

Regulation of Cryptocurrencies in the European Union – Impact of European regulatory notifications on the cryptocurrency market

Kamil Winnowicz^{1,*}, Cam-Duc Au² and Dirk Stein³

¹ *FOM University of Applied Sciences for Economics and Management, Siegen, Germany*

² *Department of Finance, Faculty of Economics and Administration, Masaryk University, 601 77 Brno, Czech Republic; FOM University of Applied Sciences for Economics and Management, Frankfurt am Main, Germany; isf Institute for Strategic Finance, Essen, Germany*

³ *FOM University of Applied Sciences for Economics and Management, Cologne, Germany; isf Institute for Strategic Finance, Essen, Germany*

Abstract.

Driven by the economic crisis in 2007 and the resulting distrust of governments and banks, Bitcoin is one of many conceivable applications that the blockchain technology behind it enables. Cryptocurrencies are primarily traded on unregulated online exchanges and deviate significantly from the original intention as an independent means of payment. Thus, the regulatory authorities are currently working hard on developing guidelines on how to put a legal framework around the vastly developing digital assets. The aim of this paper is to review the current regulatory guidelines for cryptocurrencies in the European area and to present the ongoing development. Furthermore, with the help of quantitative research technique, more in-depth knowledge and classification approaches are used to gain a broader impression of the regulation of cryptocurrencies. In doing so, measures are highlighted that serve to combat illegal use of the new currency. The regulations for the interoperability of cryptocurrencies with regulated financial companies must also be questioned to derive further insights into the influence on the Bitcoin price. The results show that individual countries such as Germany, Switzerland and Liechtenstein are more advanced in terms of the regulatory system for cryptocurrencies. However, these countries are too small and have an insignificant trade volume in relation to China and the USA, after which these countries could play a relevant role on the world market. If the European states do not act as a joint entity with the EU financial authorities on the world market, then international states will have a far lead and shape regulatory measures in the future.

Keywords: Bitcoin, Blockchain, Digital Assets, Cryptocurrency, Regulation

1. Introduction

Cryptocurrencies are primarily traded on unregulated online exchanges and deviate significantly from the original intention as an independent means of payment (Umlauf, 2018). In order to describe Bitcoin as a means of payment, it is assumed that the actual value of such a coin is covered by gold or other assets that enable value stability (Wolla, 2018). Currently, the price of Bitcoin, as well as the price of other cryptocurrencies, is determined entirely by supply and demand. The price excesses that have occurred are due, among other things, to mechanisms in the system that are familiar from traditional capital markets. The upswing multiplies the upswing. This leads to exponential paradigms in the system (Hennies & Raudjärv, 2018). This raises the question of whether cryptocurrencies should therefore be classified as assets and not as currencies, since the currency function as a stable means of payment is not primarily pursued (Glaser et al., 2014). It is problematic to see that due to this lack of transparency, corresponding state regulation cannot be applied across the board and cryptocurrencies and their properties must therefore be specified in order to define a valid regulatory approach (Grigo & Hansen, 2019). Accordingly, it is essential to create state framework conditions in order to generate approximate price stability. Due to the currently prevailing self-regulation, there is a risk of further price excesses. The original intention as a decentralized means of payment is thus missed (De Filippi, 2014).

In addition to the high volatility, the increased illegal activity using the anonymous payment function of cryptocurrencies on the Darknet is also problematic (Foley et al., 2018). Bitcoin and other cryptocurrencies are an ideal tool for money laundering activities or the transaction of larger sums of money internationally without a third party such as a bank recognizing these processes (Lu, 2018). Nevertheless, a total ban is ineffective due to the decentralized structure, even if some countries, for example, officially classify Bitcoin as illegal (Vogel, 2016). As long as it is a product of the black capital market, with a limited investment volume and limited private use as a means of payment, state regulation of cryptocurrencies presents a complex challenge (Schäfer, 2017).

In order to address regulatory concerns, it is important to find out which competent authorities in the European Union are responsible for classifying cryptocurrencies. In addition, it is crucial for the classification that the focus is not on the technology used, but on the economic purpose. Furthermore, it is necessary to critically question which boundaries are drawn between the European regulatory bodies in order to create clear responsibilities (Auer & Claessens, 2018; Brühl, 2017, A). It is also important to check whether the European financial authorities and European countries are having an impact on the Bitcoin price with their regulatory actions. A corresponding result makes it possible to question the current position of Europe on the international market.

In the further course of this article, the results will be analyzed both descriptively and inductively using an event study in order to finally work out explanations for the influences.

1.1 Fundamentals of Blockchain

It should be noted that the term blockchain is subject to arbitrary usage (Koens & Poll, 2018). Other sources also state that there is no generally accepted definition of the term blockchain and that it is subject to constant change (Mattila, 2016; Glatz et al., 2017). Accordingly, the first etymological approaches can be traced back to the founder of the blockchain Satoshi Nakamoto (Nakamoto, 2008). This only uses the term data blocks that are linked together, also called chained (Rasinski, 2017). A reduced form of functionality describes that in each new data record, also called a block, a cryptographic checksum, the hash value, of the previous chain of data records is encoded, so that manipulation of the data by individual participants is in principle impossible (Brandt & Werner, 2018). Thus, the development of Satoshi Nakamoto's concept is not the primary source of word formation, but merely defines the origin of the words block and chain (Nakamoto, 2008). The coherent conceptual approach blockchain cannot be derived from any primary literature and can therefore be traced back to the word development of other authors who have tried to summarize the system with one word.

As described above, the increasing awareness of the blockchain led to a partially inflationary use of the term. A research group from the University of Cambridge came to the same conclusion, which determined the use of incomplete and inconsistent terminology and derived a reference model that describes the necessary components of a blockchain (Zhang, 2018).

The term blockchain can be assigned to the generic term distributed ledger technology. This is a system that works without a central control authority despite the unknown reliability of these participants (Hinckeldeyn, 2019). The World Bank describes the DLT system as a specific implementation of a special form of so-called distributed ledgers that allows participants in a network to share read and write permissions (World Bank Group, 2017). Using this system, participants can transact securities and cash without relying on a trusted central validation system (Pinna & Ruttenberg, 2016). In this sense, the blockchain is just another variant of the DLT system, which serves as a peer-to-peer protocol for a decentralized, immutable and distributed ledger and consists of validated transaction blocks that are connected in a time-ordered chain (Silver, 2018). The special feature of blockchain technology is the decentralized structure of the network (Hein et al., 2019).

A decentralized structure, on which the blockchain is based, does not have a central control authority, so that direct communication with each other is possible. There is no control outside of this network. Accordingly, users can access the network from anywhere in the world and always have a uniform and synchronized database, also known as a peer-to-peer network (Marume & Jubekanda, 2016). This feature forms the framework for the blockchain.

