

# INVESTMENT BANKING: FUTURES-VARIATION MARGIN CALCULATIONS ON THE BOND PORTFOLIO

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**Abstract-**Future contract is a legal agreement between two parties to buy and sell a particular asset of specific quantity at a pre-determined price, on a specified date in future, standardized to facilitate trading on a futures exchange depends on the underlying asset being traded. The computation of variation margins from the perspective of broker and investment management firms differ due to former following actual basis and latter contractual basis. The variation calculation plays a pivotal role in reconciliation of a portfolio and affects the market value and Net asset value of a portfolio. It can create discrepancies resulting a huge impact on the performance of the fund. This paper is an attempt to emphasis the calculations at the practical level to ensure there is smooth flow in operations of an investment banking firm assisting the reconcilers and managers in case of technological failure.

**Key Words:** Variation margin, Futures, Mechanism, Positions and Mark to Market (MTM)

## 1. INTRODUCTION

Investment is the application of present resources which have been saved or put aside from current consumption in the hope that some benefit will occur in the future. It is the decision activity that commits funds at present in financial assets with an expectation of receiving additional return in the future. Financial assets are those which will generate future returns. Portfolio refers to the combination of various financial assets like stocks, bonds, cash equivalent etc held by an individual or an organisation with an objective of maximum returns by diversification.

Bonds refer to a debt instrument which is issued by the financial institutions to finance various projects and activities. The financial institution issuing the instrument is known as issuer and the party buying the same is known as bond holder. It is a debt agreement promising to repay the money after definite period of time during which a fixed rate of interest is paid to the holder by the issuer. They are also known as fixed income securities and are one of the three major asset classes along with stock and cash equivalents in the organised markets. Portfolio refers to the combination of various financial assets like stocks, bonds, cash equivalent etc held by an individual or an organisation with an objective of maximum returns by diversification.

Futures are the financial contracts creating an obligation to the buyer to buy an asset or seller to sell an asset, such as physical commodity or a financial instrument at a pre-determined price and specified future date. It is one of the derivatives to hedge the risk associated with the volatility of prices. Future contract is a legal agreement between two parties to buy and sell a particular asset of specific quantity at a pre-determined price, on a specified date in future, standardized to facilitate trading on a futures exchange depending on the underlying asset being traded. Futures facilitate in hedging the commodity by transferring the risk of price to the speculators.

Managed future funds should be permitted to take position in the derivatives market without having any exposure in the cash market. Also, FIIs intending to invest funds in the cash market should also be permitted to take long position in the futures market to hedge their transactions. Stock futures encourage speculation in the capital market and with speculation being an integral part of the market; the popularity of the product is not a surprise.

Clearing refers to the procedure through which a clearing house becomes the buyer to each seller of a futures contract and the seller to each buyer, and assumes the responsibility of ensuring that each buyer and seller performs on each contract. The participants in the futures market are broadly grouped into investors, speculators, arbitragers and hedgers. The mechanism of futures contract is very organised and efficiently performed.

### 1.1 Participants

Futures market comprises of below participants from the functionality perspective. Fig. 1.1 reflects the networking of the various participants in the futures market where the members, authorised brokers and clearing houses play a pivotal role as they connect with investors who are the official clients of an investment banking firm.

#### 1.1.1 Investors

The participant who views futures market as alternative cash market for investment.

