February 10, 2022 - cascad#222

Execution Report

Title: Equilibrium Bitcoin Pricing
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Full reference: Biais Bruno, Bisière Christophe, Bouvard Matthieu, Casamatta Catherine & Menkveld Albert J. "Equilibrium Bitcoin Pricing" Working paper, February 3, 2022.

The structure and contents of this execution report provided by **cascad** for the certification are similar to those recommended by the AEA Data Editor.

1. DATA DESCRIPTION

This paper relies on data on returns, transactional benefits and costs from the the MtGox bitcoin marketplace, collected from July 17, 2010 to December 31, 2018. For a thorough description of the data, please refer to Section 4 of the paper.

2. CODE DESCRIPTION

For the purpose of this certification, we aimed to check the results displayed in Table 1 and in Figures 9-12. The code for the other Figures were not provided to us (note Figures 1 and 3 contain no results).

The replication materials are divided into four self-explanatory subfolders: "code", "input", "temp", and "output". The "input" subfolder stores one data file, "crypto-pricing-series-daily-2009-2018.xlsx". A Python script, "equilibrium-bitcoin-pricing-model-calibration.py" loads the Excel file, implements the calibration, creates the Table and Figures and stores them in the "temp" folder, before writing down in a pdf file that is exported to the "output" folder.

3. REPLICATION STEPS

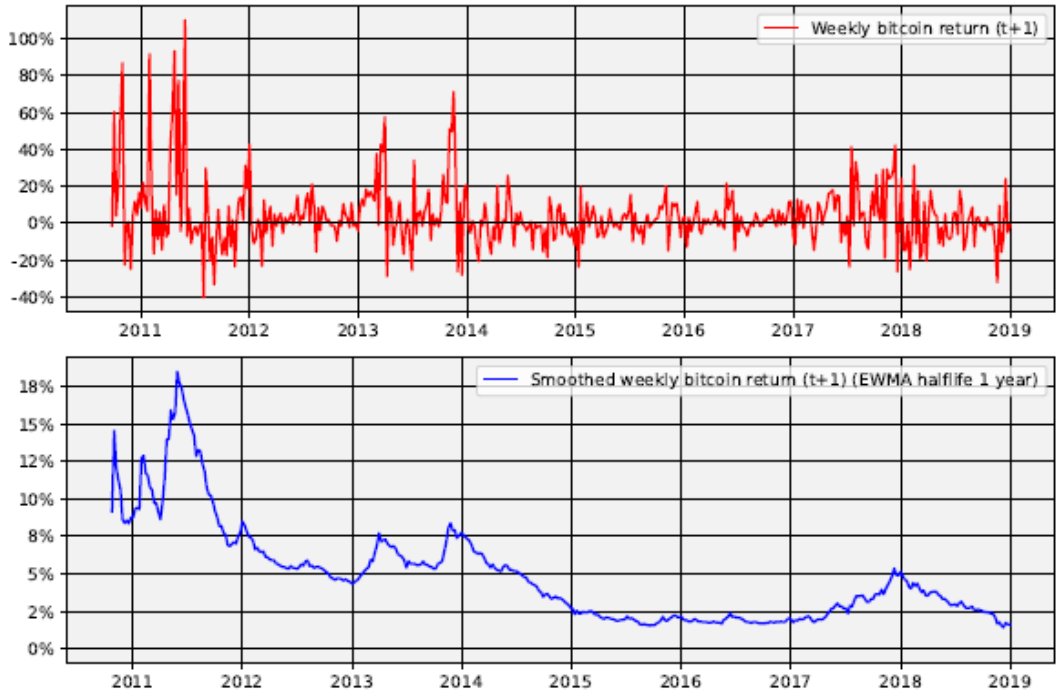
The code was downloaded from the **cascad** website, and run using Python 3.10.2 on a computer with 32GB RAM, intel® Core™ i9-9900K CPU @3.60-5.00GHz, and Linux (Debian 11 distribution). Although the code implemented the calibrations and generated the Tables and figures in the "temp" subfolder, it did not export them to a pdf file as it should. When the code imported those outputs to add them to a pdf, we got the following error message: "Exit-code not 0, check result!"

