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The Impact of Business Communication on Crypto Market Prices

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Abstract: Blockchain technology has gained increased prominence in recent years, as more people follow developments in crypto-market prices, and the business communication of blockchain developers can presumably also influence price movements. In many cases, it is said that the market has already priced in the value of a given cryptocurrency in advance, something that is very likely driven by business communication. This research aims to examine the main channels of price-formation mechanisms from the perspective of business communication, such as roadmap scheduling, the relationship between sentiment and price, credibility, and who communicates the news and how consistent that communication is in a given case. In addition, the study investigates the typical channels through which forks affect prices, such as fundamentals, uncertainty, and volatility. Based on the research results, it can be stated that if communication was accurate and a hard-fork upgrade genuinely improved the blockchain as developers announced, this may support price appreciation in the long term, while the effect is less noticeable in the short term. In the case of a soft fork, price increases are less perceptible because they involve a smaller-scale modification of the blockchain's structure.

Keywords: Business communication, Blockchain technology, Hard-fork, Soft-fork.

Introduction

Business communication can affect crypto market prices by creating expectations, trust, and investment opportunities that influence price movements. These can include:

- Roadmap,
- Partnerships,
- Audits,
- Stock market announcements,
- CEO statements,
- Social posts,
- Airdrop announcements,
- Upcoming token burn announcements.

These are communication channels that can cause the price to change in a positive or negative direction. This largely depends on the value of the news.

Blockchain technology has been around for decades, but its popularity has only begun to grow in the last 10 years. As its popularity grew, its price also began to rise. The first blockchain protocol was formulated in 1982, but few people had heard of it at the time. This technology became popular with the advent of Bitcoin. This popularity developed slowly. In 2012, 1 BTC was worth $5, while by the beginning of 2026, it had already reached $91,000. Figure 1 below shows the development of blockchain technology.

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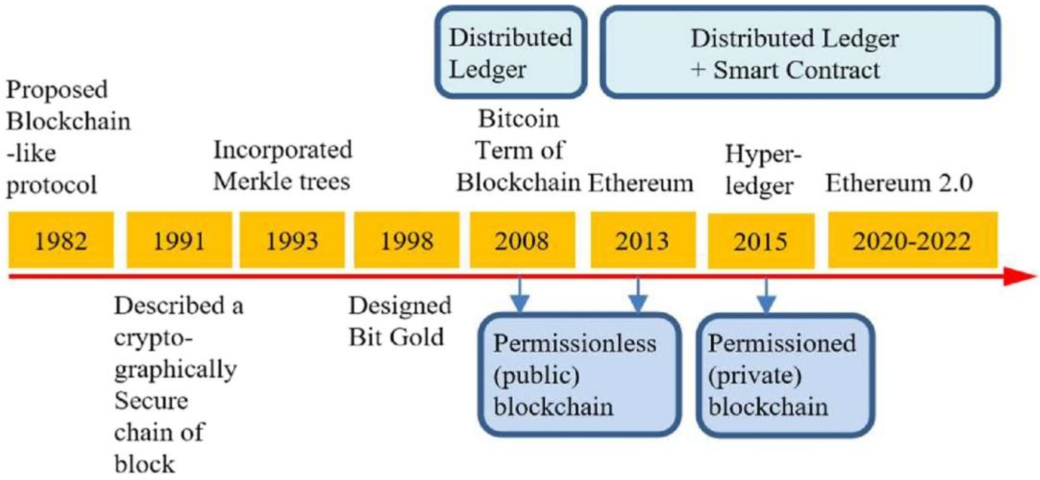

Figure 1. Development of blockchain technology (Bálint, 2024)

In the practical part of the research, two models will be applied. A program written in C# will be able to model the price movement of Bitcoin using calculations. Since this calculation process is quite complex, it is advisable to write a program that performs the important calculation tasks. The program downloads the data necessary for the calculation from the Internet. The research uses a GARCH (Generalized Autoregressive Conditional Heteroskedasticity) diagram to model the volatility of the Bitcoin price. The essence of the model is that the volatility of the standard deviation of financial returns changes over time. After calm periods, turbulent periods can occur and then calm down again. GARCH describes this phenomenon with conditional variance.