1.2 Cryptocurrencies: The new digital asset

The word cryptocurrency is made up of the terms crypto and currency. The etymological origin of the term crypto can be traced back to the ancient Greek term *kryptós* and was essentially understood as hidden or hidden. The preceding word formation element is primarily associated with cryptography and describes the science of encrypting information using secret codes (Spitz et al., 2011; Wätjen, 2018). The etymological origin of the word currency has its

medieval roots in the former state guarantee for the fineness of coins minted from precious metals. The term denari waringe was first used in Cologne at the end of the 12th century. A century later the term warandia publica followed. Until the term werung was used in the Constance Coin Ordinance of 1404 and in Article 11 of the Swabian Coin Association, thus creating the basis for the current use of the term (Goldschmidt, 1868; Reinhuber, 1995). Deriving from the current definition of the term cryptocurrency, these can be described as transferrable digital assets, which can be regarded as a secure means of payment due to the implemented cryptography (White, 2014). In addition to the function as a means of payment, it is also possible to convert a crypto currency into a token within an initial coin offering phase. This acts as a medium of exchange for exclusive content during startup financing (Sixt, 2017; Hahn & Wons, 2018).

The first recorded experiments with cryptocurrency took place in the Netherlands as early as the mid-1980s (Cohen, 2017). On August 18, 2008, the bitcoin.org domain was registered. As a result, on October 31, 2008, a group or individual published a concept paper on the Bitcoin decentralized payment system under the pseudonym Satoshi Nakamoto. Derived from the genesis block, the first 50 Bitcoins were created on January 3, 2009, which initiated the gradual adaptation process of this technology (Crosby et al., 2015; Cohan, 2017).

Before a transaction can be carried out on a blockchain, the validation process must first be specified, as this serves as a set of rules for all subsequent transactions and describes a source code that defines how computers communicate. These automatically executable programs, which are based on the blockchain, are also called smart contracts (Berentsen & Schär, 2018). Nick Szabo invented smart contract technology in 1994 and developed a computer protocol that could digitally map contracts. Based on this source code, it is possible to automatically execute contractual transfers on the blockchain without a third party (Crosby et al., 2016; Braunschweig & Pichler, 2018).

For this reason, every transaction is secured by a digital signature, which must first go through a bilateral validation process. First, the sender generates a key pair consisting of a private key and a public key. The sender uses the private key to create an encrypted signature, while the public key has the function in the network of verifying the signature and thus checking the legitimacy of the sender. To transfer cryptocurrencies, the recipient address of the online purse, also called wallet, is required, which is generated using a cryptographic process. The sender then generates a transaction that must be generated according to a specified format and, in addition to the recipient address, contains the amount and all relevant transaction references that declare the sender as the legal owner of the cryptocurrency to be sent. Furthermore, the private key uses a signing algorithm to create a signature for the data, which is sent encrypted with the public key over the network to the recipient. The recipient uses the sender's public key to verify the transaction. A signature can only have been created by the owner of the private key that matches the public key sent (Brühl, 2017; Badev & Chen, 2014).

1.3 Regulation approaches with the European Union

The same trade-off exists in the regulation of cryptocurrencies as in many other innovations in the financial sector. If a regulatory measure is implemented too early and too heavily, the

desired innovation is suppressed and thus increases the shift of this development to other countries. Late or insufficient regulatory action can, in turn, lead to significant risks. In particular, cryptocurrencies raise some new regulatory and legal issues that require further investigation (Hungerland et al., 2017). In particular, the question to be asked here is whether and how European regulatory measures and the associated news will affect the cryptocurrency markets.

The question of the position and definition of cryptocurrencies must be clarified here in order to be able to prevent criminal activities. Corresponding regulatory starting points can be divided into three categories. The first to be mentioned are bitcoin-specific crimes, which include the theft of bitcoin through hacker attacks, but also exchange rate manipulation. The lack of transparency of the responsibilities of regulatory authorities makes appropriate regulation in such a case difficult. Second, there is money laundering activity. The design of cryptocurrencies with the corresponding blockchain proves to be an advantage, since transactions are permanently recorded and documented in a sustainable manner and the flow of money can thus be monitored. Publications of new cryptocurrencies or a new blockchain must therefore be monitored by the appropriate responsible authorities, which may still have to be created. The third point to be mentioned is crimes that are facilitated by the existence of cryptocurrencies. The acquisition of illegal goods, such as drugs and weapons via the dark web, falls under this category. A small amount of regulatory intervention tempts criminals to conduct such transactions via cryptocurrencies, so that the relevant regulatory authorities have to be shown a high level of relevance (Böhme et al., 2015; Marian, 2015).

In addition, there are the issues of data protection and anonymity of consumers, which must be questioned. Users of cryptocurrencies see, among other things, the danger that they could be identified via digital storage in the blockchain. Specific identification is only possible to a limited extent. Although transactions can be traced, the identity of the users and the transaction carried out are encrypted by the hash algorithm. This property corresponds to the same advantage as paying with cash. Each banknote has a serial number and is therefore traceable, but it is not possible to trace whose hands it passed through (Pilkington, 2015; Krombholz et al., 2016).

Currently, a threat to monetary and financial market stability is not to be expected, as cryptocurrencies are still used to a limited extent. The market capitalization of cryptocurrencies in 2017 corresponds to around 20 billion euros. Compared to the euro money supply in this period, this is only 0.3% (Hanl, 2017). A current example shows the oldest and most prominent representative of cryptocurrencies, namely Bitcoin, that the development should not be underestimated. The market capitalization of Bitcoin alone corresponds to around 155 billion euros at the beginning of 2020. Compared to the current euro money supply, the share is 1.7% (European Central Bank, 2020; Rabe, 2020). Accordingly, it can be seen that the proportion of cryptocurrencies compared to the euro money supply has multiplied within around three years and shows a steady trend. Although this is still a small amount compared to most traditional currencies, it can be derived from this that the relevance of corresponding regulatory measures is also increasing. Before empirically examining the effects of European regulatory notifications on the cryptocurrency market in the next section, it is essential to review the

classification of ICOs by the EU financial supervisory authorities and the current status of state regulation in order to understand the structure of the regulatory authorities and regulatory notifications of a more specific classification to undergo.

