premium of an options transaction is exchanged upfront between the buyer and the seller, the seller of the option must deposit collateral to cover the risk of his position – known as premium margin.

The options buyer receives a premium margin credit which can be used to offset a margin requirement arising from his entire position.

Futures-style options

In the case of futures-style options (e.g. options on fixed income futures), both the buyer and the seller of the option are required to deposit collateral, as no premium is exchanged between the buyer and the seller when the transaction is entered.

With futures-style derivatives, the positions are marked-to-market on a daily basis. Profits and losses of futures-style derivatives positions are calculated and settled every day based on the provided variation margin.

Swaps products

Eurex Clearing's EurexOTC Clear offering includes different types of swaps products:

- Interest rate swaps (IRS)
- Overnight index swaps (OIS)
- Forward rate agreements (FRAs)

² In case a futures or options product is designed that a physical exchange of the underlying is excluded, such contracts are settled in cash.

All three are margined in a similar manner as they share certain characteristics, which are briefly described below.

Interest rate swaps

An interest rate swap (IRS) is a derivative in which one party exchanges an agreed series of interest payments for another party's series of interest payments. Interest rate swaps allow market participants to lock in interest rates and payments.

In an interest rate swap, each counterparty agrees to pay either a fixed or floating rate denominated in a particular currency to the other counterparty. The fixed or floating rate is multiplied by a notional principal amount. This notional amount is not exchanged between counterparties, but is used only for calculating the size of cash flows to be exchanged.

A so-called plain vanilla interest rate swap is an instrument where one counterparty pays a fixed rate (the swap rate) to another counterparty, while receiving a floating rate (linked to a reference rate such as the EURIBOR). With such instruments, fixed interest rate payments received/paid out of an underlying security/loan can be swapped into floating interest payments received/paid and vice versa.

According to usual market convention, the counterparty paying the fixed rate is called the "payer", and the counterparty receiving the fixed rate is called the "receiver".

A tenor basis swap is an instrument where one counterparty pays a floating rate linked to a reference rate with one reset frequency (e.g. Three Month EURIBOR) plus a spread to another counterparty, while receiving a floating rate linked to a reference rate with an other reset frequency (e.g. Six Month EURIBOR).

Usually, interest rate calculations are based on a constant "notional" principal amount, but variable notionals, variable fixed rates and variable floating rate spreads are supported, too. Compounding and zero coupon swaps are also supported.

An interest rate swap can be spot or forward starting. Supported IRS are in a single currency; the reset is in advance, the payment in arrears and interest payments are settled net.

Overnight index swaps

An overnight index swap (OIS) is an interest rate swap where the fixed rate of the swap is exchanged for the weighted (geometric) average of

an overnight index (i.e. a published interest rate) over every day of the payment period. The index is typically an interest rate for overnight call-money in euro (EONIA) or U.S. dollar (Fed Funds) etc. It will not be paid daily but compounded and typically paid at maturity or annually for calculation periods exceeding one year.

Forward rate agreements

A forward rate agreement (FRA) is a contract that starts in the future and whose final payoff depends on an interest rate fixing on that date. The difference between a swap and an FRA is that only one payment occurs and that typically the payment is settled on the effective date.

Two types of backward-looking components are applicable for the swaps products described above.³ They are variation margin and price alignment interest (PAI). Marking-to-market is carried out as well for all swaps products. Profits and losses that arise due to the price fluctuations of open positions are offset daily via variation margin, as in the case of financial futures. Price alignment interest (PAI) serves as a further cash-based margin component. It is the interest paid on the variation margin, which aligns the payoff of a cleared interest rate swap with that of an OTC interest rate swap.

Applicable margin components

	Backward-looking components			Forward-looking components				
	Price alignment interest	Premium margin	Variation margin	Market risk	Model adjustments			Liquidity risk
				Correlation break	Compression	Long option credit		
Premium-style options								
Futures								
Futures-style options								
Interest rate swaps								
Forward rate agreements								
Overnight index swaps								

■ Applicable ■ Not applicable

³ All margin components are described in-depth in the next chapter.