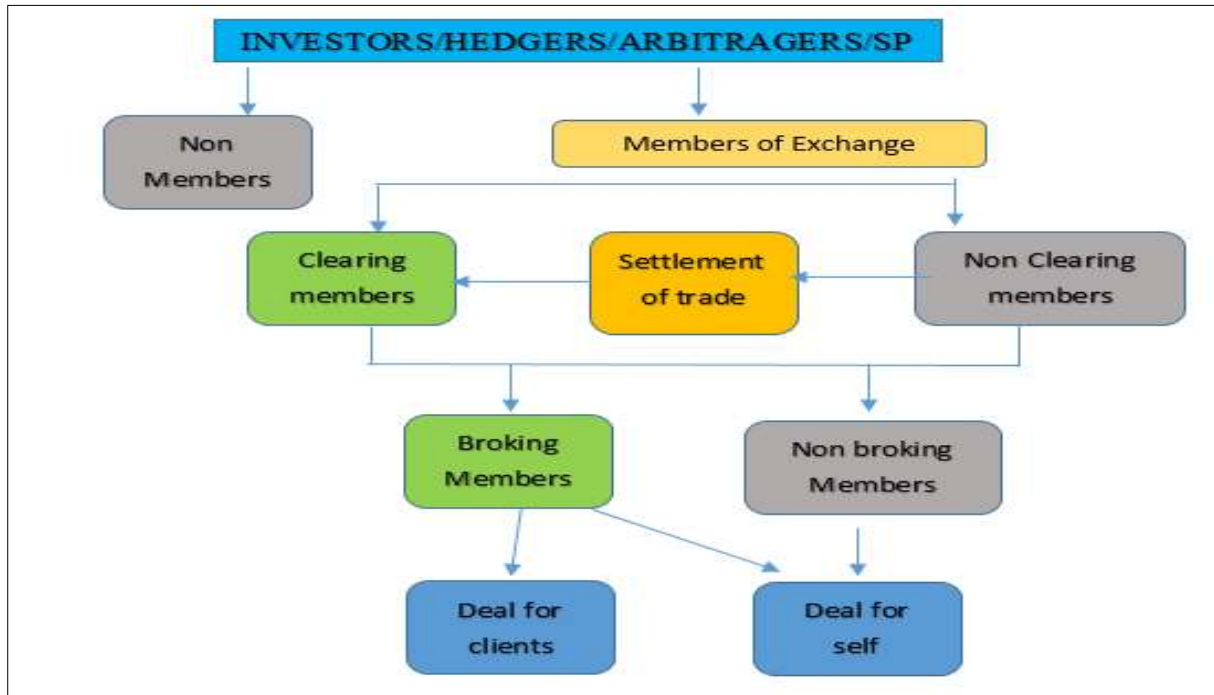


Fig 1.1 Participants in Futures Market

### 1.1.2 Hedgers

The participants who have exposures in cash markets and curb their risk by taking the opposite positions in the futures market.

### 1.1.3 Arbitragers

The participants who take the advantage of the difference in prices in different or similar markets for the profit motive.

### 1.1.4 Speculators

The participants who focus on gain from price movements in the market.

## 2. COMPONENTS

The components of the investment banking firm with respect to future contracts plays a pivotal role in trading the same on the futures market and customize accordingly to the needs for the investors. The important components are briefed as below.

