Staking parameters and conditions

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In the design of this staking program, there is an information asymmetry regarding the future payments of interests that needs to be accounted for. Indeed, USDT/BUSD stakers cannot be certain that the necessary amount of USDT/BUSD will be injected into the contract before interest payments and principal are due. Thus, the company could exploit this asymmetry, especially in an unregulated market like crypto.

Besides, USDT/BUSD stakers have no control over decision-making processes conducted at the company level to ensure that payments of interests and principal will be made in due time. This staking program should be seen by investors as a loan to sustain business development and the continuity of the Jax.Network ecosystem.

In order to correct these asymmetries and minimize the risks for the USDT/BUSD stakers, we detail below how the program is collateralized and the expected streams of revenues to ensure that stakers' risks are under control. The first part explores how the 'fair price' system and JAX minting optimization bring cash flows to repay the outstanding debt. The second part details the minimum collateral requirements if, in case of default on USDT/BUSD payments, the staker can always recoup his or her initial investment in WJXN. Finally, we briefly explain how the minimal loan to value ratio keeps the company accounting in check.

1 Mining JAX

1.1 Fair price for WJAX

Fiat currencies do retain their purchasing value (at least to some extent) not because they are backed by other assets but because of public trust that the central bank that controls them will limit inflation. John Nash was already skeptical about this scheme and suggested enforcing money issuance, not beyond the productivity gains of the industrial sector over time, measured by some index.

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Stablecoins are in and of themselves not stable since they are directly pegged to fiat currencies that do not necessarily retain purchasing power. Another point in question is 100% or more reserve requirements, which bring about capital allocation inefficiencies and limit the scalability of any of them. We have worked around Nash's idea of 'ideal money' in a decentralized network.

1. We posit that, for private monies (see the work of Klein in 1974 on this topic), money issuance should be costly to mine to incentivize minters to control for inflation – especially when supply is uncapped like in our case.
2. Miners are profit-oriented, and
3. The only known reliable data in a PoW system is the difficulty D.

However, D is nothing but the energy cost required to mine one coin, iff the block reward is proportional to the computing power allocated to the network. In that way, our chain is measuring the average cost of electricity spent for each coin (this cost can be controlled by a K-constant voted by miners to take into account the productivity gains in the energy sector).

For simplicity, let's assume the cost of production of 1 JAX is \$0. The opportunity cost $o(c)$ of mining JAX is then determined by

$$o(c) = \frac{P_{BTC} \cdot 6.25}{D},$$

where P_{BTC} is the spot price of BTC at time t. This is the upper bond price of JAX above which it becomes not economical to mine it. Since the cost of production is non-zero, the price can only fluctuate within this narrow band. Volatility is controlled this way, and as long as the opportunity cost is higher than the dollar, value is retained against fiat.

The following hypothesis needs to be obviously verified, but if realized, volatility is further controlled. Thanks to arbitrage, it becomes more profitable for miners to mine JAX rather than Bitcoin when the price of the latter goes down. With merge-mining, they can switch their hashrate towards mining JAX at no cost. Hence, keeping the total hashrate much more stable than it is now, and further reducing the narrow band within which JAX can fluctuate, since D will remain more stable during demand shocks. In a nutshell, mining JAX is then entirely a market-based mechanism and an arbitrage.

Thus, the governor has the duty to set the 'fair price' of the pair WJAX/JAXUD. This fair price is calculated as follows:

$$K = \frac{P_{BTC} \cdot 6.25}{D},$$

where P_{BTC} is the market price of Bitcoin at time t, 6.25 being the current block reward – excluding the transaction fees, which are anyway distributed whether you mine JAX or (BTC + JXN – D) is Bitcoin network difficulty.

However, in order for the market to find the price equilibrium of WJAX, we allow deposits and withdrawals within a range, such as:

$$K = \frac{P_{BTC} \cdot 6.25}{D} + \epsilon'$$

and ϵ' is a margin term to allow some price fluctuations and more market arbitrage for the WJAX/BUSD price, where $\epsilon' \in [-0.03, 0.03]$. In other words, one can deposit BUSD in the Jax.Money contract up to the limit of $K + 3\%$, while withdrawals are under tight control to avoid losses for VRP token holders (see the Jax.Money documentation for more details on this mechanism).

