



Haircut Model at NASDAQ OMX

Model Validation 2016



Current Version 1 from 17 January 2017

Executive Summary

NASDAQ OMX Clearing AB (“NASDAQ Clearing”) provides clearing and Central Counterparty (“CCP”) services. In order to prudently manage these services NASDAQ Clearing uses a large number of different models. This report is the validation of the Haircut Model used for establishing accurate value of pledged collateral. The purpose of a validation of models is to ensure the theoretical and empirical soundness of the models used by the CCP. This is an executive summary of the validation report. For detailed information see “*2016 Validation of Haircut model version 1.1.pdf*”.

From discussions with key personnel it is evident that the knowledge of the model is good and the risk of misconception in usage of the model when estimating haircut parameters is low.

There has been an improvement of the documentation of the methodology and there are better explanation of the models. However, further improvements are needed to improve the step-by-step calculation and assumptions.

The methodology is purely numerical and makes no assumptions on distribution. The drawbacks with all similar types of methodologies (as historical simulation) are that movements that have not happened cannot happen. This means that no matter how high the probability level is set on the numerical cumulative distribution it can never exceed the largest movements in the look back period.

There is however a lack of good alternatives. Not using historical movements would in essence decouple haircut parameters from reality which is clearly a bad thing.

This could be a problem for equities with low volumes and short time from introduction to today. Since NASDAQ Clearing only uses the larger equities as eligible for collateral this is less of a problem.

Interest rate products are valued using historical yield curves rather than the actual price movements of the individual products. This minimizes the challenge with short historical data on individual instruments. It should also be emphasized that this is a very nice way of avoiding the challenge of adjusting for interest rate instruments that moves in time when constructing time series.

The methodology has attached safety points to it to prevent low volatility periods (minimum haircut levels), high risk on individual credits (concentration limits) etc. These points regulate the usage of collateral thus preventing NASDAQ Clearing to find itself in an undesirable position when it comes to pledged collateral in case of a default.

It should for clarity be noted that no portfolio calculation is performed when deducting haircuts. This means that any observed historical correlation (or lack thereof) between different collateral instruments is not given credit for. The haircuts are simply estimated for one instrument at a time. This indicates that collateral portfolios that consist of a lot of different collateral instruments will be undervalued due to the lack of correlation effects. This further underlines the conservative calculations.

Moreover, the need to cater for extreme but plausible market conditions in haircuts (since the collateral handling is separated from derivatives in stress testing) has resulted in NASDAQ Clearing using very conservative assumptions on liquidation periods and confidence intervals when estimating haircuts.

NASDAQ Clearing controls collateral instrument price changes on daily basis and estimates haircut parameters on regular basis and changes to the environment of the model will quickly be picked up.

Area	Severity	Finding and Recommendation
Regulatory topics	Sign-off	With accordance with the regulation 648/2012 and the corresponding regulatory technical standards, the Haircut model is well adopted.
Documentation	Tentative Sign-off	Documentation needs further improvement. <ol style="list-style-type: none"> 1) The foreign exchange effect for foreign assets (equity, bond). The overall policy and management of cross foreign exchange effect needs further improvement. In addition, the step by step description of the model in this case. 2) The 25% buffer proxy, for interest rates bearing products, assumption is not clear. NASDAQ is recommended to improve the proxy data buffer level description. 3) The haircut calculation with buffer increase for proxy bonds. The step by step description needs further improvement. 4) The liquidity assumption. NASDAQ is recommended to clarify its view/description on liquidity risk of the underlying market.
Theoretical framework	Sign-off	The theoretical framework of the model is adequate. The long lookback period in combination with high confidence makes the model conservative.
Monitoring process	Sign-off	NASDAQ Clearing controls collateral instrument price changes on daily basis and estimates haircut parameters on regular basis and changes to the environment of the model will quickly be picked up.

Table 1: Overview of findings and recommendations

Severity	Criteria
Rejection	<ul style="list-style-type: none"> - Methodology is judged to be breach the purpose - Serious concern on certain elements of the approach and/or critical remedial actions required - Concerns must be addressed as soon as possible
Tentative Sign-off	<ul style="list-style-type: none"> - Methodology is judged to be generally appropriate and adequate for the intended purpose - However certain limitations which are of immaterial impact to the results are revealed during the model validation process, - Identified issues can easily be rectified within a reasonable period



	- Future analysis and monitoring need to be conducted during the next model validation projects.
Sign-off	- Methodology is judged to be appropriate and adequate for the intended purpose and in line with the relevant regulatory requirements and NASDAQ Clearing's policies

Table 2: Color code in order to read severity of recommendations

Recommendation

In addition to the recommendations above, NASDAQ is recommended to keep high confidence levels, 99.90% today, for the Haircut model as well as a long lock back period. Changes to these parameters should be carefully investigated bore implemented. For further information see *"2016 Validation of Haircut model version 1.1.pdf"*.

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