In addition to GARCH, the research also calculates the EGARCH (Exponential GARCH) model, which expands the possibilities of GARCH. The use of GARCH and EGARCH models is advantageous because the most important "problem" with Bitcoin returns is not the average return, but the fact that risk/volatility changes over time, and these two models provide a formal framework for this. In this case, it is not sufficient to calculate the regression or establish a constant standard deviation, since classical time series thinking often assumes that the standard deviation of the error term is constant. This is typically not true for Bitcoin, as there are periods of calm and periods of "stormy" action, which results in large movements following one another. This phenomenon is called volatility clustering.

Bitcoin Hard-Fork, Soft-Fork Updates and BTC Price Changes

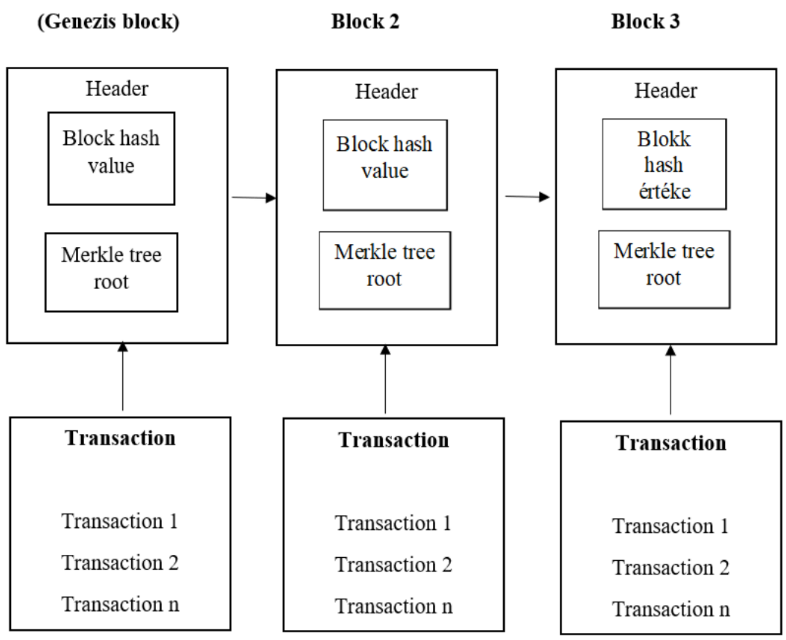

Figure 2. The Bitcoin blockchain structure (Tanzeela et al., 2020)

One of the most famous blockchains is Bitcoin, which laid the foundation for all other blockchains. Although the blockchain can only store a small amount of data, it is one of the most successful blockchains today. Each block is strictly linked to the previous block, forming the blockchain. Each block contains the hash value of the previous block, so if one block is modified without authorization, all blocks would have to be modified, which is an impossible task, especially in 2026. The blockchain is getting bigger through mining, which means that a successful hacker attack on the blockchain is almost impossible. To do this, you would need to take control of 51% of the blockchain, which would be a huge energy and computationally intensive task. Figure 2 below presents the relationship between the blocks. Blockchain is successful if it has the right fundamentals and uses forward-looking solutions. However, in the field of IT, this is not enough, as development is ongoing, so blockchains must also be developed according to the needs of the community. There are two solutions available when developing a blockchain. These are:

- Hard-Fork and
- Soft-Fork.

A new blockchain is created during Hard-Fork. August 1, 2017, hard fork resulted in the creation of Bitcoin Cash, which provided BTC owners with a windfall, as they received one Bitcoin Cash for every Bitcoin they held (Webb, 2018). Forking traditionally refers to the copying of a project to pursue a separate, often competing, line of development. Often, in such cases, the name and direction of the project also typically change. For example, developers may fork a project if they are not satisfied with the direction or governance and decide to create a different version that is more in line with their own vision (Zhou et al., 2020).

Unlike Hard-Fork, Soft-Fork is a backward compatible update, where the updated nodes are able to communicate with the non-updated nodes. This is only possible if the new and updated rule does not conflict with the old one. This process sometimes results in a discrepancy in the chain, where a given block mined with the old rules is not processed by the updated nodes, but is processed by the non-updated nodes instead - leading to a lack of synchronization by users (Yiu, 2021). With the recent development of electronic payments, as an emerging payment method, are becoming increasingly prevalent in people's lives (Guan & Tick, 2024). The 21st Century has been continuously digitalized, which gradually helped companies to introduce new and innovative technologies, change business (Tick, 2023). The 2008 crisis highlighted the importance of financial awareness planning (Csiszárik-Kocsir, 2023). Inadequate communication and negative news are also present in the crypto world and affect price movements.