2. Research Method

Building on the theoretical main part, it is to be further investigated empirically whether the aforementioned regulatory measures trigger a corresponding effect on the cryptocurrency market. Since cryptocurrencies are not influenced by a central institution, a specific view of the market is crucial, especially with new legislation at the national level. It is crucial here that the period before and after a regulatory report is observed in order to examine the market impact in a targeted manner. Accordingly, it must be clarified what effects European regulatory reports will have on the cryptocurrency market and whether they will cause a significant price effect. In addition to a descriptive analysis, an inductive analysis must also be carried out. The price effect is to be assessed on the basis of the following hypotheses:

H₀: European regulatory announcements have no impact on the price development of cryptocurrencies, in this case the Bitcoin price.

H₁: European regulatory announcements have an impact on the price development of cryptocurrencies, in this case the Bitcoin price.

In the further course, the robustness of the study will be checked, so that international reports will be consulted in order to show a clear significance. The following hypotheses apply to this market news:

H₀: The market news does not affect the price development of cryptocurrencies, in this case the Bitcoin price.

H₁: The market news has an impact on the price development of cryptocurrencies, in this case the Bitcoin price.

2.1 Empirical Analysis

An incident or event study is suitable for such a procedure. With the help of this it is possible to isolate prices, trading volumes and other aspects of regulatory messages. The results enable the information content of news to be measured and market efficiency to be checked (Brown & Warner, 1985). Despite the wide range of design options, an event study follows a structure that is independent of the objective of the study and the type of event (MacKinley, 1997):

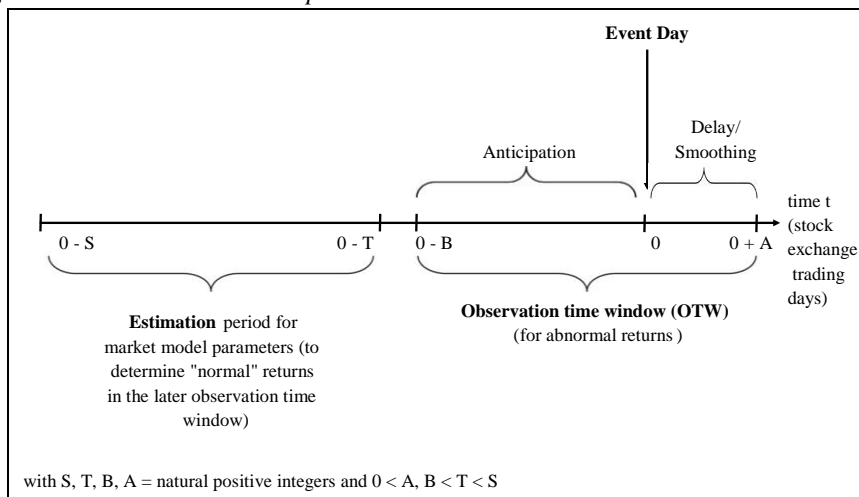
- Conceptual specification of the object of investigation or the event
- Identification or definition of the investigation period
- Defining the event and estimation period
- Calculation of the abnormal return effect

- Testing of the statistical significance and determination of the null hypothesis -
- Presentation and interpretation of the obtained results

The demarcation of the event must be precisely defined. Only a clear definition of the event to be examined can ensure that the results are not diluted or distorted by other events (Görke, 2009).

In addition to determining the investigation period, an event and estimation period must also be defined. An event period, also referred to as an observation time window, describes a time interval around the publication date of the report and serves as the basis for calculating the abnormal return. In addition, an estimation period, which can be before or after the event period, is used to determine an abnormality. This serves to determine the expected return that the object of investigation would achieve without an event (Pauser, 2007). The basic structure of the periods is visualized again in the following figure (Gerpott, 2009):

Figure 1: Event and estimation period in event studies



Source: Gerpott, T. J., 2009, p. 215

The next step is to calculate the abnormal rate of return. The abnormal return is defined as the difference between actual and expected returns. A positive result is an excess return, a negative result is an underreturn on a share i , in this example of a cryptocurrency, at the time t (Schwarzer, 2003).

To estimate returns R_{it} various models have been proposed in the literature for estimation. In research practice, the market model has prevailed:

$$R_{it} = a_i + \beta_i R_{mt} + v_{it}$$

R_{it} is determined from the closing prices of the analyzed share. The parameters a_i and β_i are to be estimated in a linear regression in the run-up to the event in the estimation window. R_{mt} corresponds to the daily return of a benchmark to be selected and v_{it} stands for the error term.

The autonomous return achieved by the company or, in this example, by the cryptocurrency is represented by a_i . Going further, β_i represents the movement of the cryptocurrency, which is compared to the benchmark (Görke, 2009; Campbell et al., 1997). Accordingly, a benchmark must first be defined in order to determine a corresponding deviation:

$$E(R_{it}) = a_i + \beta_i R_{mt}$$

On days without an event, the expected return $E(R_{it})$ depends on the performance of the benchmark. To determine the abnormal return AR_{it} , the difference between the actual and the expected return is formed:

$$AR_{it} = R_{it} - (a_i + \beta_i R_{mt})$$

These calculation steps must be carried out for each event i . Finally, the abnormal returns are to be aggregated across the events and can be tested for the significant influence of the event (Görke, 2009; McWilliams & Siegel, 1997).

The results can only be empirically verified by means of a significance test. When examining the impact of European regulatory measures on the cryptocurrency market, it is necessary to test whether the abnormal returns on the day of the event or the abnormal returns accumulated over the event period differ significantly from zero (Schwarzer, 2003; Brown & Warner, 1980).

The empirical study extends over a period from August 13, 2015 to August 12, 2020 and covers a total period of 5 years. The subject of the empirical study is the regulatory notifications from different countries within the EU. Press releases from the various European regulatory bodies are also included. A total of 91 regulatory notifications are examined.

The goals pursued with the regulation of cryptocurrencies are similar to the measures taken for other financial assets and services. The regulatory notifications are divided into three categories. These include combating the use of this currency for illegal activities, protecting consumers and investors from fraud and other abuses, and safeguarding the integrity of both markets and payment systems and financial stability overall (Fanusie & Robinson, 2018).

First, defines measures to combat illegal use by those companies that provide access to cryptocurrencies. Consumers and investors use crypto wallets and other intermediaries held by external entities. Reports are listed which show existing rules and enforcement mechanisms or also include new money laundering guidelines. Such activities are also called AML/CFT regulations. The second category contains regulations on the interoperability of cryptocurrencies with regulated financial entities such as commercial banks, credit card companies and exchanges. These regulators are responsible for converting government money into cryptocurrencies. Third, the legal status of cryptocurrencies with the authorities needs to be categorized. This includes questions about consumer protection and use in private customer business. Total bans on cryptocurrencies should also be included here. This category also contains key questions on whether cryptocurrencies should be treated as securities. Securities are subject to a strict legal framework, which can be transferred to cryptocurrencies. This consideration also includes alternative approaches, such as classifying cryptocurrencies as generic assets. (Auer & Claessens, 2018).