Margin components

The Eurex Clearing Prisma methodology calculates the actual liquidation cost of a portfolio as well as estimates the worst case losses that a Liquidation Group can incur during its holding period. This ensures that risk is covered prudently without tying up unnecessary liquidity. Risk is calculated using different margin components that are the essential elements of the Eurex Clearing Prisma computation process. When determining appropriate margin requirements and risk offsets, Eurex Clearing considers two margin types:

- Mark-to-market margin (backward-looking margin components)
- Initial margin (forward-looking margin components)

Both the backward- and forward-looking margin components are described in detail in this section. After providing an in-depth discussion of each margin component, this section then proceeds to describe how

Eurex Clearing Prisma aggregates the different forward-looking components to create a comprehensive risk profile for determining the initial margin requirement of each Clearing Member.

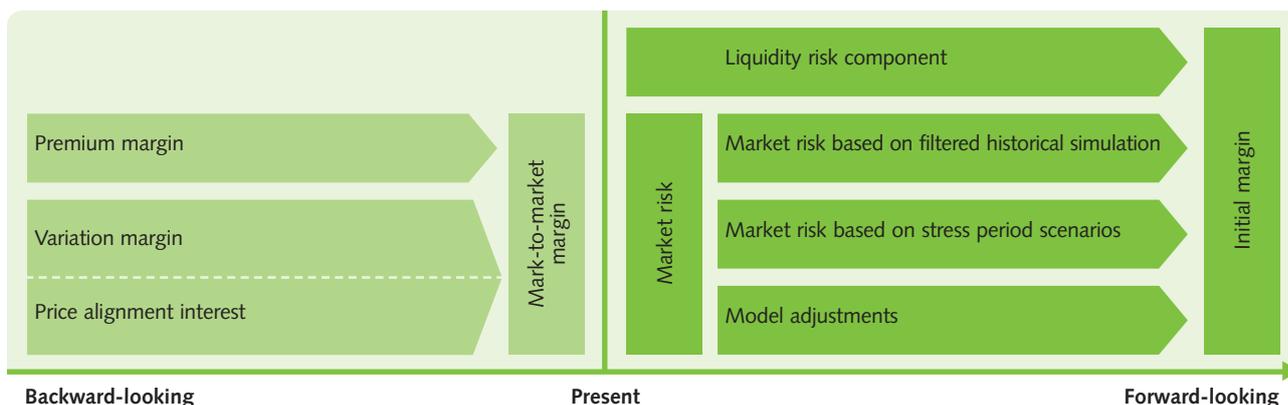
Backward-looking components: mark-to-market margin

The Eurex Clearing Prisma calculation approach begins by considering two backward-looking margin components: the premium margin which allows for the deposit of collateral and the variation margin (including price alignment interest for swaps) that is calculated on a daily basis to exchange profits and losses and which has to be deposited in cash.

Premium margin

Premium margin must be deposited by the seller of an option, if the transaction results in an open position. It covers the potential loss that could be incurred

Eurex Clearing Prisma margin components



if the seller was forced to liquidate the position today. The premium margin is continuously adjusted, i.e. if prices fluctuate so that the potential loss upon liquidation increases, the seller will be obliged to deposit additional premium margin.

Premium margin is calculated for all positions in options products that are subject to the procedure known as "premium-style margining". This involves those options for which the premium is paid in full at the time of purchase (e.g. equity options). The premium margin covers the costs or profits that would arise upon liquidating all positions of a specific product at their respective closing prices.

Variation margin

On a mark-to-market basis, Eurex Clearing settles the trading day's profits and losses of all open positions held in a position account in cash. This approach applies to futures, futures-style options and swaps products. To exchange profits and losses that arise due to the price fluctuations of open positions Eurex Clearing asks for cash collateral that is settled on a daily basis in the respective product currency, also known as variation margin.

The owner of a long position that was purchased at a lower price than the daily closing price (settlement price) is credited with the difference between the two prices, whereas the owner of the related short position must pay

that difference. When the variation margin for futures-style options is determined, calculation of the appropriate credits and debits depends on how the value of a call or put position changed during the trading day.