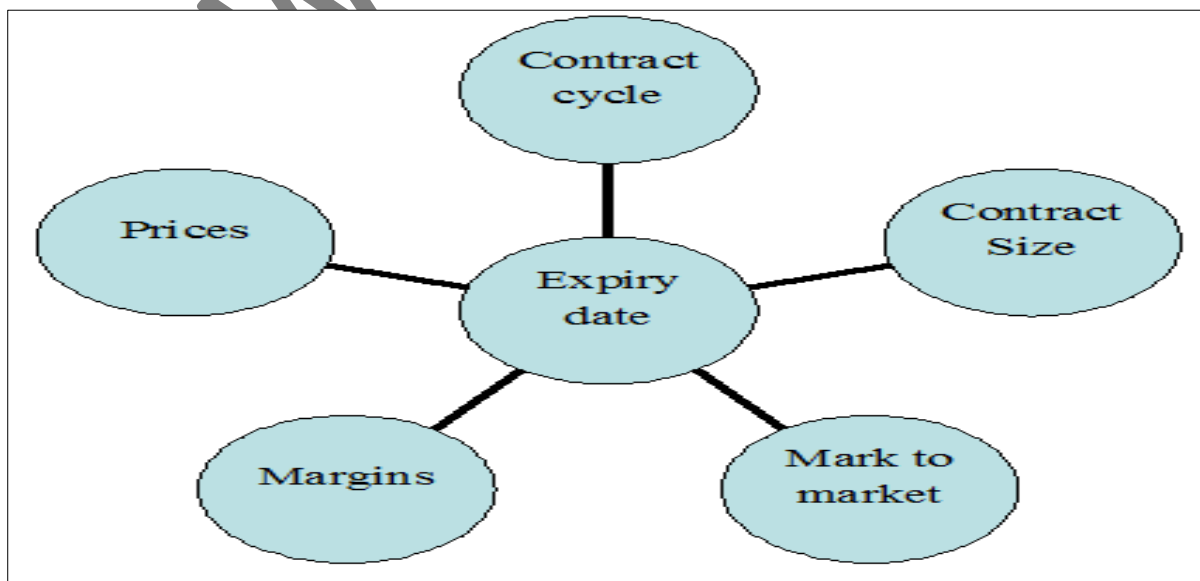


Fig. 2.1 Terms in Future Contract

Fig. 2.1 depicts the various terminologies used in a future contract which are very essential for understanding the process and to relate the concepts of futures.

### 2.1 Contract Cycle

Futures contract expires in terms of 1 Month, 2 months or 3 months. If the parties don't wish to settle the contract then the same can be rolled over for next cycle as per the contract terms.

### 2.2 Prices

#### 2.2.1 Spot Price

The price at which underlying asset is traded in the spot market

#### 2.2.2 Future Price

The price which is agreed upon at the time of contract for the delivery of an asset at a specific future date.

### 2.3 Expiry Date

The date on which final settlement of contract takes place.

### 2.4 Contract Size

The amount of asset that has to be delivered under one contract.

### 2.5 Mark to Market

At the end of each trading day, the margin account is adjusted to reflect the investor's gain or loss depending upon the futures closing price.

### 2.6 Margins

#### 2.6.1 Maintenance Margin

Investors are expected to maintain minimum margin with in their futures account before they trade. If the balance amount falls below the maintenance margin then the investor receives a margin call for the difference between initial margin and maintenance margin.

#### 2.6.2 Initial Margin

The amount that must be deposited in the margin account at the time a futures contract is first entered.

Imagine an onion producer plans to produce 100 Kgs of Onions ready for delivery in exactly 365 days. Assume the current price is \$50 per kg. The producer could take a gamble, produce the onions, and then sell it at the current market prices one year from today. Given the volatility of onion prices, the market price at that time could be at any level. Instead of taking chances, the onion producer could lock-in a guaranteed sale price by entering into a futures contract. A mathematical model is used to price futures, which takes into account the current spot price, the risk-free rate of return, time to maturity, storage costs, dividends, dividend yields and convenience yields. Assume that the one-year onion futures contracts are priced at \$53 per kg. By entering into this contract, in one year, the producer is obligated to deliver 100 Kgs of Onions and is guaranteed to receive \$53 per Kg. The \$53 price per kg is received regardless of where spot market prices are at the time. Daily profit or loss will be the variation margin.

## 3. POSITIONS HELD

Futures contract comprises of different positions held by the investor (buyer or seller) from the trade point of view as below.



Fig 3.1 Types of Positional Trades in Futures Contract

Fig. 3.1 shows the various positions held by the investors with respect to their portfolios on their future contracts based on the buying or selling activity undertaken by their portfolio managers through the authorised brokers.

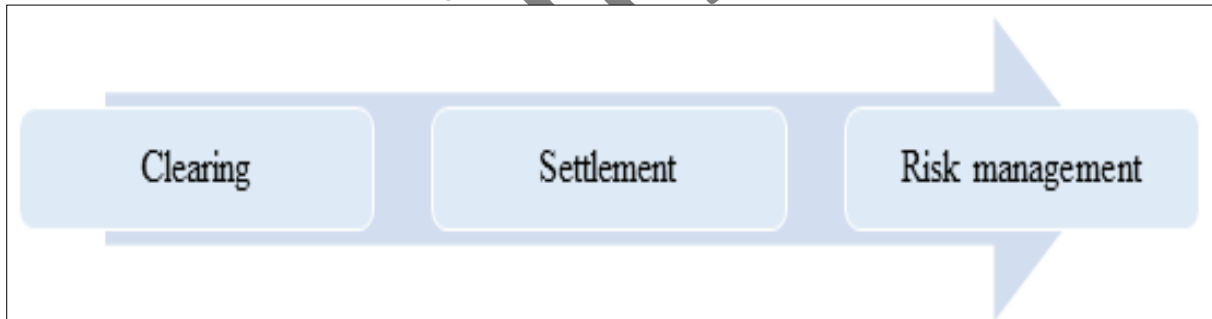
- **Sell long:** It is the process of buying the contracts with lowest price with an intension of selling them at a higher price.
- **Cover short:** It refers to the purchase of the exact same number of futures contracts that was initially sold short in order to execute the sell short trade.
- **Sell short:** It is an attempt to sell the future contracts when you actually don't hold any anticipation of profit from the downward price movement.
- **Buy:** It means purchasing a specific number of contracts of futures to hold for hedging.