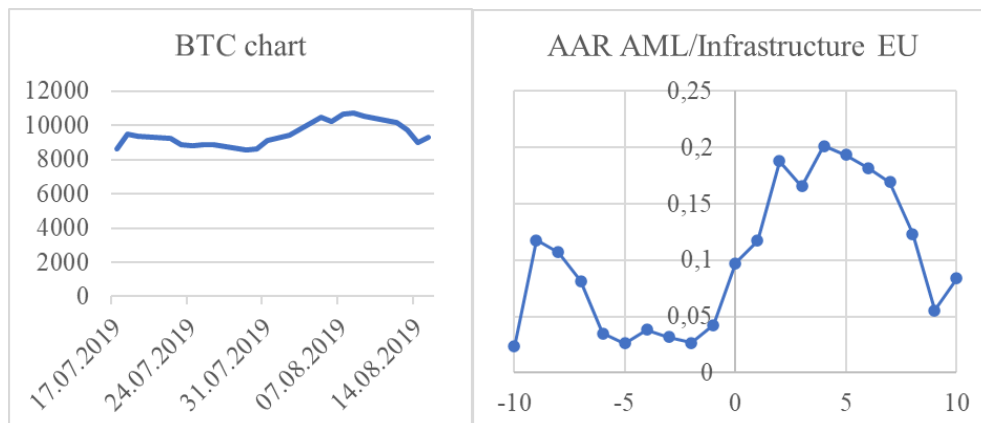
Based on the Auer and Claessens coding scheme, the regulatory notifications are also classified according to the regulatory point of view in addition to the categorization mentioned above. A simple coding scheme is used for this, namely a binary variable with a value of +1 for messages related to strict or well-defined regulations and -1 for messages indicating a mildly defined regulation (Auer & Claessens, 2018). A detailed breakdown of the coding method is provided in the appendix for overview purposes. The dataset is largely based on reports from cointelegraph, btcecho, Handelsblatt and Reuters. If a report was linked to an original article, this should be used as the primary source. In the course of the research, all items that are to be placed in the European Union, are to be classified as regulatory notifications and fall within the investigation period were checked and listed. A total of 91 regulatory notifications are examined.

3. Results and Discussion

The effect of European regulatory notifications identified within the observation time window is examined both descriptively and inductively in relation to the Bitcoin price. Since Bitcoin is the most dominant and well-known representative of cryptocurrencies and this is the most influential cryptocurrency in comparison, the decision falls on this currency for the previous calculation within the event study (Lo & Wang, 2014)

In order to show whether European regulatory announcements have an impact on the cryptocurrency market, three events were selected. The first event examined is assigned to the AML/Infrastructure category and is dated 07/31/2019. The regulatory report reports that the German government cabinet has paved the way for tougher action against money laundering. According to this, crypto assets and their providers are to be more heavily regulated in future in terms of money laundering (Finanzen.net, 2019). On the day of the event, the bitcoin price is EUR 9,109 and rises to EUR 10,697 within the lag period. This corresponds to a price change of 17.4%. In addition, the aggregated abnormal return on the day of the event is considered, which is 9.7%. In the delay period, this value increases to 20.1%.

Figure 2: Bitcoin-price and AAR on event from 31st July 2019



Source: Own illustration

From the descriptive analysis, it can be deduced that the Bitcoin price increased on the day of the event. However, it is also determined that the price shows an above-average change beforehand. The inductive analysis also shows that the standard deviation, also known as the z-score, is 1.40 on the day of the event (Curran-Everett, 2008). This corresponds to a lower than 90% confidence level. In principle, at least a critical level of 5% is aimed for in this work. This corresponds to a z-score of over -1.96 or 1.96 (Schuster & Liesen, 2017). Consequently, the event is not significant. H_0 cannot be rejected. Even with the risk of making a mistake of the second kind, this regulation message has no influence on the price development of the Bitcoin price. In contrast to the tested event time, a zscore of 2.42 can be determined on day -9. This indicates a significant event. Due to the fact that the price shows a negative trend in advance, the regulation report cannot be distinguished from the market-based price recovery in the subsequent recovery (see Table 1).

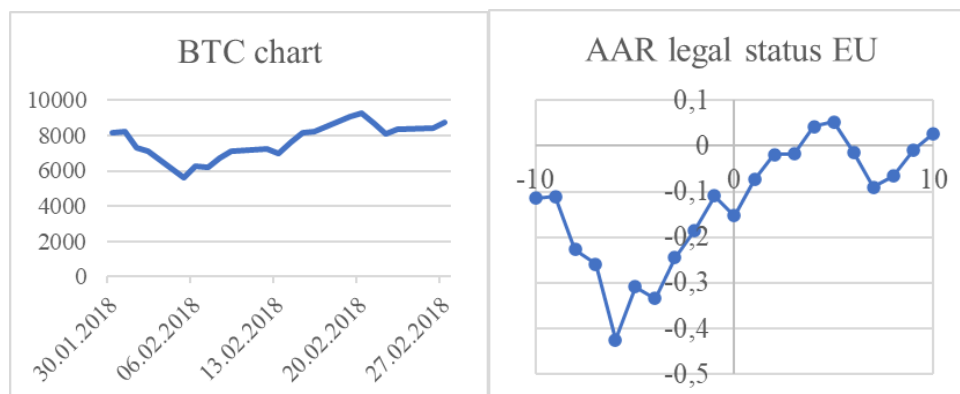
Table 1: Significance Test from 31st July 2019

Date	Tag	E r	AR	AAR	AR-Test	Significant?
17.07.2019	-10	-0,0020	0,0232	0,0232	0,5935	No
18.07.2019	-9	-0,0019	0,0945	0,1177	2,4228	Yes
19.07.2019	-8	0,0006	-0,0105	0,1072	-0,2688	No
24.07.2019	-5	0,0010	-0,0091	0,0260	-0,2320	No
25.07.2019	-4	-0,0024	0,0122	0,0382	0,3126	No
26.07.2019	-3	0,0031	-0,0064	0,0319	-0,1638	No
29.07.2019	-2	0,0008	-0,0055	0,0264	-0,1400	No
30.07.2019	-1	-0,0082	0,0161	0,0424	0,4114	No
31.07.2019	0	0,0016	0,0548	0,0972	1,4041	No
02.08.2019	1	-0,0130	0,0202	0,1174	0,5173	No
05.08.2019	2	-0,0093	0,0706	0,1880	1,8080	No
06.08.2019	3	-0,0021	-0,0226	0,1654	-0,5791	No
07.08.2019	4	0,0039	0,0358	0,2012	0,9177	No
08.08.2019	5	0,0112	-0,0076	0,1936	-0,1956	No
09.08.2019	6	-0,0056	-0,0115	0,1821	-0,2950	No
12.08.2019	7	-0,0002	-0,0129	0,1692	-0,3297	No
13.08.2019	8	0,0058	-0,0458	0,1233	-1,1749	No
14.08.2019	9	-0,0099	-0,0678	0,0555	-1,7380	No
15.08.2019	10	0,0000	0,0284	0,0839	0,7271	No