China's Ministry of Finance announced on May 20 that it will take strict action against cryptocurrency markets and transactions, including requiring the Internal Revenue Service (IRS) to report transfers of $10,000 or more. Cryptocurrency, which offers a means of tax evasion and illegal activity, poses many problems in terms of detection, the Ministry of Finance noted in a statement. Meanwhile, on May 18, 2021, the China Internet Finance Association, the China Banking Association, and the China Payment and Settlement Association announced that cryptocurrencies are not real money and should not and cannot be used as money in the market (Su et al., 2022). As a result of the negative news, the price of Bitcoin fell by 30% that day. After this, another negative news came the next day, mentioning action against mining and trading, which caused the price to fall by another 10%. In May 2022, Tesla CEO Elon Musk stated in a Twitter post that he would not accept cryptocurrency, or Bitcoin, when purchasing his electric vehicle, as its production is harmful to the environment and he does not support this polluting behavior. The exchange rate began to fall as a result that day. The price fell 14% in one day (Zahori et al., 2022).

The bankruptcy of FTX, one of the largest cryptocurrency exchanges, is the fourth major loss in the crypto world after the Luna disaster, the collapse of Celsius or the crash of Three Arrows Capital. Binance -the world's largest cryptocurrency exchange platform- studied acquiring FTX, but after assessing its books (it had an accounting gap of around $8 billion) ruled it out. The reason for the collapse is supposed to be the transfer of around $4 billion of investor funds to Alameda Research in May 2022, another company owned by Sam Bankman-Fried, FTX's founder. After these disclosures came to public light, on November 6, 2022, Binance announced that it would sell its $529 million share of the FTX token, called FTT, which quickly sparked investor fear and subsequent mass sales of the token, ending up with FTX liquidity problems. FTT evidenced the collapse by recording a 77.34% drop in its trading price between the beginning and the end of the session on November 8, 2022 (Esperacia et al., 2024).

In September 2022, the White House released the first-ever Comprehensive Framework for Responsible Development of Digital Assets. In the Framework, the Administration describes the considerable economic potential of digital assets based on distributed ledger technology, such as blockchains and cryptography. At the same time, the Framework underscores several risks accompanying these innovations, including the risk of fraud, volatility, and systemic risk arising out of a contagion of failures and interconnectedness of financial institutions. Against this risk-reward calculus, the White House urges various U.S. regulators to develop new "whole-of-government" approaches to digital assets, mitigate their risks, and reinforce the global financial leadership and competitiveness" of the United States (Guesava & Hutton 2023). As a result, the SEC, the US securities regulator, deemed cryptocurrencies suspicious and placed them under investigation, which had a negative impact on price developments. Within an hour of the news, the price of BTC fell by 5%. This clearly illustrates that news can have an immediate impact on price movements.

GARCH and EGARCH Based Hard-Fork Volatility Modeling in C# Programming Environment

When writing the program, you must specify in the Main method exactly how long the checked interval should last. In the case of Bitcoin, it is advisable to set the date so that it includes at least a four-year time interval. After defining the time window, the program needs to read the daily prices. Using the GetStringAsync(url) function, it is necessary to download the .JSON file containing the x and y values. In this case, x represents the timestamp, since it is a blockchain, meaning the exact date is needed, and y represents the price in USD. For correct time management, it is advisable to use time filtering in the code, as it is possible that the API responsible for the time creates a larger interval. When applying the model, one must strive for accuracy, as a model is good if it works with real data and does not produce incorrect partial results during its execution, which would result in an incorrect model being created. It is also important to check whether the program is working with an adequate amount of data. Since at least 4 years of data are analyzed, the amount of data series used must be at least a thousand rows. If this condition is not met, the model is incomplete. It is also important to determine the closing price, which:

- Groups daily data by year and month,
- selects the last day of each month, which is the closing price,
- Arrange the data listed above in chronological order.