4. FINDINGS

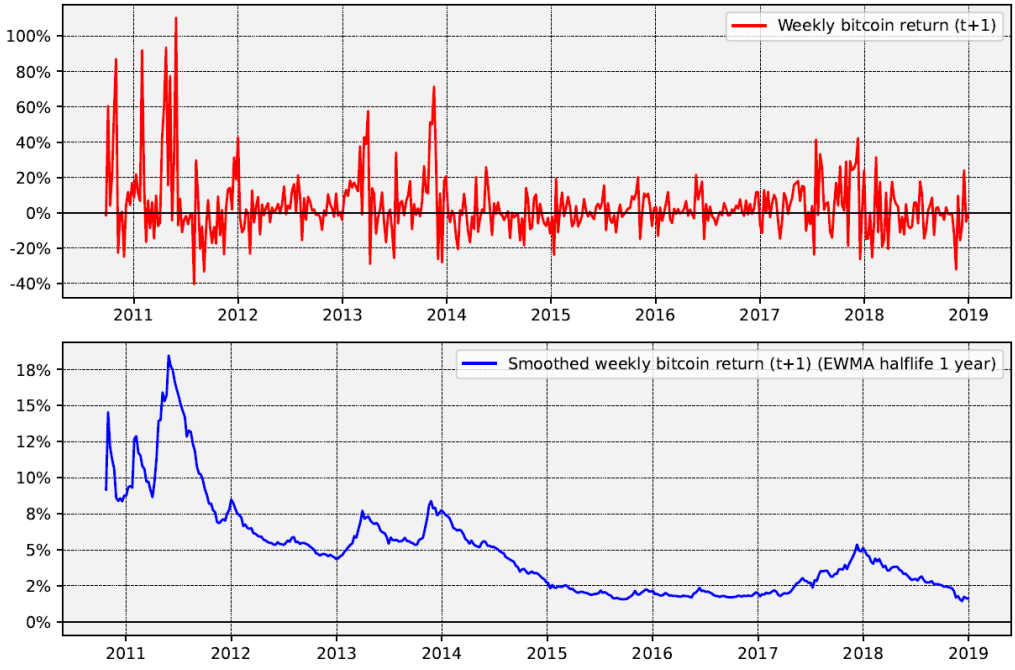
We reproduced Table 1 and Figures 9-12 with perfect accuracy.

4.1. FIGURE 9: BITCOIN RETURNS

Original:



Reproduced:



4.2. TABLE 1: CALIBRATED PARAMETERS

Original:

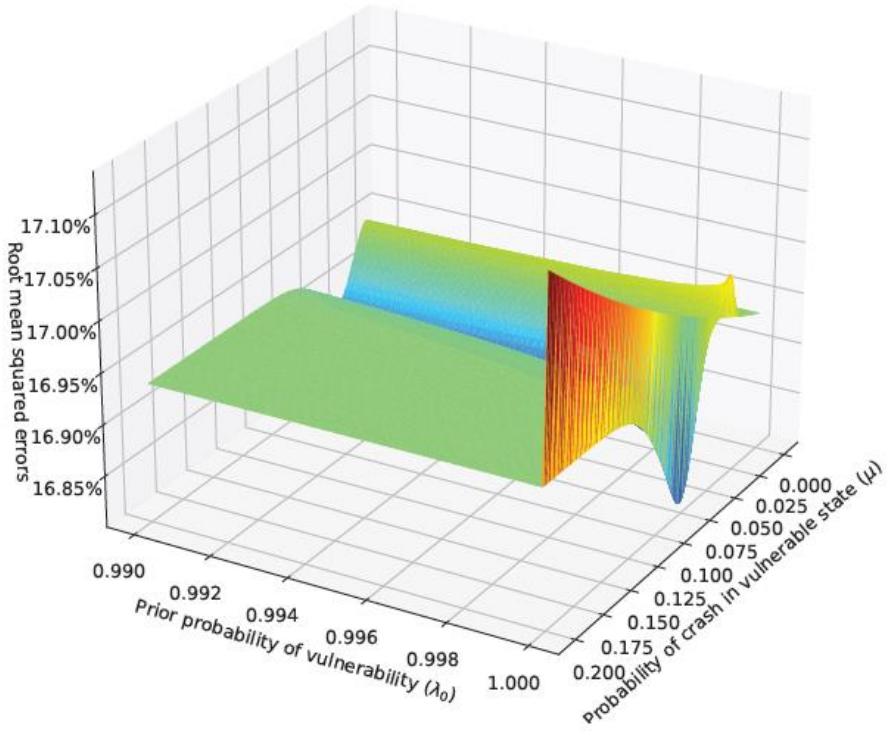
	μ	λ_0	α_1	β_1	β_2
Starting values (OLS)	0.07	0.9999000000	0.0039	0.69	0.14
Calibrated values	0.07	0.9999202621	0.0038	0.69	0.14