For the reader familiar with monetary policy, this should sound reminiscent of the snake in the tunnel implemented in Europe in the 1970s. The basic idea was to fix the exchange between the different European currencies at the time within a range.

1.2 Mining JAX and expected cash flows

This detour was necessary to explain how the company expected to repay the loans. The company will rent hashrate and do arbitrage between this fair price and the DEX price. If the DEX price is higher than the cost of hashrate (which is ultimately the fair price), then there is an incentive to mine more JAX and sell them on the DEX. The margin will be used to repay outstanding debts plus interests.

As this strategy depends on market conditions and the number of transactions occurring on Jax.Money, it's difficult to make any accurate predictions of the future cash flows. However, once the contract has started, any user can audit where the revenues to pay back the debts are coming from, and even they cover at least the total liquidity plus the interests. This mechanism makes the business model more transparent. This is also why we have capped the loan to sustainable levels (see the section below). Thus, even during bad market conditions, in the extreme case, where interests and principal are not paid back in USDT/BUSD, the contract will always have sufficient reserves in WJXN to cover all outstanding debts.

In order to optimize the mining of JAX, we have designed an auto-profit mining pool API. The API allows us to flip from mining JAX to WJXN + BTC, and vice versa, according to the shards block time and not the Bitcoin block time. This new Stratum implementation reduces the hashrate loss on mining JAX, allowing miners to better arbitrage, which coin is more profitable.

The auto-profit mining pool is fetching the WJAX price on the DEX, and the API ensures miners that they are always paid with a premium. Thus, JAX switching is optimized by this mining pool architecture to minimize hashrate loss for miners and a guaranteed premium. The DEX price difference and cost of mining plus the premium is a market-driven indicator that we can print more WJAX at a profit and sell them back to the DEX to maintain the peg.

Stakers can audit how many JAX coins have been mined over time at any moment, by following BTC, BSV, and BCH burns. Below is an example, where a total of $23.001BCH$ were burnt:

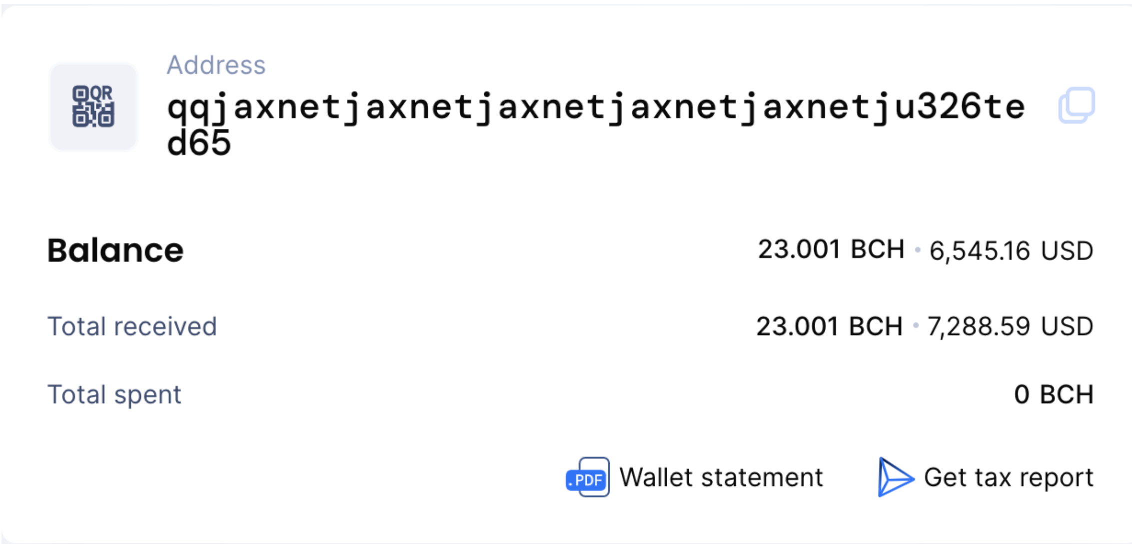

Figure 1: BCH sent to JAXNET invalid address

For further information on how the value of burnt BSV, BCH, or BTC is transformed into JAX coins, please refer to our Proof-of-Value paper.[1]

As it was mentioned above, the funds raised through this program will be used to improve and build products, sustain our pairs on DEXs and list our coins on CEXs. The use of funds will be split as per $Fig.2$ below.