#### 4. MECHANISM

The underlying asset can be commodity, currencies, stock, interest rates and bonds. Future contracts are traded only on futures exchange regulated by. The exchange performs the job of facilitator between the parties to complete the trade. Investors are expected to maintain minimum margin in their futures account before they trade as the futures prices are bound to change daily. If the balance amount falls below the maintenance margin then the investor receives a margin call from the exchange broker instructing to deposit the difference between initial margin and maintenance margin. In case of vice versa situation, broker will credit the excess amount to the investor's future account. The daily loss or gain in the futures account is known as variation margin that gets credited (positive difference) and debited (negative difference) to the futures account. The profit/loss on the trades with respect to cover short and sell long types will also have spawned variation margin along with daily variation margin.

#### 5. CLEARING AND SETTLEMENT PROCESS

Clearing is a fundamental benefit in the futures markets. Long before a trade is cleared through a clearing house, clearing firms check the financial strength of both parties to the trade, whether they are a big institution or an individual trader. They also provide access to trading platforms, where the buyer and seller agree on the price, quantity and maturity of the contract. The clearing and settlement process in the financial derivatives comprises of three stages. The settlements of transactions in terms of cash and stock exchanges between the parties of buyer and seller at the national or continent level. European countries rely on Euro clear, India relies on National clearing house etc. In case on non-settlement then the trade results in fail. They are as below:



**Fig. 5.1 Stages in Settlement Process of Futures Contract**

Fig. 5.1 reflects the stages involved in the settlement process of the futures contract consisting of clearing, settlement and risk management which shows the standardization of the futures market.

- **Clearing:** The clearing process comprises of computing the open positions and obligations of clearing members. This can be done only when the open positions of all the trading members are aggregated. The trading members open positions are arrived by aggregating their client's and proprietaries open positions.
- **Settlement:** The future contracts are settled through exchanges by clearing houses. The contracts of each member is marked –to-market (MTM) to the daily settlement price of the relevant futures contract at the end of each day. Daily MTM settlements of profits or losses are based on the closing price of the futures contract which is T+1 day (Traded date + 1 day). The final settlement is effected for expiry of contracts and the process is similar to daily MTM settlement. The final settlement price is the closing value of the index/underlying security on the expiry day.
- **Risk Management:** A comprehensive risk containment mechanism has been designed for the derivatives segment. The risk containment mechanism for the derivatives segment essentially comprises the margining system and system of on-line position monitoring. When the contract is cleared by matching these offsetting (one buy, one sell) positions together, the clearing house guarantees that both buyer and seller get paid. This offsetting or “netting” process takes risk out of the financial system as a whole.

## 6. CODES AND DESCRIPTION APPLIED

Most of the Futures contracts codes are four characters. The first two characters identify the contract type, the third character identifies the month and the last character is the last digit of the year. Some of the examples like CLX0 is a Crude Onions (CL), November (X) 2010 (0) contract.

**Table-6.1 Delivery Month Codes for Settlement of Futures Contracts**

1 <sup>st</sup> Quarter		2nd Quarter		3rd Quarter		4th Quarter	
Months	Codes	Months	Codes	Months	Codes	Months	Codes
January	F	April	J	July	N	October	V
February	G	May	K	August	Q	November	X
March	H	June	M	September	U	December	Z

Source: Investopedia

Usually the futures contracts in the market gets rolled over for a cycle of 3 months instead of being settled for the reason of receiving the benefits of hedging and price changes expected by the investors. The description of the contract comprises of the month during which quarter the contract is traded in the market with corresponding alphabet representing the respective month.