Source: Own analysis and calculation

The second event examined is a regulatory notification, which is classified as a legal status and was published on February 13, 2018. This is a cryptocurrency warning from the European regulators EBA, ESMA and EIOPA. Accordingly, consumers would run a high risk of losing capital if they invest in cryptocurrencies, since a total loss is not protected by EU financial legislation (Bülow, 2018). On the day of the event, the Bitcoin price is EUR 6,961 and rises to EUR 9,246 within the lag period. This corresponds to a price change of 32.8%. In addition, the aggregated abnormal return on the day of the event is considered, which is -15.2%. In the lag period, this value recovers to -0.01%. The key figures provide information on a recovery trend, which has its origin in advance. On day -1 the AAR is -10.9%. On the day of the event itself, a price setback can be observed, which continues the recovery trend as the following figure shows.

Figure 3: Bitcoin-price and AAR on event from 13th February 2018



Quelle: Own analysis and calculation

From the descriptive analysis it can be seen that the Bitcoin price is already subject to a corresponding influence in advance. The event originally under study also pulls back, but price continues to recover, so while there is an impact, it turns out not to be severe. Following this, the inductive results must now be checked in order to be able to determine a significance in the event. As already assumed in the descriptive analysis, there are four days in the anticipation, which point to a significant result at the critical level α with 5%. In addition, on day -6 a z-score of -3.16 can be observed, which indicates a highly significant result at the critical level α with 1%.

Table 2: Significance test event study from 13th February 2018

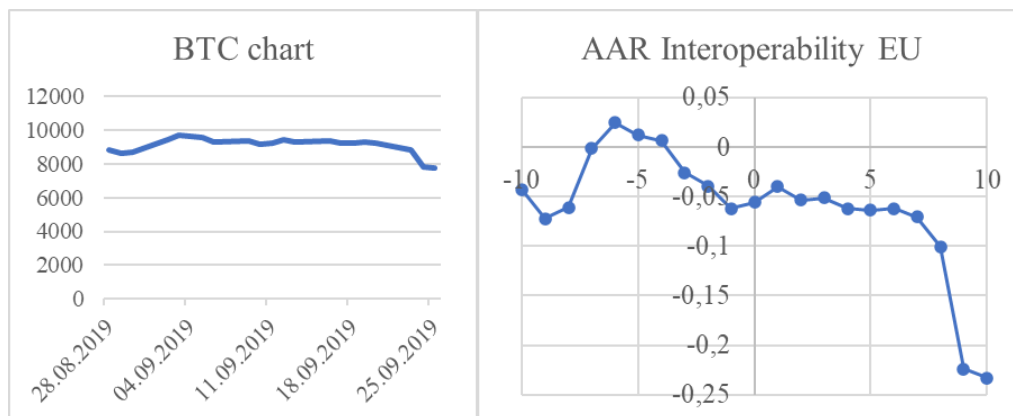
Date	Tag	E r	AR	AAR	AR-Test	Significant?
30.01.2018	-10	0,0004	-0,1140	-0,1140	-2,1670	Yes
31.01.2018	-9	0,0069	0,0038	-0,1102	0,0717	No
01.02.2018	-8	0,0011	-0,1170	-0,2272	-2,2243	Yes
02.02.2018	-7	-0,0028	-0,0311	-0,2582	-0,5904	No
05.02.2018	-6	-0,0013	-0,1662	-0,4244	-3,1600	Yes
06.02.2018	-5	-0,0083	0,1159	-0,3085	2,2040	Yes
07.02.2018	-4	0,0170	-0,0253	-0,3339	-0,4819	No
08.02.2018	-3	-0,0073	0,0891	-0,2447	1,6948	No
09.02.2018	-2	-0,0028	0,0605	-0,1842	1,1502	No
12.02.2018	-1	0,0141	0,0754	-0,1089	1,4331	No
13.02.2018	0	0,0015	-0,0432	-0,1521	-0,8214	No
14.02.2018	1	0,0117	0,0781	-0,0739	1,4856	No
15.02.2018	2	0,0100	0,0556	-0,0183	1,0577	No
16.02.2018	3	0,0131	0,0013	-0,0170	0,0239	No
19.02.2018	4	0,0031	0,0598	0,0428	1,1378	No
20.02.2018	5	0,0113	0,0097	0,0525	0,1835	No
21.02.2018	6	0,0056	-0,0657	-0,0133	-1,2494	No
22.02.2018	7	0,0068	-0,0768	-0,0900	-1,4598	No
23.02.2018	8	0,0081	0,0236	-0,0664	0,4495	No
26.02.2018	9	0,0103	0,0577	-0,0087	1,0977	No
27.02.2018	10	0,0056	0,0356	0,0269	0,6764	No

Quelle: Own analysis and calculation

On the day of the event, the z-score was -0.82. Consequently, the event is not significant. H_0 cannot be rejected. Even with the risk of making a type 2 error, this regulatory notification has no impact on the price development of the Bitcoin price, as can be seen from the following table:

Finally, a European regulatory notification must be considered, which falls under the classification of interoperability and was published on September 11th, 2019. The report relates to a publication by the Swiss Financial Market Authority on the subject of stablecoins and the Facebook currency Libra. FINMA has published an addendum to its ICO guideline that specifically addresses the issue of stablecoins. In addition, the supervisory authority also confirms that the social media group Facebook asked FINMA for an assessment of the company's stablecoin Libra (Huillet, 2019). On the day of the event, the Bitcoin price is EUR 9,242 and increases to a maximum of EUR 9,416 within the delay period. This corresponds to a price change of 1.9%. In the period of anticipation, a positive AAR on day -6 of 2.5% should be mentioned. This drops to -5.6% by the day of the event (see Figure 4).

Figure 4: Bitcoin-price and AAR on event from 11th September 2019



Source: Own analysis and illustration

In summary, it can be stated that the descriptive analysis shows an inconspicuous result, which only shows an above-average price decline on day 9. Regarding the anticipation period, it can be said that the Bitcoin price is more volatile than the traditional currency market (Pichl & Kaizoji, 2017). For this reason, the changes at this point should not be emphasized. The inductive results must be checked further. The facts already highlighted are underlined by the inductive analysis. A zscore of 0.17 can be observed on the day of the event. Within the anticipation, there are also no significant days to be named. A highly significant result at the critical level α with 1% is only shown on day 9. The z-score on that day is -3.17. Consequently, the event is not significant.