2 Optimal collateral

An investment in a staking program is a risky endeavor. It is paramount to understand that BUSD or USDT that a creditor will put into the contract will be withdrawn to fund the company's needs, as mentioned in the 'Use of Funds' pie chart. To minimize the default risk, the contract will always have minimum collateral requirements, so that potential losses are always covered by WJXN locked into the contract.

[1] https://jax.network/wp-content/uploads/2021/06/JAX_Proof_Of_Value_Mechanism.pdf

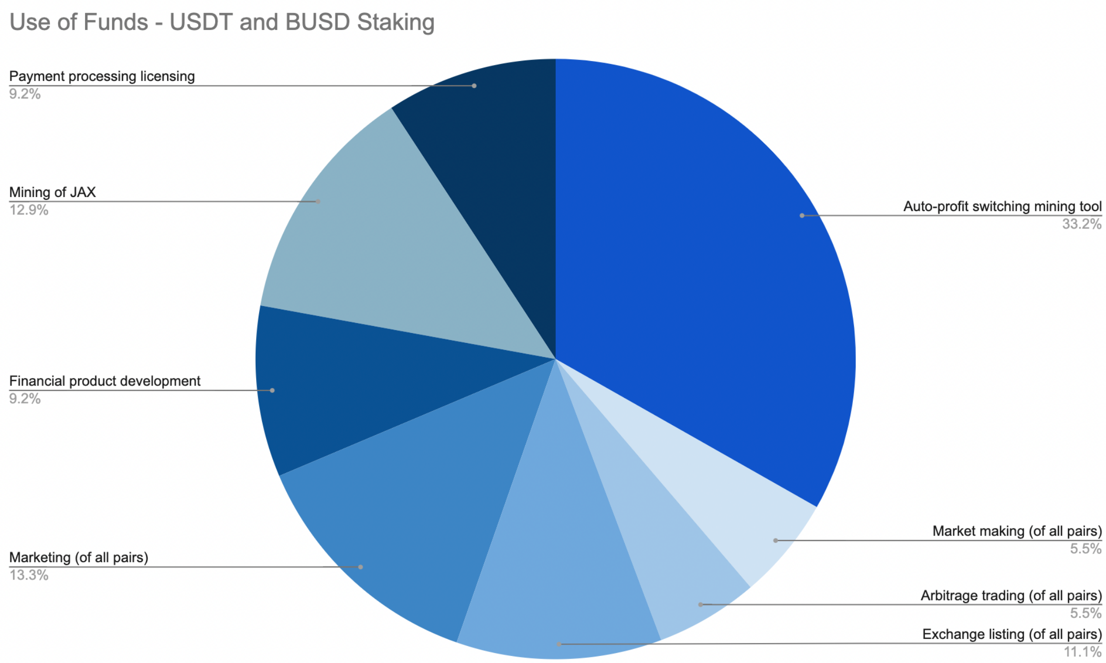

Figure 2: Use of funds for USDT and BUSD staking

2.1 Minimum collateral

It is assumed that WJXN volatility is stochastic. Thus, at time t the collateral contract might be either overcollateralized, undercollateralized or at equilibrium. The minimum volume of collateral, *at maturity*, is given by $\underline{K}_t(V_t)$:

$$\underline{K}_t(V_t) = \frac{V_t}{p_{t-1}} + \frac{V_t}{p_{t-1}} \cdot (s + \sigma), \text{ and } \underline{K}_t \geq I_t$$

Where I_t is the outstanding debt value, which comes at maturity at time t. p_{t-1} is the market price of WJXN at time $(t-1)$, K_t is the BUSD denominated value of WJXN in the collateral contract, s is the DEX slippage, and δ is a discount rate. The contract also takes the slippage into account, since big positions might be liquidated by new WJXN holders (i.e. creditors), who wish to recover their principal as soon as possible in the event of a default.