The variation margin procedure ensures that each position is revalued at the daily settlement price. The difference between today's and the previous day's closing price is offset by daily compensating payments. Thus, all that has to be done on the final settlement day is to value all open positions at their respective final settlement prices.

In the case of futures-style options, the final valuation is made at the settlement price on either the expiration date of the option or the day on which it is exercised.

Price alignment interest

Price alignment interest (PAI) serves as a further cash-based margin component in addition to variation margin and is only applicable to products within our swaps offering. It minimizes the impact of daily cash variation margin payments on the pricing of swaps.

Eurex Clearing will charge/pay interest using the overnight interest rate of the corresponding currency on cumulative variation margin received/paid for products.

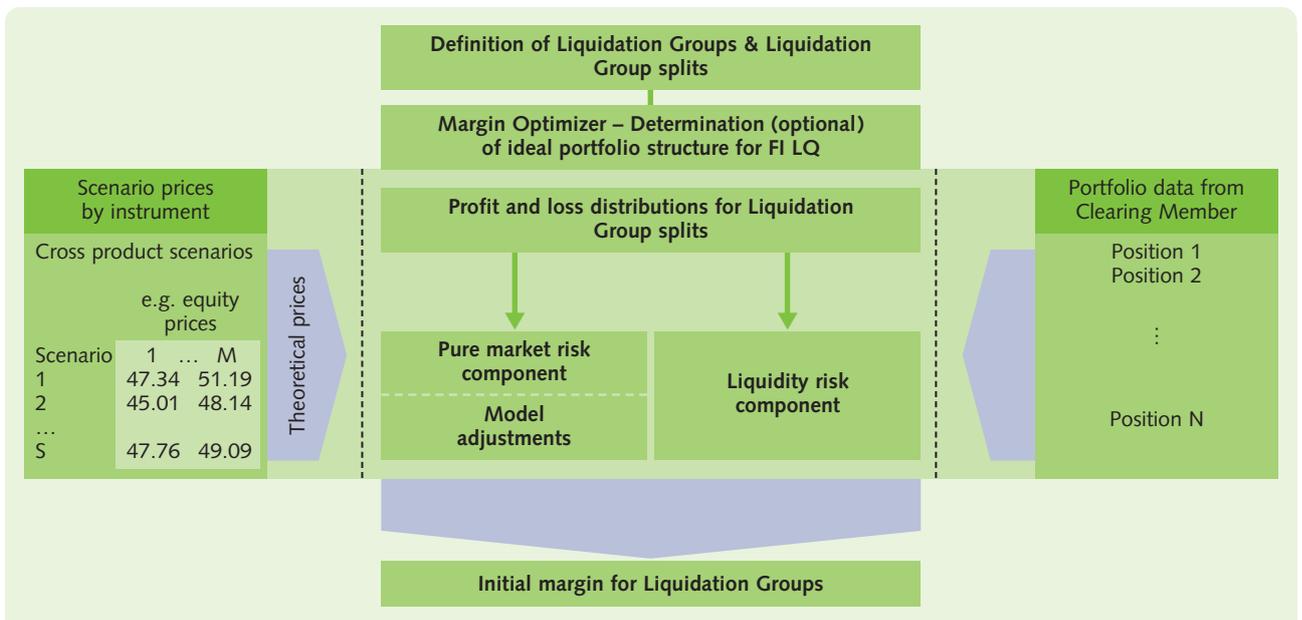
The price alignment interest is applied separately to each trading currency on a portfolio basis and is settled daily, analogous to variation margin.

Forward-looking components: initial margin

The Eurex Clearing Prisma margin methodology is based on a complete view of each Clearing Member's portfolio and takes advantage of cross-correlation effects and accounts for hedging. In this way, it determines the initial margin requirement on a portfolio level as opposed to a product-by-product view.