**Table-6.2 Examples of Commodity Futures**

CL	Crude, light onions	GC	Gold
HU	Unleaded gasoline	HO	Heating Onions
NG	Natural gas	RB	RBOB Gas

Source: Investopedia

Table 6.2 reflects some of the examples of commodity futures having their description alphabets while being traded on the futures market and these descriptions remain constant.

**Table-6.3 Examples of EURO Contracts Description**

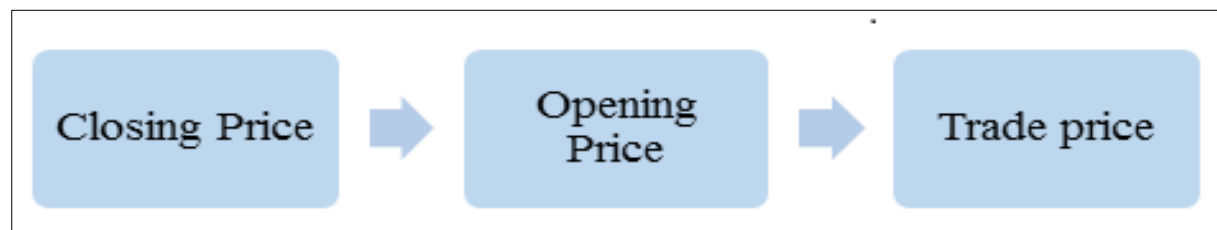
Description	Contract letters
BOBL	OE
BUND	RX
SCHATZ	DU

Source: Investopedia

The table 6.3 reflects the description with contract letters used for the futures as an example of European market.

## 7. PRICES USED IN CALCULATION OF VARIATION MARGIN

Variation margin in the futures contract is calculated on the basis of three types of prices which play a pivotal role in deciding the profit gained or loss incurred in the futures account due to daily price movements in the market.



**Fig. 7.1 Types of Prices Applied in Futures Contract for Calculation of Variation Margin**

Fig. 7.1 shows the different prices involved while calculating the variation margin comprising of spawned variation margin and daily variation margin.

- **Opening Price:** The price at the beginning of the day when the market is open for trade which and also the closing price of the previous day.

- **Closing price:** The price at the end of the day when the market gets closed for the day.
- **Trading price:** The price which is quoted in the market when there is trade executed in the form of buy or sell.

The below is the example of Bloomberg screen shot of price chart on the Euro contract RXM3.



GRAB

CLOSE/PRICE Page 1/4 Historical Price Table

RXM3 EURO-BUND FUTURE Jun13 PRICE 143.30

Range 09/07/2012 - 03/13/2013 Period Daily Market Mid/Trd High 143.88 on 12/ 7/12 Avg 142.03 Low 139.62 on 1/30/13

DATE	PRICE	Yield	DATE	PRICE	Yield	DATE	PRICE	Yield
F 2/22	141.78	1.475	F 2/ 1	140.19	1.615			
T 2/21	141.55	1.496	T 1/31	140.08	1.625			
W 3/13	143.30	1.344	W 2/20	140.60	1.579			
T 3/12	143.04	1.366	T 2/19	141.00	1.544			
M 3/11	142.72	1.394	M 2/18	140.94	1.549			
F 3/ 8	142.46	1.416	F 2/15	140.52	1.586			
T 3/ 7	142.83	1.384	T 2/14	140.76	1.565			
W 3/ 6	143.25	1.348	W 2/13	140.23	1.612			
T 3/ 5	143.21	1.351	T 2/12	140.72	1.569			
M 3/ 4	143.67	1.312	M 2/11	141.03	1.541			
F 3/ 1	143.67	1.312	F 2/ 8	141.00	1.544			
T 2/28	143.15	1.357	T 2/ 7	140.99	1.545			
W 2/27	143.24	1.349	W 2/ 6	140.72	1.569			
T 2/26	143.05	1.365	T 2/ 5	140.37	1.599			
M 2/25	141.68	1.484	M 2/ 4	140.81	1.561			

Australia 61 2 5777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2577 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2013 Bloomberg Finance L.P. SH 846536 6672-253-0 13-Mar-13 17:49:28 187 GMT+5:30

Source: Bloomberg

Fig. 7.2 Example of Bloomberg Price Chart Screen Print

Fig. 7.2 shows the closing or historical prices of the contract RXM3 (European contract) for various days.