Figure 3 shows the solution to this in the program code.

```
var monthlyClose = daily
   .GroupBy(p => new { p.DateUtc.Year, p.DateUtc.Month })
   .Select(g => g.OrderBy(x => x.DateUtc).Last())
   .OrderBy(x => x.DateUtc)
   .ToList();
```

Figure 3. Monthly closing price formation

The model also needs data calculated from the log-return, the output of which will be returns = List<(MonthEndUtc, R)>. The advantage of the log-yield calculation is that it is easy to handle statistically and can be easily summed up over time, which includes the log property itself. The log-yield cycle is shown in Figure 4 below, in which:

p0: Represents the closing price of the previous month,
p1: Represents the current closing price,
r: Monthly log-yield expressed as a percentage.

```
for (int i = 1; i < monthlyClose.Count; i++)
{
   double r = 100.0 * Math.Log(p1 / p0);
   returns.Add((monthlyClose[i].DateUtc, r));
}
```

Figure 4. Monthly log-yield calculation cycle

GARCH Model

In the case of the Bitcoin price, daily and monthly returns often fluctuate around the average, but the magnitude of the fluctuations is not constant. The Garch model uses the mean equation calculation, in which:

- r_t: Yield (often log yield),
- μ: Average yield,
- ϵ_t: Error member (innovation).

Based on the above, the mean equation formula is as follows:

rt=μ+ϵt

The variance equation of the model is as follows:

σt2=ω+αϵt−12+βσt−12

Where is:

- σ_t^2: Conditional variance (vol^2) at time t,
- α : Constant, "baseline",
- β: GARCH term (persistence of past vol).

The GARCH parameters used in the C# program are as follows:

- μ (mu): It represents the average level of returns on monthly data. This is the average monthly log return.
- ω (omega): The basic component of variance. In the case of Bitcoin, even if there were no outliers, it would still give a so-called minimum variance level.
- α (alpha): It shows how sensitive volatility is to large swings in the previous period.

For the variance to always be positive, the following conditions must be met, such as:

- ω>0,
- $\alpha \geq 0$,
- $\beta \geq 0$,
- α+β<1 (stationarity).

EGARCH model

EGARCH (Exponential GARCH) is a development of GARCH that is specifically designed to:

- Volatility should always be positive without having to apply hard limits of the type, $\omega > 0$, $\alpha \geq 0$
- Treat asymmetry appropriately,
- It is often better suited for financial crypto returns and time series.

Plain GARCH models variance directly. EGARCH models log-variance instead. Since $\ln(\sigma_t^2)$ it can be any real number, the result when converted back will always be a positive number. This is a very big practical advantage. The written program uses the following EGARCH variance equation:

ln(σt2)=ω+βln(σt−12)+α(∣zt−1∣−κ)+γzt−1

- σt2: Conditional variance. This is the variance valid at time t. Volatility: σt=σt2.
- ln(σt2): The log-variance. Az EGARCH nem közvetlenül a varianciát írja, hanem a logaritmusát. This is very important because it $\sigma_t^2 = \exp(\cdot)$ is always positive, so there is no need to "force" the variance not to be negative.
- ϵt: Innovation / error. The meaning comes from the equation: rt=μ+ϵt. By this: ϵt=rt−μ. Standardized innovation.
- K: The absolute standard normal expected value. This is necessary because if z∼N(0,1) then E∣z∣=κ.