As the initial margin is a forward-looking margin component, it quantifies an estimate of future potential losses over the holding period of all Clearing Members' Liquidation Groups at a pre-defined and appropriate confidence level. The initial margin is calculated by taking into account potential correlation and netting effects for positions within a Liquidation Group. Initial margin figures for different Liquidation

Methodology overview



The methodology is designed for the adequate and stable computation of initial margin figures, thus creating a forward-looking risk model that is able to cope with a high degree of uncertainty in the financial markets and yet at the same time is sufficiently flexible to be able to adapt to changes in the risk environment.

The Eurex Clearing Prisma initial margin calculation is the result of a simulation-based, value-at-risk (VaR) methodology that uses

- Filtered historical scenarios
- Stress period scenarios
- Adjustments to account for correlation breaks, compression and illiquidity

Group splits and Clearing Member position accounts are then aggregated to a single margin amount.

The initial margin consists of two main subcomponents:

- Market risk
- Liquidity risk

Both components are calculated using profit and loss distributions for the Liquidation Group based on a set of different scenario prices for the underlying instruments.

Margin optimization for listed and OTC interest rates derivatives

Before calculating the individual margin components within the fixed income derivatives Liquidation Group, the Clearing House uses a Margin Optimizer process to determine the ideal portfolio structure by optionally combining fixed income and money market derivatives and IRS, thereby enabling cross margining. Fixed income derivatives (e.g. Euro-Bund Futures) and money market derivatives (e.g. EURIBOR Futures), which hedge the interest rate risk of the IRS positions, are allocated to the IRS Liquidation Group split which is correspondingly also called "IRS+FI split". This allocation aims to reduce the interest rate sensitivities of the IRS portfolio as far as possible. Some product types like tenor swaps are not considered for this allocation, as they are not generally sensitive to interest rates. The Margin Optimizer also ensures that based on this allocation no adverse effects from the increased liquidation horizon occur.

Market risk component

The pure market risk component, i.e. without the model adjustments, is calculated based on tail risk measures in the form of value-at-risk figures. It utilizes profit and loss distributions on a Liquidation Group split level that in turn uses historical and stress period scenarios.

Filtered historical scenarios

A set of 750 filtered historical scenarios is used to calculate potential profits and losses for every instrument cleared

by Eurex Clearing. The filtered historical scenarios are amongst others considering the following risk factors:

- Underlying settlement prices for all other instruments cleared
- Implied volatility surfaces
- Interest curves
- FX rates

The potential profits and losses shall cover the maximum loss that could occur during the holding period of a Liquidation Group. Therefore, these maximum levels are calculated for any instrument by applying 750 historical logarithmic returns of the underlying instrument over the respective holding period to its risk factors and revaluating the instrument leading to 750 different historical scenario prices. Instead of using a straightforward historical simulation, a filtered historical simulation is used to calculate the different scenario prices. The filtered historical simulation uses dynamic volatility modeling, where the levels of margin requirements are dynamically increased when market volatility increases. In practice this means that the historical volatility is replaced by the current volatility of the instrument because current volatilities exhibit highly accurate forward-looking properties and reflect the current market conditions.

All historical scenarios are updated on a daily basis with the latest risk factor returns and the new current price information available leading to a new set of 750 historical prices every day.

Stress period scenarios

In order to introduce a countercyclical margin component by taking into account periods of high financial distress