H_0 cannot be rejected. Even with the risk of making a type 2 error, this regulatory notification has no impact on the price development of the Bitcoin price, as can be seen from the following table 3:

Table 3: Significance test event from 11th September 2019

Date	Tag	E r	AR	AAR	AR-Test	Significant?
28.08.2019	-10	0,0004	-0,0432	-0,0432	-1,1090	No
29.08.2019	-9	0,0057	-0,0289	-0,0721	-0,7419	No
30.08.2019	-8	0,0025	0,0113	-0,0608	0,2901	No
02.09.2019	-7	0,0015	0,0595	-0,0013	1,5287	No
03.09.2019	-6	-0,0003	0,0259	0,0246	0,6646	No
04.09.2019	-5	0,0040	-0,0123	0,0123	-0,3171	No
05.09.2019	-4	0,0044	-0,0060	0,0063	-0,1545	No
06.09.2019	-3	0,0020	-0,0319	-0,0257	-0,8206	No
09.09.2019	-2	0,0009	-0,0136	-0,0393	-0,3500	No
10.09.2019	-1	0,0013	-0,0230	-0,0623	-0,5900	No
11.09.2019	0	0,0027	0,0066	-0,0556	0,1705	No
12.09.2019	1	0,0031	0,0156	-0,0401	0,3997	No
13.09.2019	2	0,0021	-0,0135	-0,0536	-0,3469	No
16.09.2019	3	-0,0022	0,0025	-0,0511	0,0642	No
17.09.2019	4	0,0012	-0,0110	-0,0621	-0,2834	No
18.09.2019	5	0,0016	-0,0017	-0,0638	-0,0444	No
19.09.2019	6	0,0034	0,0016	-0,0622	0,0417	No
20.09.2019	7	0,0028	-0,0086	-0,0708	-0,2201	No
23.09.2019	8	-0,0025	-0,0296	-0,1004	-0,7606	No
24.09.2019	9	0,0004	-0,1233	-0,2237	-3,1678	Yes
25.09.2019	10	-0,0010	-0,0091	-0,2328	-0,2333	No

Source: Own analysis and illustration

Deriving from the results of the three classified categories, it can be seen that the descriptive analyzes show an influence of the regulatory reports on the Bitcoin price, but these are not significant in the inductive analysis. This means that the European regulatory announcements have no impact on the Bitcoin price and the impact found is only to be considered relative. It should be mentioned again that the selection of events was not random, but that each event in the corresponding category was subject to a conscious examination, so that incorrect interpretation can be ruled out. While other European events have shown more prominent abnormal returns, these are often influenced by confounding events. For this reason, the selection fell on events within the category that are largely free of confounding events. Since the Bitcoin price is subject to high volatility, significant events in anticipation or delay cannot be ruled out. In order to question the robustness of the study and to rule out possible calculation errors, international events will be used to evaluate the knowledge gained in the further course. Further analyses was performed on the international regulation reports.

As already described in the theory, cryptocurrencies are institution-independent and borderless, but the analysis shows that regulatory measures and reports of potential regulatory measures have an impact on the cryptocurrency markets. In particular, this study deals with the regulatory notifications and measures of the European Union. Various classifications by the EU financial supervisory authorities should be emphasized here, since in 2019 an increasing number of recommendation packages were created which are intended to pave the way for a

concrete directional decision in the still inconsistent regulation of cryptocurrencies. Worth mentioning here are the ESMA package of recommendations, in which the topics of ICOs and cryptoassets are questioned (Federal Government, 2019, A). Furthermore, the EBA only points out that crypto-related activities do not constitute any regulated services under European law for banks, payments or electronic money and this is to be classified as a risk (European Banking Authority, 2019, A; European Banking Authority, 2014). From the point of view of the ECB, there is still no threat to financial stability in the EU area, so that the current legal situation only offers the authorities a limited scope for intervention. According to the ECB, the more difficult leadership in this area and the distributed architecture of cryptoassets require appropriate regulatory intervention (European Central Bank, 2019, A; European Central Bank, 2015). For this reason, the development of a stablecoin may be considered in order to find an approach to this topic (European Central Bank, 2019, B). As can be seen in summary, the EU financial supervisory authorities have so far only identified recommendations and risks that are based on an existing legal situation. Except for the consideration of a stablecoin, no more in-depth legal innovations have been mentioned by the authorities. Let alone defining new laws for cryptocurrencies. The question to be asked here is whether such clarifications in dealing with cryptocurrencies after the boom in 2017 are not already too late (Hanne & Eder, 2019). In the course of the investigation, BaFin attracted positive attention because, as one of the few authorities based in the EU, BaFin has taken a first step towards the extensive commercialization and acceptance of cryptocurrencies. This is the change in law in December 2019 to implement the amendment directive to the fourth EU money laundering directive, which is intended to include the crypto custody business as a new financial service in the KWG (Federal Government, 2019, B). On the basis of this change in the law, Germany is assigned a special position with the help of its own strategy and can therefore be regarded as one of the few countries in the EU as a pioneer (Sandner & Groß, 2019). The blockchain strategy, which was laid down in the coalition agreement, should also be mentioned. The points contained therein describe the regulations on electronic securities and the future treatment of electronic shares (Federal Ministry of Finance, Federal Ministry of Justice and Consumer Protection, 2019). However, BaFin continues to decide on a case-by-case basis whether ICOs and the associated tokens violate applicable law (Federal Financial Supervisory Authority, 2018, A). Given the constant change in the cryptocurrency market, such an approach does not seem to be up to date and means that attempts are still being made to implement adequate regulation on existing bills. In addition, this study includes two countries that are not part of the EU, but are based in Europe and contribute to the regulation of cryptocurrencies. These include the country of Liechtenstein, which has formulated a comprehensive package of laws for dealing with so-called digital assets. These laws will come into force in 2020 and, with this progress, will overtake the laws of Switzerland. Although this is regulated within the framework of the existing laws, these are individualized according to the conditions of cryptocurrencies (Swiss News Agency, 2019). Next to be mentioned is the Switzerland-based FINMA, which published a comprehensive package on the treatment of cryptocurrencies in 2018 (Kondowa & Simonella, 2019; Swiss Financial Market Supervisory Authority, 2018). As early as 2018, FINMA started considering creating a stablecoin to limit the price volatility of cryptocurrencies (Swiss Financial Market Supervisory Authority, 2019). As described above, such a consideration on the part of the ECB only takes place more than a year later. In addition to the latest fact sheet

