CCP Back Testing Applications and the Results

Takasbank Practice 2026-3

Central Counterparty Department

Halka Açık (Tasnif Dışı)

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Introduction

- In risk management, back-testing which is usually employed to assess the assess the measurement models' accuracy and performance, is used by CCPs to test the parameters in the collateral calculation models and haircuts applied to eligible collateral assets.

- It is compulsory for CCPs to back-test risk management models as per the CPMI-IOSCO principles and EU EMIR regulations. Similarly, in our country the Takasbank's obligation to check the authenticity and reliability of the risk models employed in CCP services through back-testing was introduced through the Central Counterparty Regulation, Article 45 .

Initial Margin Back-testing

- In the CCP-enabled markets the models employed in the calculation of initial margin and adequacy of confidence levels are analysed via back-tests executed on a daily basis by the Central Counterparty Division.

- In back-testing , it is controlled whether the initial margin required for the positions are large enough the to meet the change in the value of the position during the holding period in light of the confidence level and holding period assumptions that are utilized in initial margin calculation. The observations where the initial margin does not cover the change in value is referred as breach. In the back-testing period, the number of breaches are anticipated to be less than the number implied by the confidence level.

- The back-testing results of the models employed in initial margin calculation and if there is any, suggested measures are presented to Takasbank Board of Directors at least 4 times a year in March, June, September and December by internal audit divisions. The back-testing results shall be submitted to the CCP Risk Advisory Committee in June and December.

Account Based Back-testing

- In Derivatives Market (VIOP) the back-tests are conducted on a daily basis on all accounts with open positions. At the end of each day, it is checked whether the initial margin amount required for the relevant account is large enough to meet the change in value of the position in the account during holding period. For this purpose the positions in the account are valued at market prices in the following days (during the holding period) and the change in the value of positions is calculated. If this value is larger than the initial margin, it is acknowledged that there is a breach in the account. The change in values of the positions in the Derivatives Market (VIOP) is based on the change in the profit/loss arising from futures contracts and short option positions' values.

- The conditions whereby the maximum change exceeds the initial margin is acknowledged as "breach". Back-testing is performed for all the positions taken in the market on a daily basis and the excess numbers' ratio to the total number of observations is anticipated to remain at the confidence level utilized in the initial margin calculation.

Product Based Back-testing

- As gross collateral basis is applied in Securities Lending Market (ÖPP) in back testing an approach based on borrowed/ lent security is followed. For this purpose borrowing/ lending transactions are used on security basis. For a single day, the varied number of securities, which are subject of borrowing transactions, is the observation number for that day. The price changes in the borrowed/ lent securities during the holding period is acknowledged as breach if they exceed the initial margin requested for the related borrowing transaction. In Securities Lending Market, since initial margin and valuation process utilize weighted average price, in back-testing weighted average prices are used for borrowed/lent securities as well.

- Also, in Derivatives Market (VIOP) and Equity Market(PP) back-testing are performed. In this regard, it is tested through daily calculations whether the initial margin values requested for the contracts compensate for the price movements that they shall be exposed to in the course of the holding period.

- In the Debt Securities Market, back-testing is checked by comparing the change in theoretical prices that occur on a maturity basis at the end of each day during a 2-day holding period with the calculated initial margin value.

Money Market Back-testing

- In the Money Market, one and three month maturity transactions are made. In this context, a different approach to Securities Lending Market (ÖPP) and Derivatives Market (VIOP) has been adopted in backtest analyzes.

- According to this, the interest rate implied by the level of initial margin on the contract basis is calculated daily and then it is observed whether there is an interest rate change exceeding the amount of change calculated in the market.

SWAP Market Back-testing

- The SWAP Market back-test applies to foreign currency underlying assets traded in the SWAP Market.

- The back-test was conducted by taking into account the 2-day holding period of the exchange rate fluctuations in the USD and EUR data set for the test period

Haircut Back-testing

- Haircutsare back-tested on a monthly basis. Back-testing may be performed via indices, maturity and indicators that represent the collateral assets.

- In the event that breach is observed for more than two business days in average for the past one year period during the back-testing and this asset group’s haircuts have not been previously calibrated via multiplication factors, the haircuts is calibrated by reduction subject to the framework of the multiplication factors table. If the need to recalibrate arises for a previously calibrated asset group , the haircuts are recalculated.

Haircut Back-testing

Haircut (%) = 1 – (% Reduction multiple x Multiplication factor)

Aşım Sayısı	Çarpım Faktörü
2 ve daha az	1.00
3	1.20
4	1.35
5	1.5

In the event that breach is observed for more than 5 business days in the last year's valuation multiples , the utilized data set , confidence level and the model are reviewed.

Back-testing Results

2026-3

Central Counterparty Department

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Initial Margin Back-testing Results

Product Based Back-Test Results (Derivatives Market 2026-3)

	VİOP KONTRAT BAZINDA				
	Tüm Enstrümanlar	Pay Future	Döviz Future	Elektrik Future	Opsiyon
Toplam Gözlem Sayısı	316,051	38,812	7,900	743	265,403
Güven Düzeyi Uyarınca Kabul Edilebilir Aşım Sayısı	1580	195	40	4	1327
Aşım Sayısı	260	133	1	29	92

In the back-test for the period concerned the open contracts in the derivatives market (VIOP) are taken into consideration. In the daily calculation, breach has not been observed on contract basis.