## 8. CALCULATION OF VARIATION MARGIN

Daily variation margin is calculated daily due to price movements of the contracts. These formulae are applied from the investment banking perspective. The authorized broker reflects the mark – market and profit or loss on the contracts based on the trades and price changes in their daily statements.

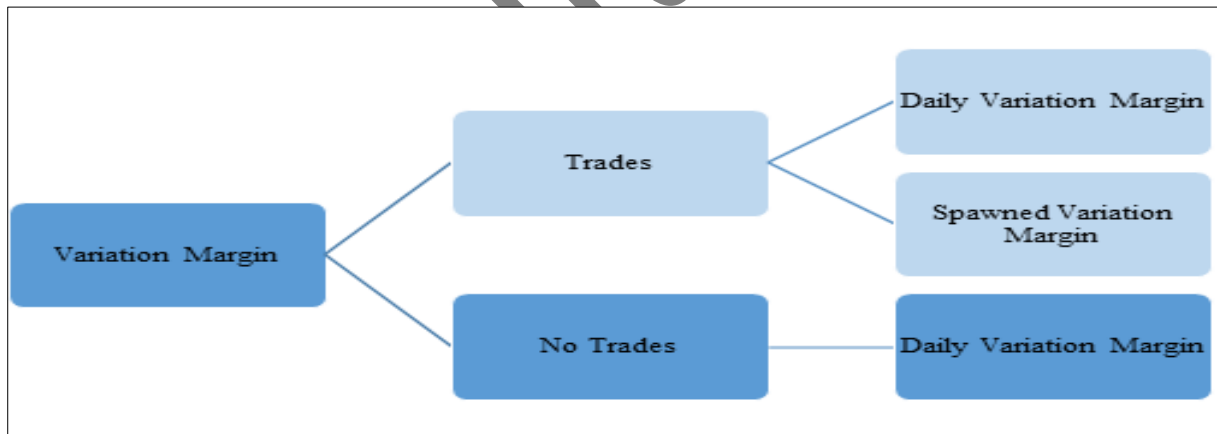


Fig. 8.1 Types of Variation Margin

Fig. 8.1 reflects the types of variation margin calculated based on the type of trades executed which results in either daily variation margin or spawned variation margin.

- **No trades:** The daily profit or loss can be obtained by calculating the difference in prices of the contract. This formula remains same for irrespective type of position held by the investors on any given day. The day when there is no change in the closing and opening price, daily variation margin reflects zero.

$$\text{Variation Margin} = \text{No of contract} * \text{Difference in Price} * \text{Ticker value}$$

- Difference in price = Closing price – Opening price
- Ticker value is the lot size of each contract traded in the market and the same can be obtained from third party source like Bloomberg, Euroclear etc.

- **ii Trades:** There will be two types of variation margins (Daily variation margin & spawned variation margin) on the contract when there is trade executed on the contract.
  - **Daily Variation margin:** It is calculated on the contract for the profit/loss due to change in closing and opening price. Difference in price remains same as above.
  - **Spawned variation margin:** It is the additional profit or loss apart from daily on the futures account due to contracts purchased by the investor with an objective of selling the contract. Hence it is applicable only on sell long and cover short trades.

**Table-8.1 The Formulae for Difference in Price During Different Types of Position Held on Account of Trades in Futures Contract**

Position Held	Difference in Price
Sell long	Trading price – Closing price
Cover short	Trading price – Closing price
Buy	Closing price – Trading price
Sell short	Closing price – Trading price

Source: Investopedia

Here is an example calculations from the investment banking company and broker perspective to match the reconciliation at the back end operations.

### 8.1 Investment Banking (Accounting System)

Investment banking firm always reflects the accounting data on the contractual basis to estimate the cash forecasting to ensure smooth flow in the investment decisions made by the portfolio managers. Daily variation margin, spawned variation margin are calculated for each contract type as per the lot which they belong to when traded. Multiplier is another term used for ticker value.