Reproduced:

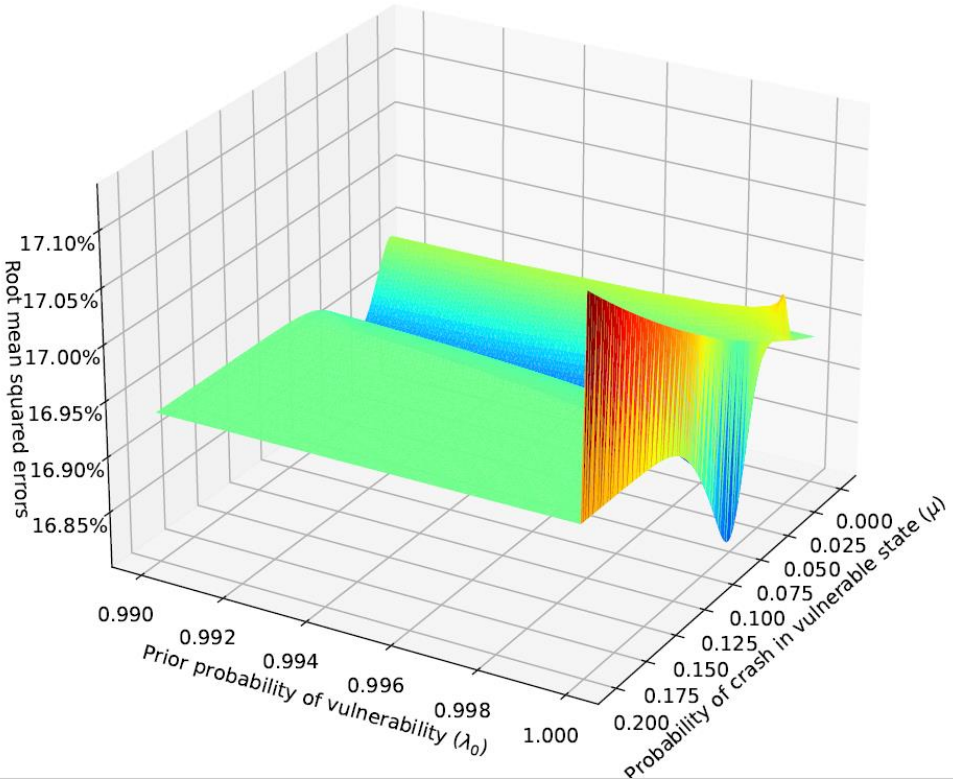
	μ	λ_0	α_1	β_1	β_2
Starting values (OLS)	0.07	0.9999000000	0.0039	0.69	0.14
Calibrated values	0.07	0.9999202621	0.0038	0.69	0.14

4.3. FIGURE 10: ROOT MEAN SQUARED ERROR LINEARISED MODEL

Original:

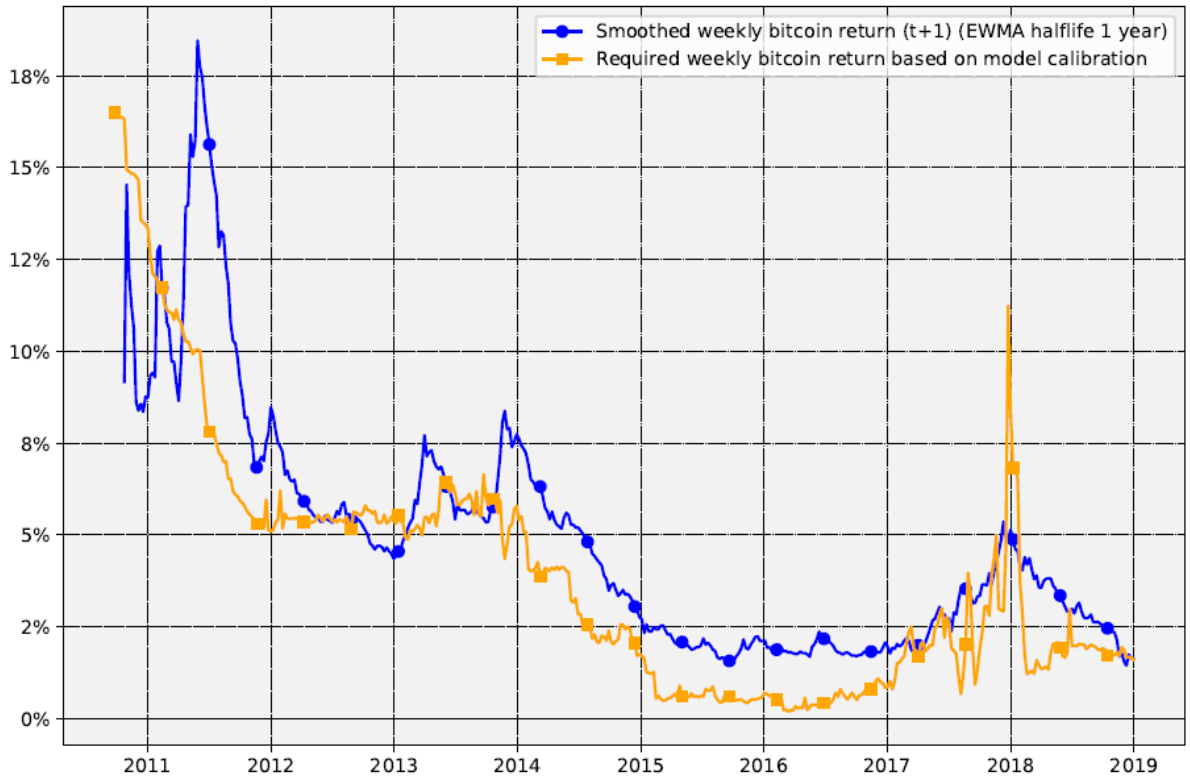


Reproduced:

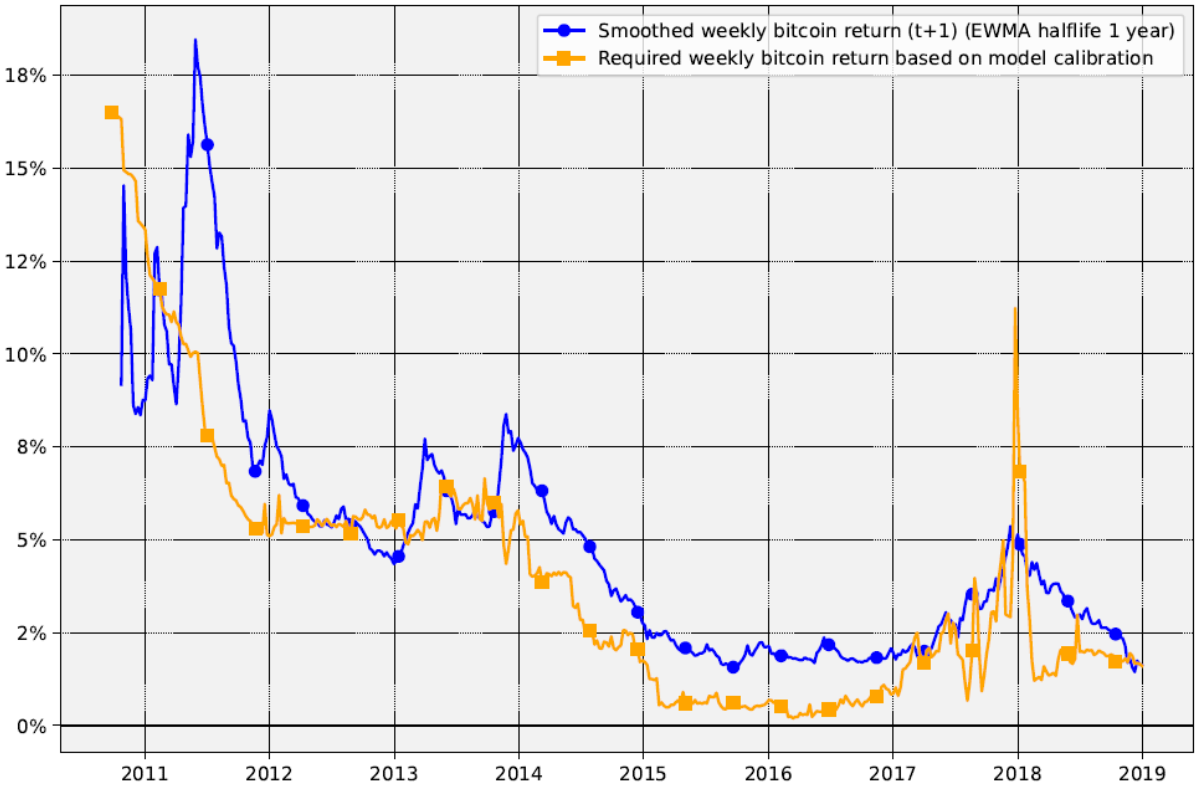


4.4. FIGURE 11: ILLUSTRATION OF MODEL FIT

Original:

