BitShares 2.0: Market Mechanics

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***Abstract*—Abstract**

1 Introduction

2 Order Matching

When we were planning Graphene one of the features we wanted to have was "market orders" - user specifies only amount and buy or sell order executes at current market price. So in Graphene order can be executed in the same block it's placed and also it can be marked as "fill or kill" - this makes market orders much easier to implement. Now we only need to add simple buy/sell/short form to the GUI where user can specify amount, click Place button, agree with price and confirm.

3 Margin Trading

In essence, *margin trading* denotes the act of *trading with borrowed funds instead of your own*. To prevent misuse, institutes that offer margin trading require enough *collateral* for these loans to be put aside such that debts to lenders can be settled in any case.

3.1 Terminology

In this paper we distinguish between

long positions that hold an actual asset,

borrowed positions that received a market pegged asset (e.g. bitUSD) for a collateral and

short positions that sold the borrowed asset at the market leaving the trader only with the locked collateral.

A margin call is when your collateral is sold to the market automatically to prevent further loss and ensure you do not default on your loans. Margin calls are executed using one or more market orders; as such, order book liquidity at the time of these orders will affect the extent of the losses you incur from the liquidation.

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3.2 Price Feed/Settlement Price

The price feed is the external price of an asset (relative to BTS) fed into the network by the witnesses [1]. The price is derived from the median of the proposed price of all witnesses to prevent manipulation by dishonest witnesses. This price furthermore, serves as the price for settlement requests of long positions (see below).

3.3 Collateral

The collateral ratio can be derived by

$$\text{ratio} = \frac{\text{debt}}{\text{collateral}} \;/\; \text{SETTLE}\ .$$

Any additional collateral above the maintenance collateral is only required to protect the position against margin calls due to volatility.

3.4 Debt, Collateral and Swan

In the case of market pegged assets, such as bitUSD, bitEUR, bitCNY, etc., where the BitShares network issues new shares [1], it has to be ensured that the collateral is always sufficient to cover the debts. Since all SmartCoins are issued by the BitShares network, the overall debt equals the supply of that particular asset.

In liquid markets, an equilibrium between collateral and debt is reached at the price

$$\text{debt} = \text{collateral} \cdot \text{price} \tag{1}$$

This price is called Black Swan Price (SWAN) and indicates the price at which all collateral could pay off all debt.

$$\Rightarrow \quad \text{SWAN price} = \text{debt}/\text{collateral} \tag{2}$$

3.5 Margin Calls

However, since markets do not have all their liquidity at the spot price we need a back-off and start closing borrow positions earlier to prevent a black swan event. In BitShares, the back-off factor is called *Maintenance Collateral Ratio (MCR)* and derives the position-specific Margin Call Price (MCP) by:

$$\text{MCP} = \frac{\text{dept}}{\text{collateral}} \cdot \text{MCR} \tag{3}$$

The MCR is a asset-specific parameter defined by the witnesses which can change at any time. It is derived from the median of the proposed MCRs of all active witnesses such that only the majority of witnesses can manipulate this parameter. A commonly agreed value for the MCR is 1.75 or 175%.

Note that, once you have borrowed an asset from the BitShares network, your position and exposure does not change (assuming you are not margin called). The reason for this is very simple: You still hold all the borrowed asset in your account that is required to pay of contract and release your collateral again.

Example: When you borrow 100 USD from the network and put 50,000 BTS as collateral, your MCP (assuming a MCR of 175%) would then derive to:

$$\text{MCP} = \frac{100\,\text{USD}}{50{,}000\,\text{BTS}} \cdot 1.75 = 0.0035\,\text{USD/BTS}$$

Your collateral ratio depends on the price feed and derives to

$$\text{ratio} = \frac{100\,\text{USD}}{50{,}000\,\text{BTS}} \;/\; \text{SETTLE}\,.$$

3.5.1 Short Squeeze Protection

A new feature in BitShares 2.0 is the protection of short/borrow positions against short squeezes (rapidly falling price of BTS). A short squeeze implies that short sellers are being squeezed out of their short positions (usually at a loss).

To protect shorts against short squeezes **in markets with low liquidity**, margin calls only execute if the position's call price (MCP) is **above** the short squeeze protection price (SQP).

The SQPis derived by

$$\text{SQP} = \frac{\text{SETTLE}}{\text{MSQR}} \tag{4}$$

This behavior is motivated to ensure that short positions do not require to buy on the ask-side even though there are bid orders above their own margin call price.

Example: Currently (November 2015), the MSQR for the USD tracking asset in BitShares has a value of 1.1 (e.g. 110%). Assuming a feed price of SETTLE $= 0.005\,\text{USD/BTS}$ results in an SQP or $0.004{,}545{,}5\,\text{USD/BTS}$. Hence, the call price has to be higher than the SQP and there must not be a bid above your MCP for a margin call to occur.

We summarize the margin call rules as follows:

> A **margin call** will occur any time the highest bid is **less** than the call price and **greater** than the Short Squeeze Protection Price, i.e.
>
> $$\text{highest bid} < \text{MCP} \tag{5}$$
> $$\wedge$$
> $$\text{highest bid} > \text{SQP} \tag{6}$$

3.5.2 Illustrative Description

In order to simplify illustration we summarize the terms that have been discussed in the previous paragraphs as follows:

(Black) Swan Price: The price at which the collateral equals the debt

Maintenance Collateral Ratio (MCR) : a ratio to define the margin call price as a function of the swan price.