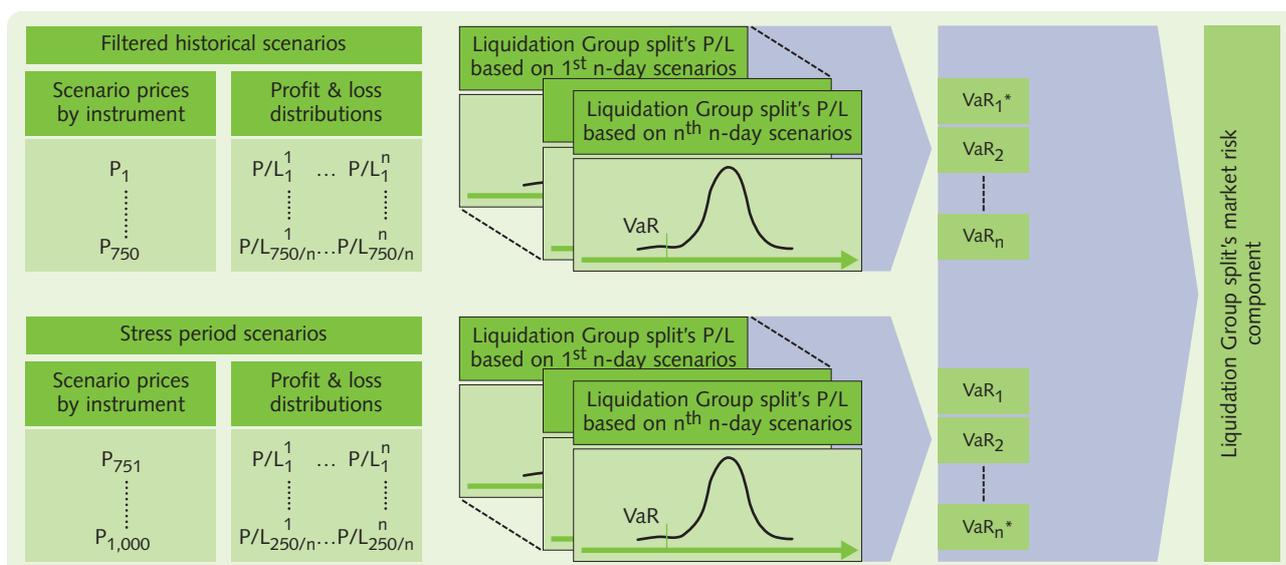
and extreme events, 250 stress scenarios are also used as input for the calculation of risk figures such as volatility, interest rates, etc. These scenarios are obtained by jointly simulating respective returns for all instruments of a Liquidation Group based on periods with exceptionally high fluctuations of the corresponding risk factors. In contrast to the calculation of historical scenarios, no filtering is used for the stress scenarios.

Subsamples

The scenario prices are divided into several subsamples to avoid artificial statistical effects resulting from overlapping time periods that would violate the assumptions of the calculated risk figures. Therefore each risk figure is calculated on scenario subsample level and subsequently aggregated to an overall risk figure. The number of subsamples depends on a Liquidation Group's holding period.

The graphic on page 16 illustrates how Eurex Clearing calculates the market risk component of a portfolio by applying filtered historical and stress period scenarios.

Overview – market risk calculation



* The maximum of the filtered historical scenario and the adjusted stress period scenario is considered.

Based on the scenario prices of the filtered historical and stress period scenarios, the profit or loss for each product is calculated by comparing the calculated scenario price to the current neutral price. The profit and loss figures for each product within a Liquidation Group are then aggregated for each scenario individually. Therefore, risk offsets within the Liquidation Groups are automatically considered.

Model adjustments

In order to mitigate model risk inherent in the calculation of the tail risk measures, three model adjustments are calculated and added to the pure market risk component:

- The correlation break adjustment completes the simulation for the worst-case breaks in correlation.
- The compression adjustment amends the simulation by pricing effects where a data compression approach has been chosen applicable to products which are sensitive to volatility.
- The Long Option Credit compensates a long option dominated portfolio and provides a credit in case the initial margin exceeds the premium margin.

Liquidity risk component

The liquidity risk component is designed to capture the potential additional costs when liquidating portfolios, including possible adverse price movements of the products cleared. The most important characteristics are listed below:

- The liquidity risk component depends on the relative size of the position. The liquidity risk component is a function of the position size and the total market capacity, which can be characterized by means of daily traded volume or open interest of a financial instrument.
- The liquidity risk component depends on the current level of market risk in the respective product, i.e. the higher the volatility of an instrument's price, the higher the premium.
- Even for small position sizes, the liquidity risk component is not zero. In reality, trading does not actually occur at mid prices, but at bid or ask prices. Therefore the minimum liquidity component is defined by the liquidity premium.

- Market capacities and liquidity risk components are product-specific and unevenly distributed across product subgroups, i.e. for options the market capacities and bid-ask spreads depend on their moneyness and time to expiry.