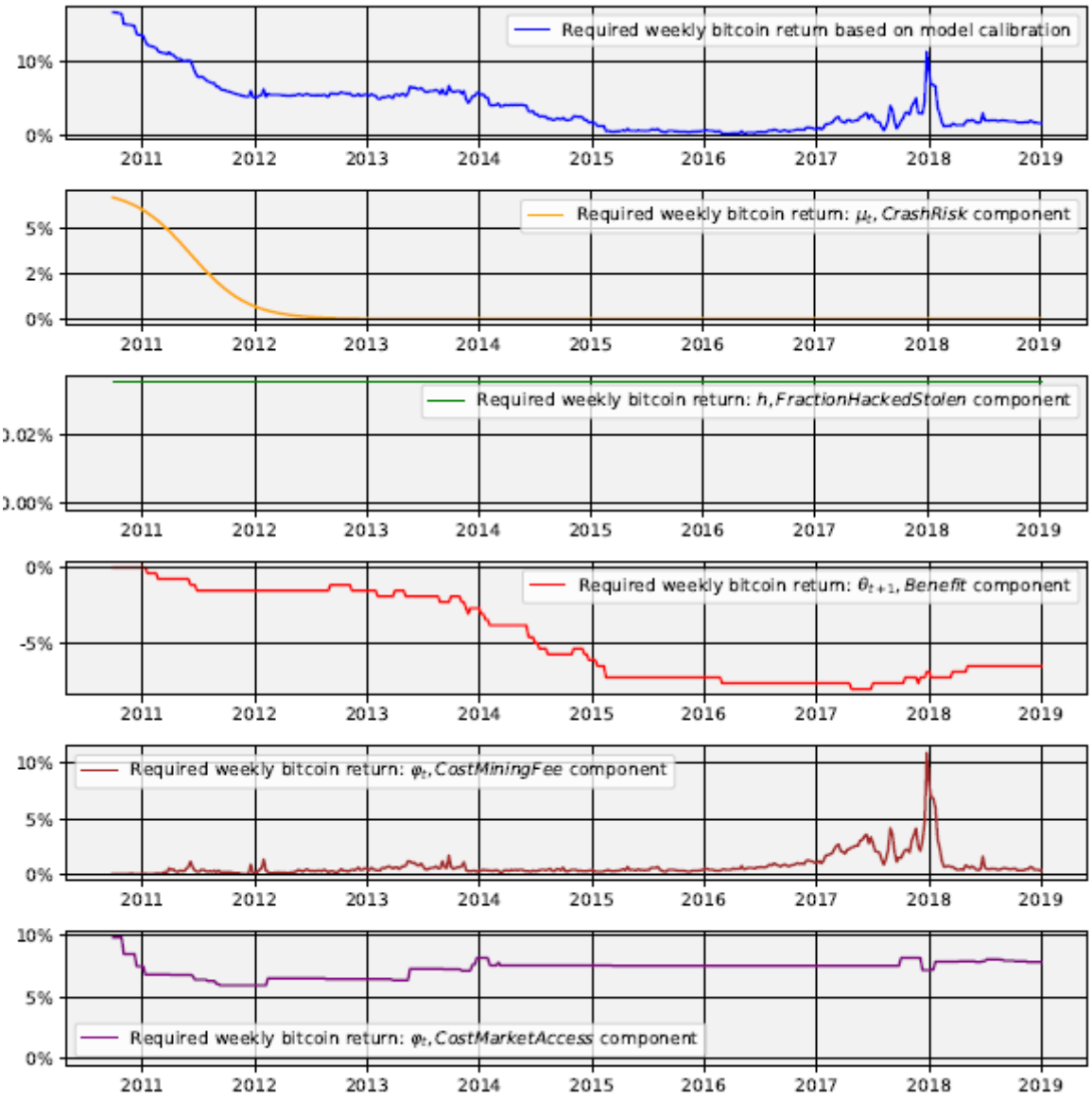


Reproduced:

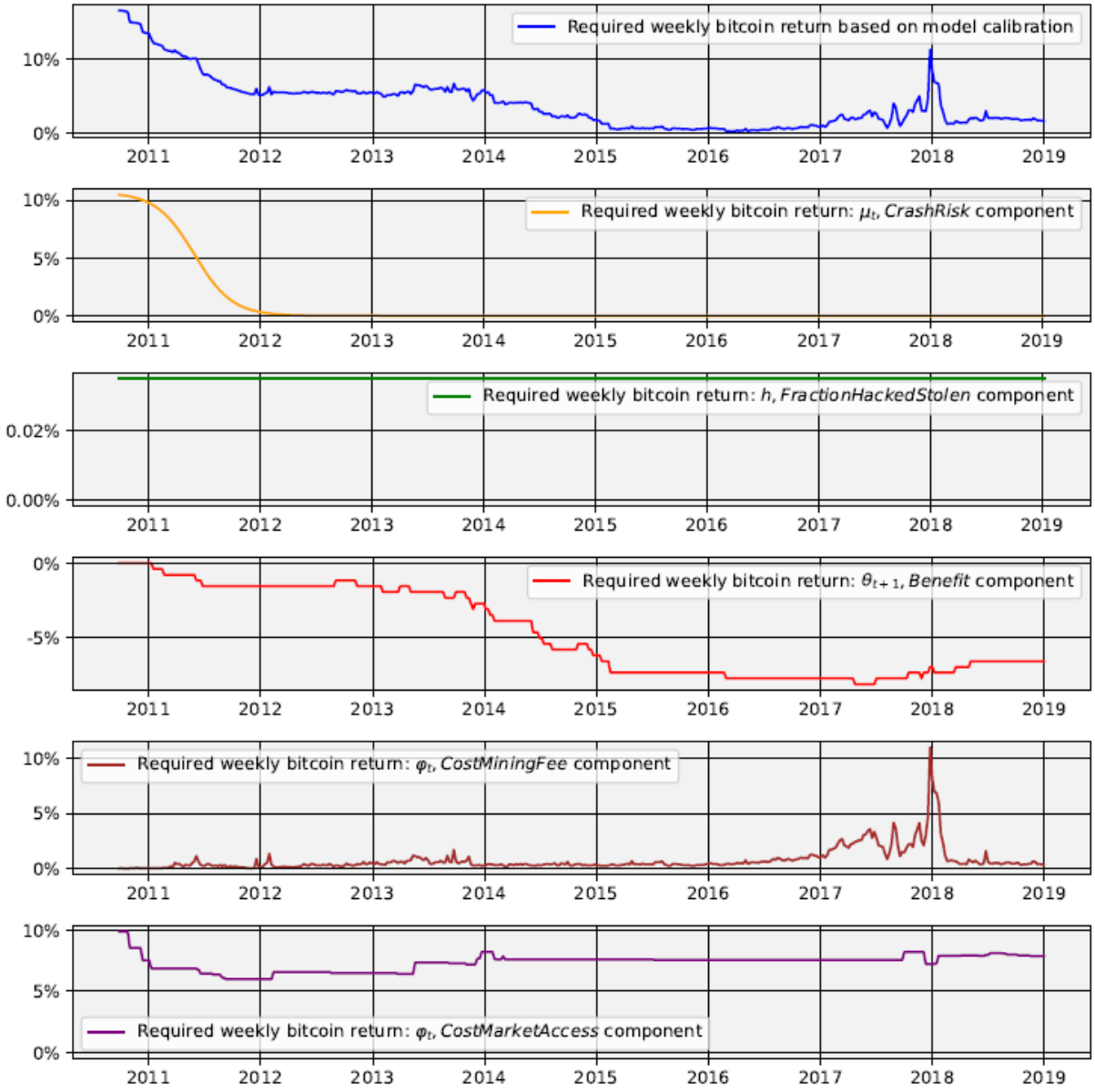


4.5. FIGURE 12: BITCOIN REQUIRED RETURN COMPONENTS

Original:



Reproduced:


Required weekly bitcoin return based on model calibration
10%
0%
2011
2012
2013
2014
2015
2016
2017
2018
2019
Required weekly bitcoin return: μ_t, *CrashRisk* component
10%
5%
0%
Required weekly bitcoin return: *h*, *FractionHackedStolen* component
0.02%
0.00%
Required weekly bitcoin return: θ_{t+1}, *Benefit* component
0%
-5%
Required weekly bitcoin return: φ_t, *CostMiningFee* component
Required weekly bitcoin return: φ_t, *CostMarketAccess* component