EXTENDED SWISSREX MODEL

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This article takes a closer look at the input variables of the SwissRex model. The Bitcoin velocity largely depends on the Bitcoin supply growth. The adoption rate is now estimated over time to avoid considering the Bitcoin velocity twice in the estimate. This results in a marginal change of the Bitcoin fair value, but significantly improves the logic of the model.

SwissRex Model

In Crypto Research # 10, the SwissRex model was described by the following formula:

$$\text{Fair Bitcoin value} \; = \; \frac{\text{Demand}}{\text{Supply}} \; = \; \frac{\text{Adoption Rate x global Transaction Volume}}{\text{mined Bitcoins x Bitcoin Velocity}}$$

Input variables are the global transaction volume, the Bitcoin velocity and mined Bitcoins. After using these input variables, the adoption rate is estimated using regression. The global transaction volume and Bitcoin velocity cannot be observed, therefore the question of their determining factors arises.

Determining factors of the Bitcoin velocity

The Bitcoin velocity describes how often a Bitcoin circulates on average per year. However, it also describes whether Bitcoin tends to move in the direction of a store of value or a medium of exchange.

If the current velocity is inserted into the above formula, the fair value corresponds to the current price (see Appendix). Therefore, an equilibrium value must be estimated for a Bitcoin forecast, either by extrapolation or by an explanatory model. So far we have used extrapolation. Now we use an explanatory model which depends on Bitcoin supply growth[1], global real interest rate and Bitcoin volatility.

What is the logic behind these explanatory variables?

1.) Bitcoin supply growth

New Bitcoins are created by mining. Miners are generally expected to sell and circulate a large proportion of the mined Bitcoins quickly to cover their operating costs (electricity, hardware, etc.). Therefore, after each Bitcoin halving, the Bitcoin velocity is likely to decrease as fewer new Bitcoins are mined.

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[1] reciprocal value of the stock-to-flow ratio

2.) Global real interest rate

Gold correlates most closely with the global interest rates, as gold does not yield a return. The same should apply to Bitcoin. The lower the real interest rate is, the more investors will prefer Bitcoin as a storeage of value.

3.) Bitcoin volatility

The lower the volatility of Bitcoin is, the lower the incentive for short-term speculation and the higher the proportion of institutional investors with a long-term investment horizon. Therefore, lower volatility should lead to a lower velocity.

We use these three variables to predict the velocity, which is shown in Figure 1.

Figure 1: Prediction of Bitcoin velocity
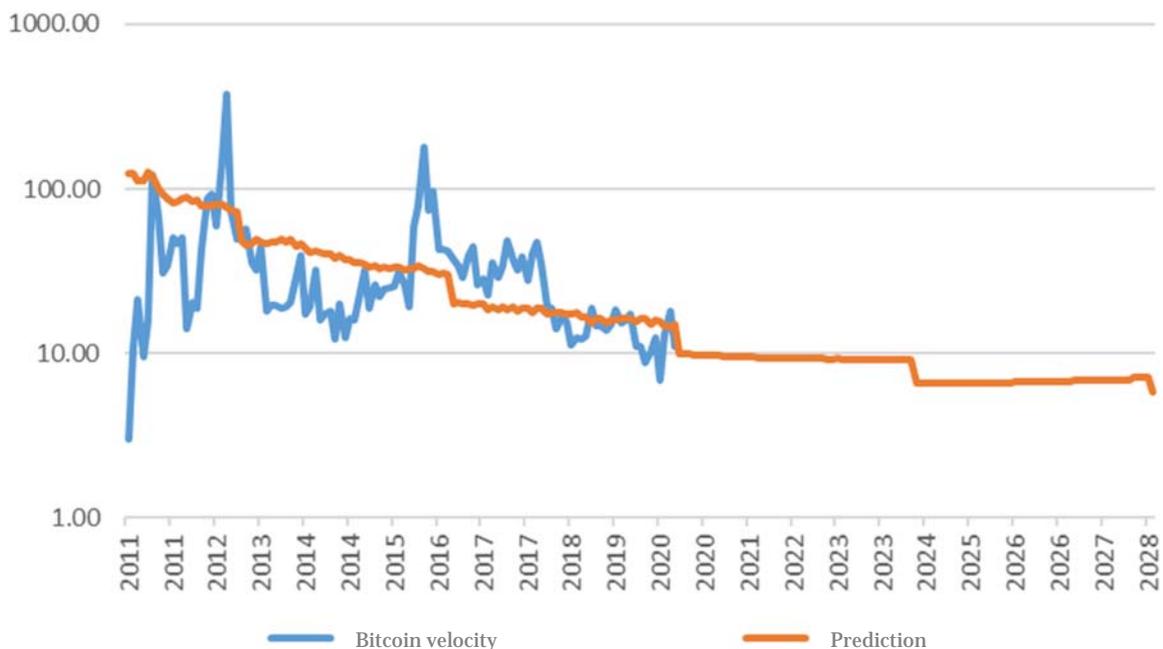
Source: Bank of England, Coinmetrics, FRED, SwissRex

Bitcoin's velocity is expected to decrease further in the coming years and Bitcoin is therefore likely to move further into the direction of a store of value.