from FINMA on virtual currencies, the operation of blockchain-based business models has been subject to authorization requirements under financial market law since January 1st, 2020. Here, too, it can be seen that Switzerland wants to play a leading role in the field of cryptocurrencies (Swiss Financial Market Supervisory Authority, 2019; Custers & Overwater, 2019). In summary, it can be stated that Switzerland and Liechtenstein are actively involved in the design of regulatory instruments and measures. The location Germany should also be mentioned at this point. Compared to the EU financial regulators, the fight to be at the forefront of this issue appears to be taking place at national level. This is also reflected in the published regulatory notifications in the sample. It can therefore be assumed that the innovative approaches of the different countries will have an impact on the Bitcoin course. A total of 91 European regulatory notifications are examined. In doing so, it had to be established that the investigation of anomalies presented some difficulties. In order to get a first indication of an abnormality, the yields must first be considered. When examining the reporting periods in more detail, the Bitcoin price is often subject to high volatility, which is either due to the market or to confounding events. Among other things, this complicates the selection of suitable regulatory reports. For this reason, events were selected for the respective classifications AML/infrastructure, interoperability and legal status, the returns of which represent medium abnormalities, but the periods are largely free of influencing factors in order to avoid erroneous findings. As can be seen from the sample, most reports are marked with the value +1. Included among these are strict or clearly defined regulations. Accordingly, it can be seen that the EU financial supervisory authorities and the European countries are trying to define suitable measures in order to implement this topic more strongly in the country or in legislation. This is confirmed by the increasing number of regulatory notifications over the course of the year. Above all, the year 2019 should be mentioned here, in which the highest number of regulatory notifications was recorded. Most of the notifications refer to the AML/Infrastructure classification, which contains all regulatory notifications that contain measures to combat illegal use. Due to the decentralized nature of cryptocurrencies, it is quite understandable that the authorities are focusing on this topic, since transactions are traceable, but the underlying wallet affiliations are managed anonymously (Hein et al., 2019). The second is interoperability, which includes regulations with regulated financial companies such as commercial banks, credit card companies and stock exchanges.

The amendment to the law on cryptocurrency custody business proposed by BaFin should be emphasized here (Lukas, 2020). Banks are only allowed to offer cryptocurrencies with a corresponding license. The wallets are managed by the banks, which create more transparency for the government through central administration. It can therefore be deduced that interoperability is based on the measures of the AML/infrastructure regulations. Finally, the legal status should be mentioned. In addition to questions about consumer protection or private customer business, this category also includes complete bans on cryptocurrencies. The annual breakdown shows that during the 2017 boom phase, this classification is more concise, but decreases significantly over time (Barone & Masciandaro, 2019). In conclusion, it can be stated that due to the uncontrolled boom, some bans were imposed, but over time the countries have been quite open to this new technology and have recognized potential in it, so that appropriate changes in the law are being initiated. For this reason, the proportion of the aforementioned

classifications is increasing over the years. In summary, it can be stated that in the sample considered, both the EU financial supervisory authorities and the European countries actively contribute to the regulatory process and want to help shape the market. Nevertheless, the impact and strength of the regulatory measures must be critically examined, since weaknesses in implementation and formulation can be identified when considering the individual EU authorities and EU laws. To what extent the regulation of cryptocurrencies in the EU has an impact on the cryptocurrency market is illustrated in the next section.

In order to show whether European regulatory announcements have an impact on the cryptocurrency market, three events serve as a basis for investigation, each of which is classified in the categories described. Starting with the AML/Infrastructure category, to which an event of 07/31/2019 is assigned, it is reported that the German government cabinet has paved the way for tougher action against money laundering (Finanzen.net, 2019). From the descriptive analysis, an influence can be seen on the day of the event, since a positive AAR of 9.7% can be determined on this day and this increases to up to 20.1% in the delay period. However, the inductive analysis only shows a z-score of 1.4 on the day of the event. Accordingly, influence can be ruled out. Even if the z-score leads to the exclusion of a significant influence, an influence can still be seen descriptively, but this is an exception compared to the other analyses. Consequently, the report by the German government cabinet has no relevant influence. It also cannot be ruled out that a confounding event made a contribution to the described descriptive analysis, since the result is not significant.

Furthermore, the second event examined is a regulatory report, which falls under the classification of interoperability and was published on September 11, 2019. FINMA publishes a report on the subject of stablecoins and comments on the Facebook currency Libra (Huillet, 2019). It should be emphasized that comments on Libra and suggestions for a stablecoin often arouse media interest and it can be assumed that the Bitcoin price will show a corresponding direction on the day of the report (Arner et al., 2020). However, the descriptive analysis shows that the Bitcoin price is hardly affected. The price slide on day 9 is to be classified as a confounding event and can be disregarded here, since the Bitcoin price showed a stable sideways movement in the days before. These findings are again confirmed by the inductive analysis, so that an influence on the course can be ruled out. The z-score is only 0.17 on the day of the event. Despite the suspicion that an influence should be seen due to the media presence of the topics, the study confirms the opposite effect. Although FINMA enjoys an internationally recognized status as a cryptocurrency location and often makes international headlines with new crypto regulations, FINMA does not seem to have any influence on Bitcoin prices (Müller et al., 2018). Unlike the deduced cognition in the previous event, in this investigation the inductive analysis is confirmed by the descriptive analysis.

Finally, one last European regulatory notification must be considered, which falls under the legal status classification and was published on 02/13/2018. This is a warning about cryptocurrencies from the European regulators EBA, ESMA and EIOPA (Bülow, 2018). A striking picture can already be seen in the descriptive analysis. On the day of the event, the Bitcoin price is EUR 6,961 and rises to EUR 9,246 within the lag period. This corresponds to a price change of 32.8%. The key figures provide information on a recovery trend, which has

its origins in advance. On day -1, the AAR is -10.9%. However, on the day of the event, a z-score of -0.82 can be determined. Consequently, the result is not significant, although a conspicuous pattern can already be identified in the descriptive analysis. Accordingly, the report by the EU financial supervisory authorities has no significant impact on the Bitcoin price. In comparison to the previous European regulatory notifications, which originated at national level, it should be added that this time the notification was published by an EU body, with the conclusion that the price also shows no significant influence. It can therefore be deduced that the EU financial supervisory authorities and the European countries have no influence on the Bitcoin price. Despite the efforts and activities on this topic outlined in advance, this shows once again how strong the international influence on the development of cryptocurrencies in Europe is. This again underscores the inconsistent action with recommendation packages, too little relevance for the authorities and the lively participation in the design of a future payment system. Only the national contribution by various European countries at least shows that they are willing to make an active contribution to a future payment system that can be based on new regulatory laws. Nevertheless, the national European influence on the cryptocurrency market can be described as irrelevant. This is shown by the statistical calculations using the Event Study. The following hypotheses are therefore to be checked:

H_0 : European regulatory announcements have no impact on the price development of cryptocurrencies, in this case the Bitcoin price.