The illustration below shows the liquidity risk component's dependence on the position size and the market risk of three positions with different risk profiles. For all three positions the liquidity risk component is non-zero even for a small position size (i.e. on the left hand side of each graph) and grows with an increasing position size. The liquidity risk component for a position carrying a higher market risk increases at a faster rate relative to the liquidity risk component for positions with a smaller market risk.

Specific treatment for swaps products
Interest rate swaps are treated differently from other instruments due to

product specific requirements and market conventions. The liquidity risk adjustment is calculated by currency according to the expected transaction costs of the swaps required to hedge the Clearing Members' portfolio.

Cross margining allocation algorithm for interest rate derivatives

The cross margining allocation algorithm is based on the combination of IRS positions, fixed income and money market derivatives to offset interest rate sensitivities. This offset is calculated for each "maturity bucket" that assigns the instruments to the respective parts of the yield curve. So, for each maturity bucket, the appropriate number of futures and/or options on futures is calculated and – if such an amount is available – allocated to the IRS+FI Liquidation Group split.

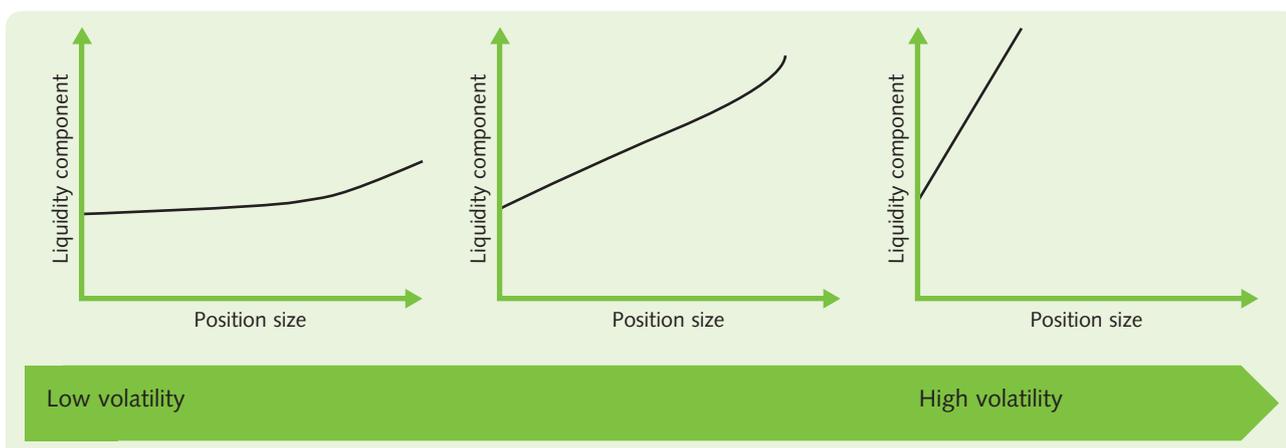
At each step, initial margin is calculated for both the IRS+FI and FI-only splits, before and after allocating the fixed

income and money market derivatives to the IRS+FI split. If the total initial margin of both splits is not reduced at this step, then the allocation is rejected and the algorithm continues with the next step. This procedure continues with each maturity bucket, working towards the shortest maturity bucket over time. In the first two maturity buckets⁴ of the euro curve, money market futures are considered. They are allocated to the maturity bucket in which their respective maturity falls.

The result of the cross margining affects two splits of the fixed income Liquidation Group:

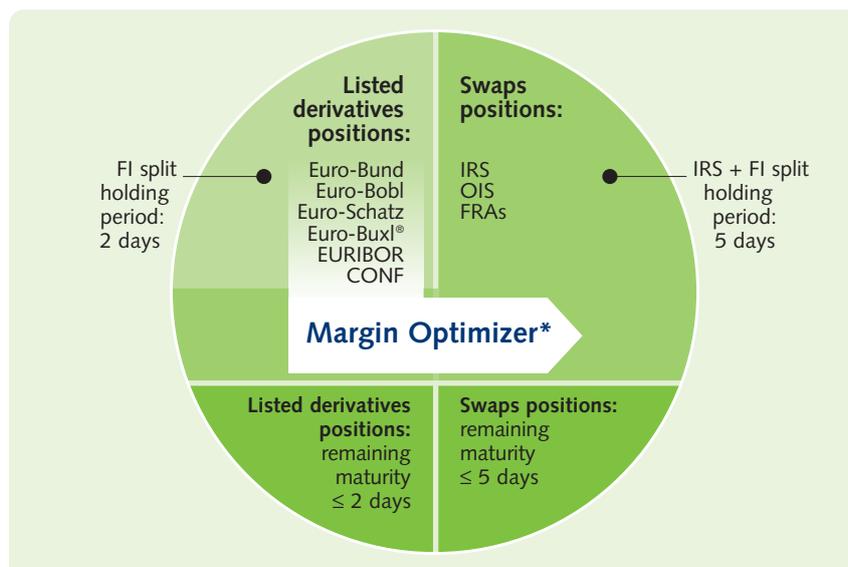
- One contains IRS, fixed income and money market positions that are margined using a 5-day holding period.
- A second one contains fixed income and money market derivatives only that are margined using a 2-day holding period.

Liquidity risk depictions



⁴ Please visit the Eurex Clearing Prisma User Guide or the Eurex Clearing Prisma Cross Margining User Guide, which are available on Eurex Clearing's website www.eurexclearing.com, for more detailed information about the applied maturity buckets.

Liquidation Group fixed income derivatives – potential splits & Margin Optimizer



* For the Liquidation Group fixed income a total of four Liquidation Group splits are available. The Margin Optimizer optionally associates listed derivatives positions with swaps positions, enabling collateral and margin efficiencies. Within each Liquidation Group split portfolio margin is applied.

as backward-looking components have been covered previously and are partly settled in cash on a daily basis.

The total initial margin component for a single Liquidation Group consists of the aggregated market risk components over all scenario subsamples, including the respective model adjustments and Liquidation Group specific liquidity risk components.

The value-at-risk figures for each subsample of the filtered historical and the stress scenarios are aggregated by taking the mean value-at-risk figures of the subsamples separately for the filtered historical and the stress scenarios, including the relevant model adjustments.

As illustrated, for the fixed income Liquidation Group a total of four Liquidation Group splits are available.

The IRS+FI split contains IRS positions across all currencies (EUR, CHF, USD, GBP, JPY) and the allocated EUR and CHF fixed income/money market derivatives. Hence, cross margining is only applied to combined positions denominated in EUR and CHF. The FI Liquidation Group split contains all remaining fixed income and money market positions.

Listed derivatives positions and swaps positions which mature within the respective holding period are allocated to separate Liquidation Group splits.