We pointed out in Crypto Research #9 that the consideration of lost Bitcoins in the stock-to-flow model leads to inconsistencies. Loss of Bitcoins reduces the stock-to-flow ratio and thus the fair Bitcoin value. Logically, however, the fair value should increase due to lower supply. Furthermore, it is difficult to assess whether inactive Bitcoins are in fact lost or simply held as a long-term investment.

The Bitcoin velocity automatically takes lost Bitcoins into account. These no longer circulate and therefore reduce the velocity. The difficulty remains in estimating future losses. However, we believe that this factor is decreasing due to easier and more professional storage of Bitcoins.

Determining factors of global transaction volume

The World Bank publishes annual data on the global gross domestic product and global equity market capitalisation. We take the sum of these as an estimate of the global transaction volume:

Global transaction volume = global gross domestic product + global equity market capitalization

The higher the global gross domestic product and the global stock market capitalization are, the higher the transaction volume in USD is. The correlation coefficient between the US money supply M2 and this global transaction volume is a high 97%. We can therefore use the US money supply M2 to determine the current transaction volume and to estimate the future transaction volume. [2]

Estimate of the adoption rate

So far, we have assumed that the Bitcoin adoption rate is mainly dependent on Bitcoin supply growth and therefore less dilution from newly mined Bitcoins will result in a portfolio allocation towards Bitcoin. However, supply growth also affects Bitcoin velocity, so there should be a double consideration: once in the adoption rate and once in the Bitcoin velocity. [3]

To avoid this, we re-estimate the adoption rate over time instead of supply growth.

The adoption rate of new technologies typically follows an S-curve as shown in Figure 2. In the SwissRex model, this function is statistically estimated after the input variables are applied. We could use explanatory variables for the adoption rate, such as active addresses, hashrate or number of nodes. However, the problem of their estimation then arises again. We also assume that these variables are more likely to be determined by the Bitcoin price than vice versa. The higher the Bitcoin price, the more miners and investors move up to Bitcoin.
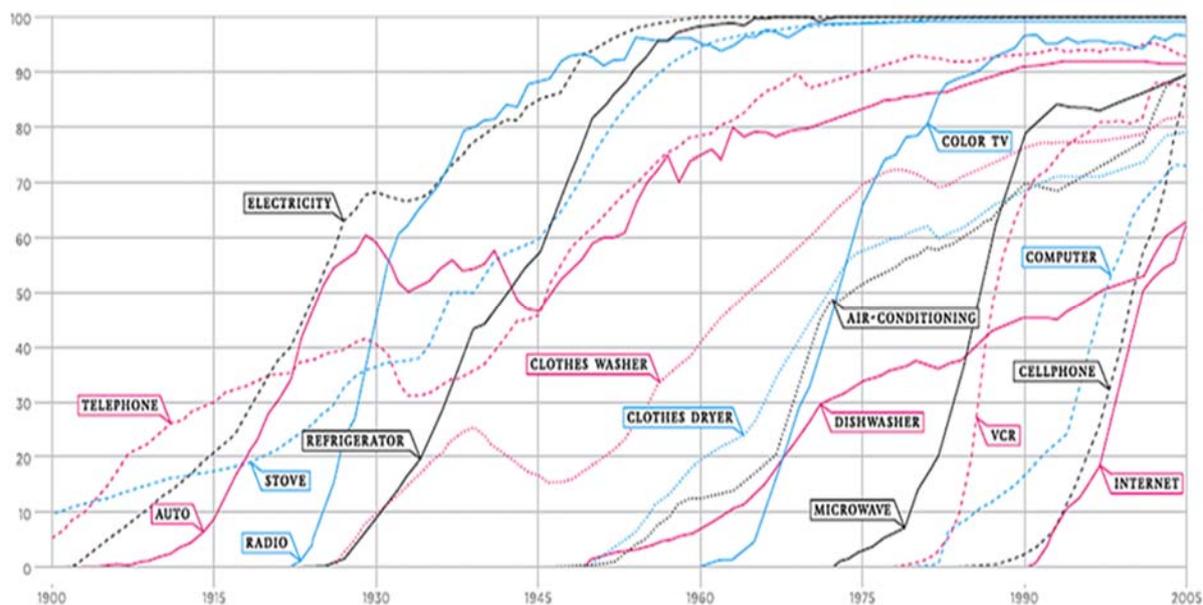
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[2] It should be explicitly stated that this only applies to the sum. There is practically no relationship between the gross domestic product and the money supply