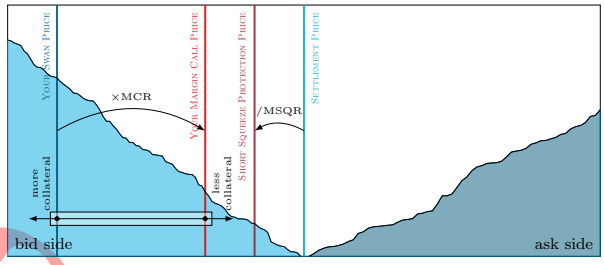
Margin Call Price (MCP): Margin positions with a call price below this price may be margin called (see below).

Settlement Price (SETTLE): The price at which a long position can request settlement against the least collateralized borrow position.

Maximum Short Squeeze Ratio (MSQR): This ratio defines the price to which shorts are protected against short squeezes.

Short Squeeze Protection Price (SQP): As long as the highest bid order is above this price, no margin calls will be executed. The SQP defines the most that a margin position will ever be forced to pay to cover.

To illustrate the relation of prices and the impact of collateral, we have depicted the prices in the following figure.

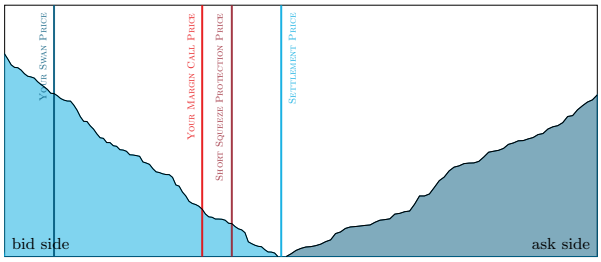


We see that the trader's swan price can be adapted by increasing (or decreasing) the amount of collateral. Obviously, this has a direct consequence on the position's margin call price because it is derived from the asset-specific MCR(e.g. 175%).

We also see that the short squeeze protection price (SQP) is derived from the settlement price and the maximum short squeeze ratio (MSQR) (e.g. 110%).

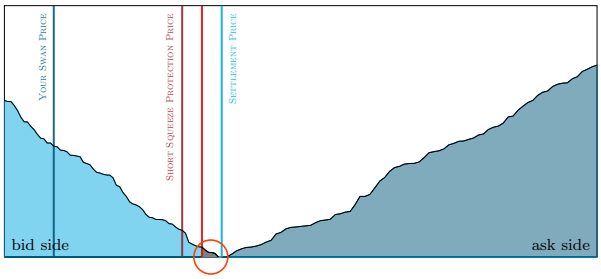
When the price of BTS against an asset (e.g. USD) falls, the market moves closer to a black swan event. To prevent a black swan, the BitShares automatically performs margin calls.

The following figure shows the market (and the price feed) at a lower price. We see that the position's MCP is still below (here: left of) the short SQP. Hence, that particular position is not called yet. However, the risk being margin called rises.

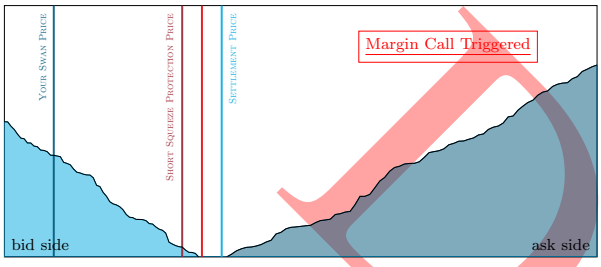


At this point it is strongly advised that traders check their markets and open positions regularly, mitigating the risk of being margin called by reducing the debt of your positions or increasing the collateral ratio with additional collateral.

If the price falls further (as depicted in the next figure), the SQP may cross the MCPand your position is in danger of being called. In this particular example, however, there are still bid orders above your MCP, which results in no margin call, as of yet.



If, however, the all the bids above your MCP disappear (either by being closed or filled), you position will be force liquidated.



This means, that all of the collateral will be used to buy just enough of the borrowed asset (e.g. USD) to close the position. The remaining collateral will be transfered back to the original position's owner.

3.6 Settlement

Any long position (i.e. holder of SmartCoins) can request a settlement to convert their long position into the core asset BTS. The settlement has a asset-specific delay of 24h and settles at the settlement price which is identical to the feed price. By this it is ensured that 1 bitUSD is always worth at least $1 worth of BTS.

3.7 Discussion

A margin position will be forced to sell its collateral anytime the highest offer to buy the collateral is less than the call price (USD/BTS).

The market defines everything (as it should). The market sets the value of BTS in terms of BitUSD based on the highest offer to buy BTS with BitUSD. Once we know the market value, we can trigger margin calls.

There is ONE edge case and that is for thin markets. In this edge case the market cannot define the value of BTS in terms of BitUSD. This is where we use the SQP as the lower bound on the value of BTS in terms of BitUSD. I get that it is illogical for a bid to stay high, when he can lower his bid and force a margin call. In a thin market this is easy. A thick market would be more difficult.

Its not logical to lower your bid when there are other bids still above the margin call price; You may never get filled. All participants would need to play the same game, or you would have to sell into the bid till the margin call triggered, but this has a cost that may be more than the reward.

In addition, a short can always, at any time, manually close his position at "cheap" (when bid is higher than his Margin Call Price), instead of waiting for a forced liquidation at "expensive" (when bid falls below his Margin Call Price).

I guess they make sense in protecting the system from there not being enough bid to cover a margin called short. Its only partial protection though. I'm not sure its worth the distortion it creates. Essentially incentivizing the bid to stay just above the SQP rate.

What are you suggesting should be changed, to make this wheel round? Should the short be called only when the feed drops below his margin call price filling all available bids down to the SQP rate(10%)?

I think so long as the markets determining the feeds are external to the Dex and greater in volume the old rule is more practical, but with greater systemic risk. Once the internal markets are leading the feed, I think this issue goes away and really may be unnecessary.

3.7.1 Liquid Markets

3.7.2 Thin Markets

3.7.3 Manipulative Bid-Orders

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