For instance, there are $2,000,000 bonds coming at maturity in one day, and no BUSD/USDT in the DEX pool. The contract needs to sell the WJXN to pay back the creditors. Hence $I_t = \$2,000,000$. For simplicity of calculations, let's assume a 5% DEX slippage and a 10% discount rate, and a DEX price of WJXN $p_{t-1} \approx \$1.5$ is assumed. Hence, in order to repay the principal to our creditors, we need to have in the contract $\underline{K}_t(V_t) \approx 1.533$ mil WJXN, for a total value of $\underline{K}_t = \$2.3$ mil. In other words, one needs at least 1.533 million WJXN to cover this position in this example.

2.2 Value at risk

However, this calculation does not take into consideration the volatility of WJXN. In order to determine the level of capital needed at launch, $\underline{K}$ is not enough to cover for price swings and worst-case scenarios. The latter is defined as 0 USDT/BUSD sitting in the contract to repay the creditors and price depreciation of WJXN against USDT/BUSD. Besides, the WJXN/BUSD pair has yet no liquidity to estimate the optimal collateral ratio. Let's assume the price of BTC is strongly correlated to WJXN.

We use the RiskMetric method to estimate the VaR k-day horizon, which can be approximated by[2]:

$$VaR(k) = 1 \cdot VaR(\text{of log returns}) \cdot \sqrt{k}\sigma_{t-1}$$

Where, σ is the daily standard deviation over one year. Assuming, for simplicity, a normal distribution, we can use a z-score of 2.58 for a 99% confidence interval and $\sigma_{t-1} = 4.56\%$.[3] Hence, we have:

$$VaR(30) = 2.58\sqrt{30} \cdot 0.0456 \approx 64,44\%$$

In a nutshell, it means that the contract collateral ratio should be at least $164,44\%$ **at all times.** We used the $VaR(30)$ of Bitcoin here. There are three reasons for that: i) the liquidity of the WJXN/BNB pair is too low to make good predictions of the WJXN VaR itself, ii) Bitcoin price fluctuations give a good account of the crypto market in general, iii) as Jax.Network is merge-mined with Bitcoin, prices should be correlated in downturns.

Let's assume the price of WJXN is \$1. Raising \$2,000,000 through staking means that at least 3,288,800 WJXN should be locked into the contract. If the price of WJXN grows to \$5, then the contract needs to lock 657,760 WJXN, since the contract is entirely denominated in USDT/BUSD.

More generally, the maximum $\overline{K}_t$ collateral at time t is defined by a percentage of the debt position in function of τ. WJXN price variations (Δ_{WJXN}) are as such:

$$\Delta_{WJXN} = \frac{p_t - p_{t-1}}{p_{t-1}} = \tau, \ \forall\, \tau \in [-1, +\infty]$$

With τ, being the rate of price change of WJXN expressed in BUSD between two time periods.[4]

[2] web.mst.edu/ huwen/teaching_VaR_Weiqian_Li.pdf

[3] pro.arcgis.com/en/pro-app/2.8/tool-reference/spatial-statistics/what-is-a-z-score-what-is-a-p-value.htm

[4] Linear returns are preferred over log-returns, as in Colucci (2018).

Then, we have a maximum collateral for any price change:

$$\overline{K}_t(V_t) = (1-\tau)\cdot\left(\underline{K}_{t-1}(V_{t-1}) + VaR(k)\cdot\frac{(1-(s+\delta))\cdot V_{t-1}}{p_{t-1}}\right)$$

Where, K_t being the collateral at time t. When $\tau \to +\infty, \overline{K}_t(V_t) = -\infty$. Although mathematically possible, this case should be ruled out, as price changes between two time periods are not so extreme. The equation above shows that the remaining interests are not repaid in the event of a default. Indeed, the principal is paid back, modulo a discount rate plus a slippage rate, which cover approximately a 7-month interest rate.