**Table-8.2 The Variation Margin Calculated from the Investment Bank Perspective Accounting System**

No. of Contracts	Security	CP (29 Nov 2013)	TP (29 Nov 2013)	Difference ( CP-TP)	Multiplier	VM
-5	OEZ3	125.30	125.29	0.01	1000	(50.00)
		OP (28 Nov 2013)	CP (29 Nov 2013)	CP-OP	Multiplier	VM
-11	OEZ3	125.28	125.3	0.02	1000	(220.00)
					<b>Total VM</b>	<b>-270</b>

Source: Bloomberg and Euroclear

Table 8.2 shows the calculations of the variation margin from the investment banking firm's accounting system perspective for two different contracts. Future contracts are always traded in lots with specific number of contracts. Each time there is a trade executed, there will be impact on the lot which it is traded on. The above example in the table has taken contract namely OEZ3. The first trade with a lot having 5 contracts which means sell short and hence its negative number of contracts, hence the price difference is between closing price and trade price. Likewise the second value with negative 11 is the number of contracts already in the account before sell short of 5 contracts. Since there was no change with the lot of 11 contracts, the difference in price is just the closing price and opening price. The total VM is the sum of the VM of the individual lots and hence the final variation margin in this example is negative 270.

### 8.2 Broker statement

The accounting system practised by the broker is on the actual basis where the transactions are recorded with immediate effect as soon as they have occurred to ensure real time data reflection for their decision making during trading of the contracts. They maintain the record in the form of statements reflecting various future contract details like name, price, number of contracts, margin call, trade (buy or sell) etc.

ACCOUNT NUMBER: 523 34250									
STATEMENT DATE: Nov 26, 2013									
<b>JOURNAL ENTRIES</b>									
NO ACTIVITY									
<b>CONFIRMATION</b>									
NO ACTIVITY									
<b>PURCHASE &amp; SALES</b>									
NO ACTIVITY									
<b>SECURITIES ON DEPOSIT</b>									
NO SECURITIES ON DEPOSIT									
<b>OPEN POSITIONS</b>									
Trade Date	Settlement Date	Long	Short	Contract Description <sup>1,2</sup>	Price	Market	Balance Type	CCY	(Debit)/Credit
Sep 04, 2013			11	OEZ3 Comdty DEC 13 EURX EUR-BOBL	122.970	EUREX		EUR	(25,410.00)
				SETTLEMENT PRICE	125.28000000			EUR	(25,410.00)
			11	Average Short:	122.970000				

Source: Goldman Sachs Website

Fig. 8.2 Broker Statement of the Contracts Held and Traded as on 28<sup>th</sup> November, 2013

ACCOUNT NUMBER: 523 34250										
STATEMENT DATE: Nov 29, 2013										
<b>Daily Statement</b>										
<b>JOURNAL ENTRIES</b>										
NO ACTIVITY										
<b>CONFIRMATION</b>										
The Following Trades Have Been Made Or Accepted This Day For Your Account And Risk										
Trade Date	Settlement Date	Buy	Sell	Contract Description <sup>1,2</sup>	Price	Market	Executing Broker	Balance Type	CCY	(Debit)/Credit
Nov 29, 2013			5	OEZ3 Comdty DEC 13 EURX EUR-BOBL	125.290	EUREX	GOLDMAN SACHS		EUR	
			5	Average Short:	125.290000			Commission	EUR	(7.50)
<b>PURCHASE &amp; SALES</b>										
NO ACTIVITY										
<b>SECURITIES ON DEPOSIT</b>										
NO SECURITIES ON DEPOSIT										
<b>OPEN POSITIONS</b>										
Trade Date	Settlement Date	Long	Short	Contract Description <sup>1,2</sup>	Price	Market	Balance Type	CCY	(Debit)/Credit	
Sep 04, 2013			11	OEZ3 Comdty DEC 13 EURX EUR-BOBL	122.970	EUREX		EUR	(25,630.00)	
Nov 29, 2013			5	OEZ3 Comdty DEC 13 EURX EUR-BOBL	125.290			EUR	(50.00)	
				SETTLEMENT PRICE	125.30000000			EUR	(25,680.00)	
			16	Average Short:	123.695000					
Sep 04, 2013		14		RXZ3 Comdty	137.78	EUREX		EUR	55,020.00	