The program code for the EGARCH model is illustrated in Figure 5 below.

```
private static FitResult FitEgarch11(double[] r)
    {
        double mean = r.Average();
        double var = Variance(r);

        double[] theta0 = new[]
        {
            mean,
            Math.Log(Math.Max(var, 1e-6)), // omega
            Math.Log(0.10),              // logAlpha
            Atanh(0.85),                 // atanhBeta
            0.0                          // gamma
        };
        double Objective(double[] theta)
        {
            var p = UnpackEgarch(theta);
            if (double.IsNaN(p.alpha) || p.alpha <= 0) return 1e50;
            if (double.IsNaN(p.beta) || Math.Abs(p.beta) >= 0.999999) return 1e50;
            return EgarchNll(r, p.mu, p.omega, p.alpha, p.beta, p.gamma);
        }
        var best = NelderMead.Minimize(Objective, theta0, step: 0.10, maxIter: 12000, tol: 1e-8);
        var pars = UnpackEgarch(best.x);
        return new FitResult(best.f, new[] { pars.mu, pars.omega, pars.alpha, pars.beta, pars.gamma });
    }
    private static (double mu, double omega, double alpha, double beta, double gamma) UnpackEgarch(double[]
theta)
    {
        double mu = theta[0];
        double omega = theta[1];
        double alpha = Math.Exp(theta[2]);
        double beta = Math.Tanh(theta[3]);
        double gamma = theta[4];
        return (mu, omega, alpha, beta, gamma);
    }
    private static double EgarchNll(double[] r, double mu, double omega, double alpha, double beta, double
gamma)
    {
        int T = r.Length;
        double[] eps = new double[T];
        for (int t = 0; t < T; t++) eps[t] = r[t] - mu;
        double var0 = Math.Max(Variance(eps), 1e-8);
        double logSigma2 = Math.Log(var0);
        const double tiny = 1e-12;
        double kappa = Math.Sqrt(2.0 / Math.PI);
        double nll = 0.0;
        for (int t = 0; t < T; t++)
        {
            if (t > 0)
            {
                double sigmaPrev = Math.Sqrt(Math.Exp(logSigma2));
                if (sigmaPrev < 1e-8) sigmaPrev = 1e-8;

                double zPrev = eps[t - 1] / sigmaPrev;

                logSigma2 = omega
                        + beta * logSigma2
                        + alpha * (Math.Abs(zPrev) - kappa)
                        + gamma * zPrev;
            }
```

```
            double sigma2 = Math.Exp(logSigma2);
            if (sigma2 < tiny) sigma2 = tiny;

            nll += 0.5 * (Math.Log(2.0 * Math.PI) + Math.Log(sigma2) + (eps[t] * eps[t]) / sigma2);
            if (double.IsNaN(nll) || double.IsInfinity(nll)) return 1e50;
        }
        return nll;
    }

    private static double[] ComputeEgarchConditionalVol(double[] r, double[] pars)
    {
        double mu = pars[0], omega = pars[1], alpha = pars[2], beta = pars[3], gamma = pars[4];
        int T = r.Length;

        double[] eps = new double[T];
        for (int t = 0; t < T; t++) eps[t] = r[t] - mu;
        double[] vol = new double[T];
        double var0 = Math.Max(Variance(eps), 1e-8);
        double logSigma2 = Math.Log(var0);
        double kappa = Math.Sqrt(2.0 / Math.PI);
        for (int t = 0; t < T; t++)
        {
            if (t > 0)
            {
                double sigmaPrev = Math.Sqrt(Math.Exp(logSigma2));
                if (sigmaPrev < 1e-8) sigmaPrev = 1e-8;
                double zPrev = eps[t - 1] / sigmaPrev;
                logSigma2 = omega
                        + beta * logSigma2
                        + alpha * (Math.Abs(zPrev) - kappa)
                        + gamma * zPrev;
            }
            vol[t] = Math.Sqrt(Math.Exp(logSigma2));
        }
        return vol;
    }
```

Figure 5. EGARCH model

Structure of the Volatility Model

The structure of the volatility model of the program written in C# is shown in Figure 6 below. The most important steps in building the program that performs the model calculation are shown in Figure 6.

Results and Discussion

GARCH(1,1) and EGARCH(1,1) models were fitted to monthly Bitcoin log returns using maximum likelihood. The EGARCH(1,1) model yielded lower NLL, AIC, and BIC values (AIC: 450.36; BIC: 459.61) than GARCH(1,1) (AIC: 457.77; BIC: 465.17), suggesting that EGARCH provides a better fit to the sample. The GARCH estimate was marginal ($\alpha \approx 1$, $\beta \approx 0$), suggesting a small sample or specification limitations. The EGARCH parameters indicate an asymmetric volatility response ($\gamma > 0$), meaning that positive and negative shocks may affect volatility differently.

Figure 7 shows the results of fitting two models (GARCH(1,1) and EGARCH(1,1)) using BTC log returns. The program estimated the parameters using the maximum-likelihood method and then printed the fit indices (NLL, AIC, BIC) and the model parameters.

