

Cotter J. and F. Longin (2005) “Margin setting with high-frequency data” Working paper.

Both in practice and in the academic literature, models for setting margin requirements in futures markets classically use daily closing price changes. However, as well documented in the literature on high-frequency data, financial markets have recently shown high intraday volatility, which could bring more risk than expected.

The main contribution of the paper is to take into account the intraday dynamics of futures market prices in computing margin requirements. All previous academic studies considered daily closing prices only, thus missing important information. Indeed, for risk measures (as opposed to performance measures), it is beneficial to use data with the highest frequency in order to get more precise estimates. The intraday futures price movements are relied on in two ways. First, daily price movements defined using different time-intervals to define price changes (say from 3 pm to 3 pm on the following trading day instead of traditional closing times) are used to compute daily margin levels. Second, high-frequency 5-minute and 1-hour price changes are used to compute intraday margin levels that are then scaled to give daily margin levels.

The table below gives the margin level for a long position for a probability level of 99.60% or equivalently an average waiting time-period of 1 year. Different statistical models are used: three unconditional distributions (the Gaussian distribution, the extreme value distribution and the historical distribution) and a GARCH process. To define the price change, the starting time (which is equal to the ending time on the following day) varies from 9 am (opening of the market) to 5 pm (closing of the market). Data are price changes of the FTSE 100 future contract traded on LIFFE over the year 2000.

Margin levels based on daily price changes

Model	Open	10 am	11 am	12 pm	1 pm	2 pm	3 pm	4 pm	Close
Gaussian	3.54	3.30	3.21	3.29	3.16	3.45	3.28	3.11	3.48
Extreme value	3.83	4.29	4.15	3.35	3.32	2.84	2.54	3.32	3.59
Historical	3.59	3.39	3.41	3.01	3.01	3.10	2.71	3.31	3.45
GARCH	3.23	4.25	4.16	3.38	3.02	3.16	2.92	3.52	4.10

The table below gives the daily margin obtained with 5-minute price changes and 1-hour price changes and a scaling method. Margin levels obtained from daily price changes correspond to the average over the margin levels obtained with different time-intervals.

Daily margin levels based on 5-minute, 1-hour and 1-day price changes

Model	Frequency of price changes		
	5 minutes	1 hour	1 day
Gaussian	4.95	4.00	3.31
Extreme value	4.48	4.12	3.47
Historical	Na	na	2.90
GARCH	4.36	3.44	3.53

Our empirical results emphasize the impact of the intraday dynamics of futures market prices on computing daily margin levels. These empirical results show significant differences from the usual way to define margin levels as margin levels defined with different time-intervals or based on high-frequency data present significant differences. This shows the impact of the intraday dynamics with implications for being aware of the risk of the existing method and for defining margin levels in a different way.