Source: Goldman Sachs Website

Fig. 8.3 Broker Statement of the Contracts Held and Traded as on 29<sup>th</sup> November, 2013



**Table-8.3 The Calculation of Variation Margin From Broker's Statement Perspective**

Particulars	Daily Profit/Loss	Traded Gain/Loss	Total
28-Nov-2013	(25,410.00 )	Nil	(25,410.00 )
29-Nov-2013	(25,630.00 )	(50.00 )	(25,680.00)
		Difference	(270)
		Variation Margin	<b>(270)</b>

Source: Bloomberg

Table 8.3 represents the calculation of variation margin from the broker's accounting data. Broker reflects on the actual basis of settlement of transactions as per the clearing houses. He reflects the open position held in terms of number of contracts and prices available in that portfolio as on given date. Journal entries shows the margin call if any on that portfolio. Confirmation in the broker statement is the number of trades booked or traded on that portfolio as on given day. The daily profit or loss is also reflected to show the additional benefit received on the contract in that portfolio due to daily price movements. He collects minimum charges for every trade which remains fixed in terms of respective contract on the basis of currency in which the contract is traded.

## CONCLUSION

Futures is one of the important components of derivatives market. It is also one of the most sought by investors and speculators for hedging and profit making. Futures can be traded with stock, currency, and commodities etc as an underlying assets. Clearing houses provide clearing and settlement services for futures traded at an exchange. They act as the neutral counterparty between every buyer and seller, ensuring the soundness and integrity of every trade. The calculations of variation margin from the management of books of accounts plays an important role in reconciliation or operations in an investment banking firm. Most of the firms have their customized accounting systems embedded with technology and business process re-engineering abilities. However technology always has the other side of its coin. The manual calculations or knowledge at the root level plays a major role in managing business crisis or business continuity planning. Hence here is an attempt to overcome the technological failure and provide an insights of practical knowledge. This paper is an attempt to overcome the technological failure so that the reconciliation level must be aware of the manual calculations. Also it reflects how exactly the future contracts operate in the area of investment banking firm at the operational level though there are accounting softwares to track the variation margin. Generally, the accounting softwares gets updated with the help of batches which are run at regular intervals importing the data from various sources. In case of any technological issues, when the batch fails to run at the scheduled time then this manual calculations comes to rescue to continue the reconciliation and also to send various reports to the concerned authorities.

## REFERENCES

- [1] Vedapradha.R and Hariharan Ravi. 2016. "Bonds Reconciliation of entitlement of shares in investment banking". International Journal of Advances in Management and Economics, Vol 5.Issue 6.
- [2] Michael Marien 2002. "Futures studies in the 21<sup>st</sup> century: a reality based view". Science Direct Elsevier, Vol 34. Issue 3-4.
- [3] John.B.Robinson. 1990. "Futures under glass: A recipe for people who hate to predict". Science Direct.Elsevier, Vol 22.Issue 8.
- [4] Louis.H.Ederington. 1979. "The hedging performance of the new futures markets". The journal of American Finance Association, Vol 34, Issue 1.
- [5] Bazerman MH and Gillespie II. 1999. "Betting on the future: The Virtue of contingent contracts". Harvard Business Review.
- [6] Leland L. Johnson. 1960. "The theory of hedging and speculation in commodity futures". The review of economic studies.Vol 27.Issue 3.
- [7] Gerald .D. Gay et.al. 1986. "A comparative analysis of futures contract margins". Journal of futures markets.Vol 6.Issue 2.
- [8] Kenneth .D Carbade and William L. Silber. 1983. "Cash settlement of future contracts: An economic analysis". Journal of futures markets Vol 3 Issue 4.
- [9] Wee chingpok and Sunil poshakwale. 2006. "The impact of the introduction of futures contracts on the spot market volatility: the case of Kuala Lumpur stock exchange". Journal of applied financial economics. Vol14. Issue 2.
- [10] BahramAdrangi and ArjunChatrath. 1999. "Margin requirements and futures activity: Evidence from the soyabeanand corn markets". Journal of futures markets.Vol 19.Issue 4.