[3] In statistical terminology this is called multikolinearity and leads to instability of the model

Figure 2: Adoptionrate of new technolgies follow an S-curve

Source: New York Times

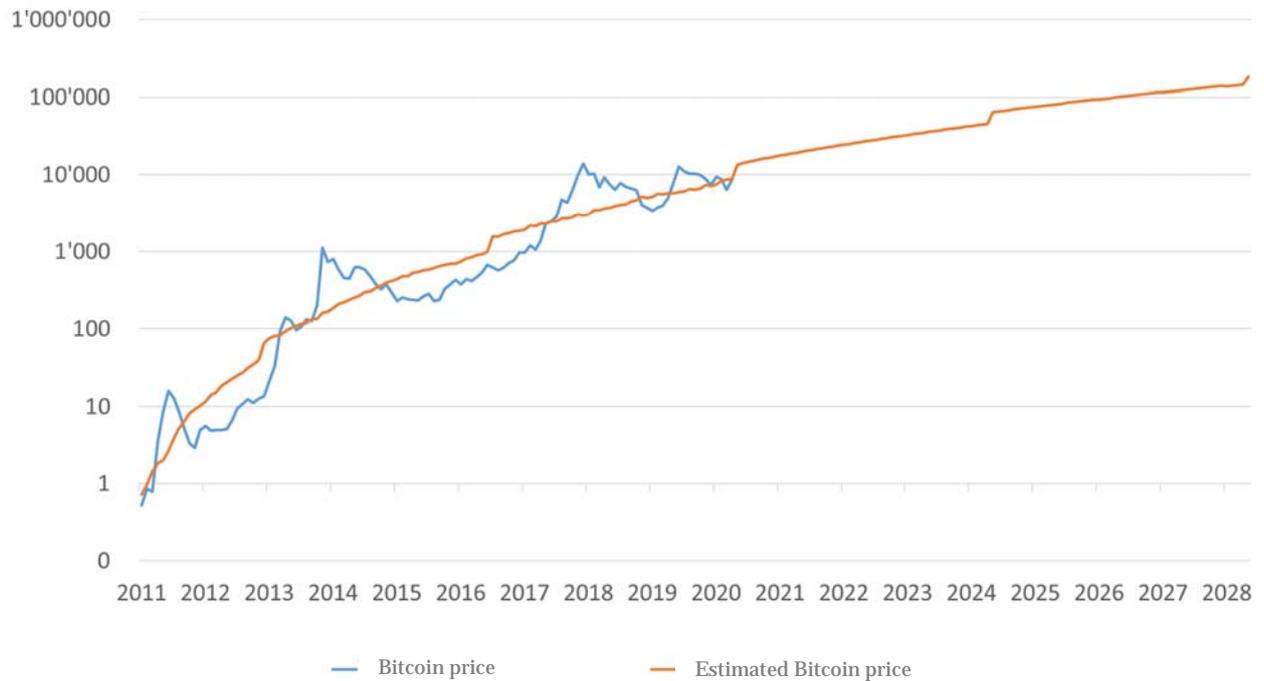# Bitcoin forecast of the SwissRex Model

Since we have previously used an S-curve to estimate the adoption rate, our Bitcoin forecast changes only marginally, mainly as a result of the estimated Bitcoin velocity.

The estimated fair value of Bitcoin as shown in Table 3 at the end of the respective year:

2020:   20`000 USD

2024:   70`000 USD

2028:   150`000 USD

Figure 3: Bitcoin price forecast

Source: SwissRex, Coinmetrics, Weltbank, FRED

Conclusion

In this article, the determinants of the input variables of the SwissRex Model were examined in more detail. If the current Bitcoin velocity is inserted into the SwissRex model, the fair value corresponds to the current price. So far we have therefore used an estimated equilibrium value.

Now we estimate the velocity using an explanatory model with the following input variables: Bitcoin supply growth, global real interest rate and Bitcoin volatility. As a result, the Bitcoin supply growth would be considered twice; firstly via the adoption rate, and secondly via the Bitcoin velocity. Therefore, we now estimate the adoption rate over time instead of supply growth.

The fair value changes only marginally and stands at USD 20,000 at the end of 2020.

Appendix

(1) $P = \dfrac{T}{M \times V}$ **Fair value according to quantity equation**

(2) $V = \dfrac{\text{transaction volume}}{\text{market cap}} = \dfrac{T}{P \times M}$ **Velocity definition**

Inserting (2) into (1) results in

(3) $P = P$ **Fair value corresponds to current price**