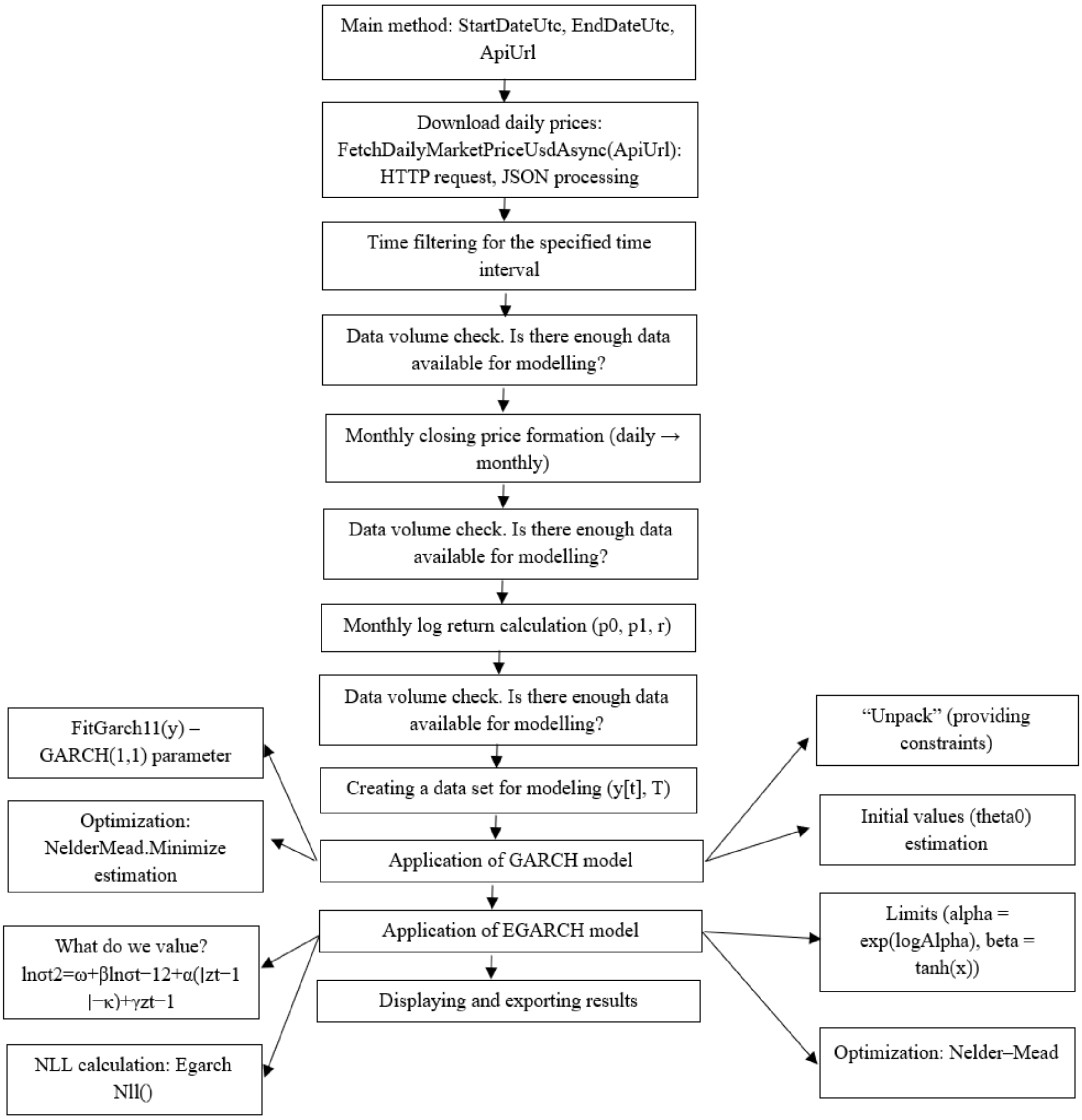

Figure 6. Structure of building a volatility model

=== GARCH(1,1) ===
mu = 1.794237
omega = 390.174135
alpha = 0.999999
beta = 0.000000
alpha+beta = 0.999999

=== EGARCH(1,1) ===
NLL: 220.181186
AIC: 450.362372
BIC: 459.613110
mu = 3.831849
omega = 4.549299
alpha = 0.577390
beta = 0.303780
gamma = 0.760008

Figure 7. GARCH and EGARCH model results

Conclusion

The price movement of cryptocurrencies has always been characterized by high volatility. This is due to several factors, such as a relatively small market, novelty and uncertainty, and the lack of proper regulation. Communication has a great impact on price movement. Positive news is certainly a price-boosting factor, while negative news tends to cause the price of Bitcoin to decrease, which causes its price movement. For this reason, it is advisable to create a model and examine which model best describes the price development. While sound fundamentals are essential in blockchain technology, research has shown that news can generate significant price volatility. Based on the result, it can be concluded that in GARCH an $\alpha \approx 1$, $\beta \approx 0$ marginal solution can be detected, which often indicates that the plain GARCH does not find "nice" dynamics on this sample. EGARCH gave better AIC/BIC, which indicates that the model handles the structure better.

Scientific Ethics Declaration

* The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Conflict of Interest

* The authors declare that they have no conflicts of interest

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