So that for each dollar in issued debt, the contract should hold at least:

$$\underline{K}_t(V_t) + VaR(30)\cdot\frac{V_{t-1}}{p_{t-1}}.$$

Thus, if $\underline{K}_t(V_t) \approx 1.533\,mil$, then $\overline{K}_t \approx 3.215\,mil$ WJXN, assuming here that:

$$\frac{V_{t-1}}{p_{t-1}} = \frac{0.85\cdot\underline{K}_t(V_t)}{1.5}.$$

Hence, the collateral ratio should vary anywhere between 115% and 161%, $\forall\, p_{t-1}$ WJXN, and where, $s+\delta = 0.15$

At the start of the contract, we are putting a $164,44\%$ collateral ratio to bring confidence. The discount rate is set at 10% and the minimum buy back price of WJXN is $\$1$. The contract is fully backed by WJXN. Everything is denominated in USDT/BUSD. Thus, if the price of WJXN is \$1, then, $3,288,800$ WJXN will be locked in the contract for a $\$2,000,000$ staking. In case of default, interests are paid in WJXN and not USDT/BUSD. Interests are paid back through revenues from JAX mining auto-profit API.

2.3 Liquidation and default structure

Firm's assets can be mainly categorized into 2 broad categories:

- Human capital;
- Digital assets (WJXN) owned by its BVI company.

Let's analyze what happens to WJXN only, should a default or bankruptcy occur, since this is the asset and renegotiation or loan restructuring cannot happen on blockchain.

When a default occurs, and in the extreme case, bankruptcy, the collateral WJXN coins are locked to ensure that the bondholder gets paid out first. For instance, assume there are \$4.5 million of BUSD in the contract, and \$5 million worth of BJXC arriving at maturity. The contract will then fill the gap by distributing \$0.5 million in WJXN at the discount rate mentioned earlier.

A fire-sell of WJXN could also be triggered on DEXs due to two factors: i) creditors have received WJXN instead of USDT/BUSD after a default and they want to cash them out, ii) the yield reversal has affected WJXN holders' confidence and they are trying to cover potential losses by switching to cash. Thus, WJXN enters a pro-cyclical price drop, entailing liquidity dry-ups in the BNB/WJXN pair. This price drop is, at least partly, accounted for by creditors as detailed above.

In the event of a bankruptcy, the contract will trigger the distribution of WJXN to our creditors. Assets (WJXN) will continue to exist and be priced on DEXs. Hence, as long as liquidity is reasonable for the BNB/WJXN pair, creditors should be able to recoup at least their principal.

The BVI company owns approximately 8 million V_t WJXN tokens, most of them being locked for 2 years. In both cases, we posit that the levered value (Ericsson and Renault, 2006) of the company is equal to v_t:

$$v_t = (1 - L) \cdot V_t p_t \approx \$4,800,000$$

Where L is the probability of default that is set at 60%, and $p_t = \$1.5$. Since the contract is denominated in BUSD/USDT, the borrowing amount can grow proportional to the WJXN price increase, while keeping the levered value stable.

Now, with 3.289 mil WJXN, we can calculate the maximum loan to value ratio for our company, which is approximately 41% and remains rather safe in terms of debt overhang at the start of the program.

2.4 interest rates

Since rates are paid by the cash flows stemming from JAX mining and WJAX reselling on the DEX, all the process is fully transparent and accountable since it occurs on-chain. We offer attractive rates at early stages to bring more adoption. The rates, however, decrease after the promotional offer, which is only available for the first 500,000 BUSD/USDT. Unlocked rate is also capped to 10% of the total liquidity in the contract. In the long run, interest rates will be as follow:

- 4% APR for unlocked tokens;
- 8% APR for a 3-month lock period;
- 12% APR for a 6-month lock period;
- 16% APR for a 9-month lock period;

- 20% APR for a 12-month lock period.