

## Abstract

This thesis examines Bitcoin in 2012-2015 period along with the two Bitcoin bubbles — April 2013 and November 2013 — using ARIMA, GARCH and LPPL models. First, we perform standard GARCH analysis along with GARCH rolling estimation and find that the volatility of Bitcoin differs substantially over time and that this relation is best captured by GARCH(1,1) in all studied periods. We also conclude that during the November bubble the number of irrational traders entering the market was much higher than in the April bubble which probably caused greater instability on the Bitcoin market. However, based on Ljung-box test we find these results to be questionable. For that reason, we present LPPL model and study its key parameters — power law growth rate  $\beta$ , frequency of log oscillation  $\omega$  and its scaling ratio  $\lambda$  — in more detail using standard methodology and “loop analysis”. We find that the November bubble experiences much faster oscillation and lower acceleration rate of power law in comparison with the April bubble. By the end we propose hypothesis that  $\Delta\lambda$  serves as a better indicator of the upcoming bubble crash than simple scaling ratio which we concluded to be true in our analysis of the two Bitcoin bubbles. However, further examination of other financial bubbles is needed, in order to support this hypothesis.