Initial Margin Back-testing Results

Product Based Back-Test Results (Equity Market 2026-3)

	PAY PİYASASI KONTRAT BAZINDA					
	Toplam Paylar	BİST30*	BİST100-30	BİST DİĞER**	BİST GÖZALTI	VARANT
Toplam Gözlem Sayısı	160,683	12,975	17,413	124,570	3,779	752,784
Güven Düzeyi Uyarınca Kabul Edilebilir Aşım Sayısı	803	65	87	623	19	3764
Aşım Sayısı	1135	32	203	889	0	3465

The backtest shows that the breach rate in the Equity Market during the relevant period was above the confidence level used (99.5%). The total number of breaches during the period analyzed was 1135, which is more than the acceptable number of breaches (803) according to the confidence level used.

Initial Margin Back-testing Results

Maturity Based Back-Test Results (Debt Securities Market 2026-3)

	BORÇLANMA ARAÇLARI PİYASASI VADE BAZINDA						
	Toplam	ON*	1 M	6 M	1 Y	2 Y	5 Y*
Toplam Gözlem Sayısı	**2580**	258	516	516	516	516	258
Güven Düzeyi Uyarınca Kabul Edilebilir Aşım Sayısı	**13**	**1**	**3**	**3**	**3**	**3**	**1**
Aşım Sayısı	**0**	**0**	**0**	**0**	0	0	0

The backtest shows that the excess rate in the Debt Instruments Market during the relevant period was below the confidence level used (99.5%). The total number of excesses during the period analyzed was 0, which is less than the acceptable number of excesses (13) according to the confidence level used.

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Initial Margin Back-testing Results

Money Market Back-testing Results (2026-3):

	BİAŞ Para P. Gün Bazlı
Toplam Gözlem Sayısı	261
Güven Düzeyi Uyarınca Kabul Edilebilir Aşım Sayısı	1
Aşım Sayısı	0

The test results show that there is no change in the market interest rate exceeding the declared rates.

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Initial Margin Back-testing Results

SWAP Market Back-testing Results (2026-3):

	Toplam	SWAP Piyasası (USD)	SWAP Piyasası (EUR)	SWAP Piyasası (XAUEUR)	SWAP Piyasası (XAUUSD)	SWAP Piyasası (XAUTRY)
Toplam Gözlem Sayısı	1305	261	261	261	261	261
Güven Düzeyi Uyarınca Kabul Edilebilir Aşım Sayısı	10	2	2	2	2	2
Aşım Sayısı	12	0	0	5	5	2

Backtesting shows that the overshoot rate in the SWAP Market during the relevant period was above the confidence level used (99.5%).

Initial Margin Back-testing Results

OTC Market Back-testing Results (2026-3):

	OTC KONTRAT BAZINDA
Toplam Gözlem Sayısı	46,681
Güven Düzeyi Uyarınca Kabul Edilebilir Aşım Sayısı	233
Aşım Sayısı	117

Backtesting shows that the overshoot rate in the OTC market during the relevant period is below the confidence level used (99.5%).

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Haircut Back-testing Results

2025 Ekim - 2026 Eylül Teminat Değerleme Katsayıları Geriye Dönük Testi		**Teminat Değerleme Katsayıları**	**Aşım Sayısı**
DÖVİZ	*DOLAR*	90%	0
	EURO	89%	0
	POUND	89%	0
DİBS	*1 yıllık faize göre hesaplama yapılmıştır.*	94%	0
	5 yıllık faize göre hesaplama yapılmıştır.	81%	0
	10 yıllık faize göre hesaplama yapılmıştır.	79%	0
EUROBOND (USD)	*5 yıllık gösterge faize göre hesaplama yapılmıştır.*	89%	0
	10 yıllık gösterge faize göre hesaplama yapılmıştır.	89%	0
	30 yıllık gösterge faize göre hesaplama yapılmıştır.	88%	0
EUROBOND (EUR)	*5 yıllık gösterge faize göre hesaplama yapılmıştır.*	89%	0
	10 yıllık gösterge faize göre hesaplama yapılmıştır.	85%	0
	30 yıllık gösterge faize göre hesaplama yapılmıştır.	66%	0
PAY*	***1.Grup İçerisindeki Aşım Gerçekleşen Pay Sayısı:***	82%	11
	2		
	2.Grup İçerisindeki Aşım Gerçekleşen Pay Sayısı:	77%	0
	0		
	3.Grup İçerisindeki Aşım Gerçekleşen Pay Sayısı:	72%	0
	0		
ALTIN		88%	1
YATIRIM FONU*	***Aşım Gerçekleşen Hisse Senedi Şemsiye Fonu Sayısı:***		
	4	87%	16
	Aşım Gerçekleşen Borçlanma Araçları Şemsiye Fonu Sayısı:		
	7	96%	8
	Aşım Gerçekleşen Para Piyasası Şemsiye Fonu Sayısı:		
	1	98%	2

*1. Grup paylarında toplam aşım sayısının 76'yı, 2.Grup paylarında toplam aşım sayısının 66'yı, 3. Grup paylarında toplam aşım sayısının 58'i,toplam sayısı 193 olan hisse senedi şemsiye fonlarında aşım sayısının 386'yı, toplam sayısı 85 olan borçlanma araçları şemsiye fonlarında aşım sayısının 170'i ve toplam sayısı 83 olan para piyasası şemsiye fonlarında ise 166'yı geçmemesi teminat değerleme katsayılarında kalibrasyon ihtiyacının bulunmadığını göstermektedir.

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Thank you

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