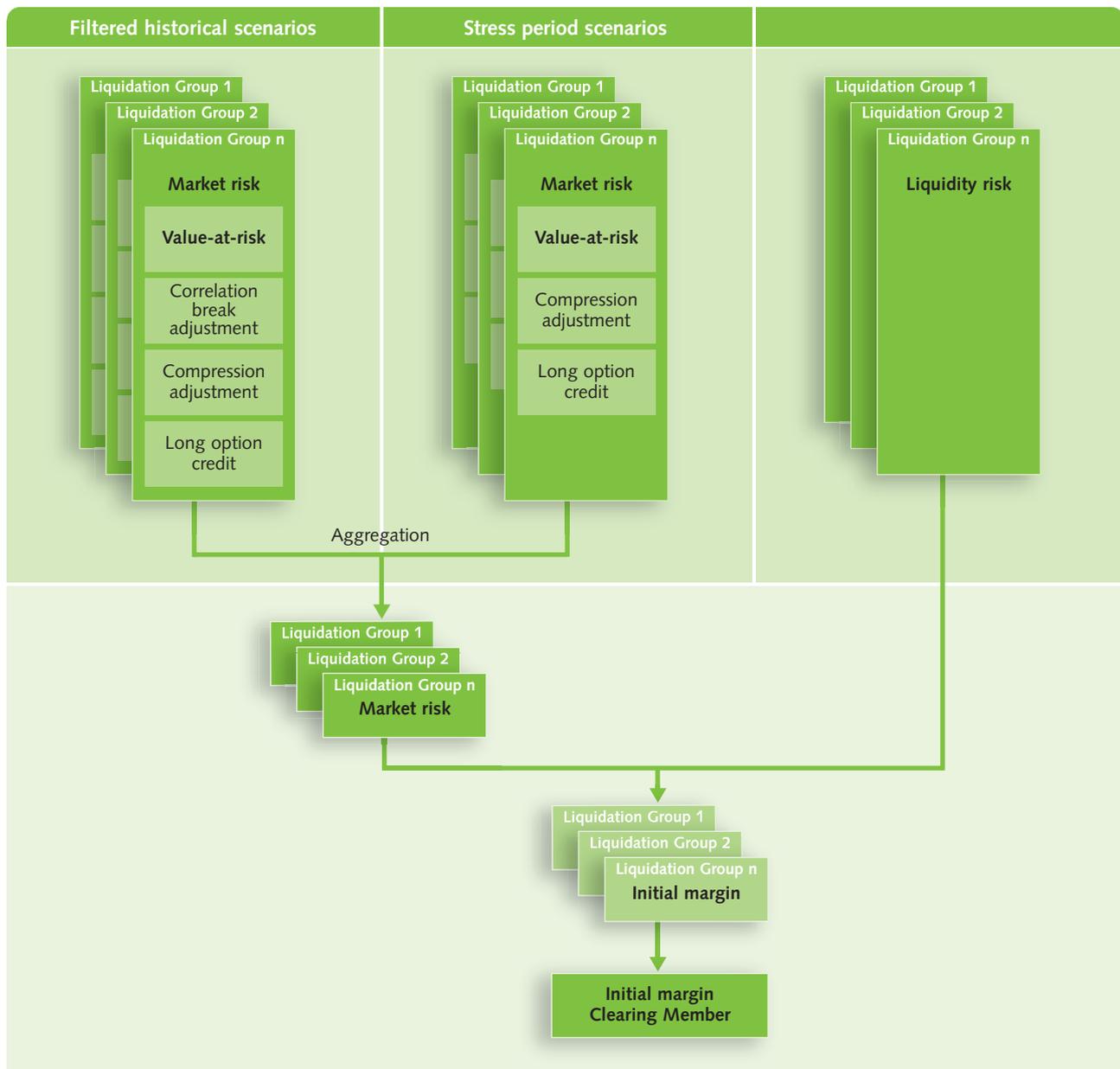
Aggregating forward-looking components

The Eurex Clearing Prisma methodology takes both backward- and forward-looking risk components into consideration in forming a complete risk picture. This section exclusively covers the elements of the forward-looking risk components – the initial margin –

The resulting two value-at-risk figures for the stress and the filtered historical scenarios need to be aggregated as well. This is done by taking the maximum of the filtered historical value-at-risk and a scaled stress value-at-risk. The scaling ensures the appropriate statistical confidence level of the stress value-at-risk.

The following table depicts how the initial margin for a Clearing Member is determined.

Initial margin calculation by Clearing Member and Liquidation Group



Aggregation

After the calculation of the two market risk components (filtered historical scenarios and stress period scenarios), the results from the two components are aggregated per Liquidation Group, such that the filtered historical component is floored by the scaled stress period component.

This calculation is performed for each Liquidation Group and the result can differ by Clearing Member and position

account, i.e. in one instance it can be the value from the filtered historical scenario and in another instance it can be the value from the stress period scenarios. The value selected will be the most favorable for the safety of the Clearing House and the marketplace.

Initial margin

The initial margin per Liquidation Group is determined by combining the market risk component with the liquidity risk component. This approach is followed

for each individual Liquidation Group that is contained within the Clearing Member's portfolio and is applied to an individual position account.

The consolidated initial margin for each Clearing Member results from the sum of all initial margin results by Liquidation Group.

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