H_1 : European regulatory announcements have an impact on the price development of cryptocurrencies, in this case the Bitcoin price.

As can be seen from the main part, all three events are to be marked as not significant. H_0 can therefore not be rejected. Even with the risk of making a type 2 error, the regulatory reports have no impact on the price development of the Bitcoin price.

In order to question the empirical quality of this result, it must be shown again whether the methodology can be used to determine statistical significance for alternative events. For this reason, further events are to be included, which show a differentiated result through the applied calculation. To test the hypothesis, five other international regulatory notifications are to be checked for significance. The review begins with the G20 summit event on June 28, 2019, at which supervisors and central banks have been on the alert for a long time, fearing for the stability of the monetary system (Holtermann, 2019). While a high volatility of the Bitcoin price can already be determined in the descriptive analysis, the inductive analysis underlines the results derived from it. On day -1, the AAR is 35.9% and decreases to 20.8% on day 0. However, this recovers to 30.8% on day 1. Days -2 to 1 are to be marked as statistically significant. On day 0, a z-score of -4.31 can be observed. This indicates a highly significant result at the critical level α with $<1\%$. Accordingly, there is a clear connection between the event and the Bitcoin price. As can be observed, although cryptocurrencies are decentralized, the most important developed and emerging countries have an influence on the price. Due to the extensive disqualification as a means of payment by critics, the Bitcoin price seems to have been divided during the period, which decisions are made at the G20 summit and shows a corresponding volatility.

Furthermore, two US regulatory notifications are to be shown, which have shown statistical significance. The first US regulation announcement on 12/20/2018 is a new law that would exclude digital currencies from the decades-old definition of a security (Grenda, 2018). A clear influence cannot be distinguished from the descriptive analysis, since an event that negatively influences the Bitcoin price can be identified in the anticipation. While an AAR value of 19.8% is indicated on day -4, this increases to 3.3% on event day 0. On day 9, only an AAR value of -16.4% can be seen. From these results it can be deduced that the event leads to a price recovery, which cannot be maintained due to a preceding or subsequent event. This finding is confirmed by the inductive analysis. The following z-scores are to be marked as statistically significant: day -3 with 2.17, event day 0 with 2.48, day 9 with -2.31. Accordingly, this US regulation message has an impact on the Bitcoin price, since a new legal reform has long been desired in the community (Hungerland et al., 2017). As in the section on the EU, the USA also uses the currently existing laws to define a rudimentary regulation. Nevertheless, the need for an adapted regulatory law for cryptocurrencies is seen. For this reason, this message has a positive influence on the price.

The next US event on September 24, 2019 reported a change in the rules for the Bitcoin ETF application by the US Securities and Exchange Commission (SEC), which led to another decision being postponed (Schäffges, 2019; Securities and Exchange Commission, 2019). Within the descriptive analysis, the Bitcoin price falls to EUR 7827 on event day 0. The AAR shows a value of -18.4%. This is a classic case of an event event, since the price shows a stable sideways movement within the anticipation and the sideways movement continues even after the price slide. On the day of the event, a z-score of -3.18 can be observed. Statistical significance can only be seen on this day. For the crypto community, an ETF officially sanctioned by the state is another successful step in acknowledging the scene in the financial mainstream. The application was already postponed in May 2018 (Schäffges, 2019; Securities and Exchange Commission, 2019). The Bitcoin price slide followed due to the renewed shift.

In addition to the influence exerted by the USA, the influence exerted by China should also be mentioned, as the Chinese regulatory reports have shown the greatest influence. With the first Chinese report on September 14, 2017, the world's largest Bitcoin trading platform BTC China announced that the operators were closing the platform on September 30 (Handelzeitung.ch, 2017). From the descriptive analysis it can be seen that two Chinese reports in anticipation had a negative impact on the Bitcoin price, which can be found in the main part. On the day of the event, the AAR is -35.2%. The z-score from the inductive analysis equals -5.69. The values show a clear statistical significance. In addition, the entire period under review is interspersed with Chinese reports and negative price effects. Since four of the five largest mining pools are located in China and the Chinese renminbi is the most important currency in bitcoin trading at 31%, any reports from China have a direct link to the bitcoin rate (Hanl & Michaelis, 2017). In addition, China trades with a high volume of Bitcoin. China also has a developed crypto scene. For this reason, the closure of one of the largest Bitcoin exchanges has resulted in a significant price slide.

Finally, the last Chinese regulatory notification, which was published by Chinese President Xi Jinping on October 25, 2019, should be mentioned. He clearly spoke out in favor of

blockchain technology (Trentin, 2019). The news results in the correction of the AAR on the day of the event to -10.2%, which was -1 -24.2% on the previous day. Accordingly, the descriptive analysis shows that the event results in a positive jump in price. This finding is confirmed by the inductive analysis. A z-score of 3.69 can be observed on the day of the event. Consequently, this is a highly significant result to be classified as an event affecting the Bitcoin price. Apparently, it is enough that China makes positive comments about blockchain technology and then causes a positive jump in the Bitcoin price. This shows how much influence China has over cryptocurrencies (Hileman & Rauchs, 2017; Kaiser et al., 2018). The findings derived from the first Chinese report are again underpinned by this event. Accordingly, an influence by the G20 summit, the USA and China can be determined. China and the USA have the greatest influence on the course, as these events were selected on the basis of the most striking returns and the findings from the descriptive and inductive analysis also show significant results. This result is underlined by global Bitcoin trading, in which the Chinese currency renminbi accounts for the largest share at 31%, followed by the US dollar at 25% (Hanal & Michaelis, 2017). In conclusion, international regulatory reports have a statistically significant impact on the Bitcoin price. This finding is used, among other things, to test the robustness of the study. The selection of these events serves to check the further hypotheses in order to prove the correctness of the method calculation with abnormalities in the return analysis. Accordingly, the following hypotheses apply to international market news:

H₀: The market news does not affect the price development of cryptocurrencies, in this case the Bitcoin price.

H₁: The market news has an impact on the price development of cryptocurrencies, in this case the Bitcoin price.

The inductive analyzes show that the international events are quantified with a significant and highly significant value. For this reason, H₀ can be rejected at a critical level α with 5% or <1% depending on the market news. Consequently, international market news has an impact on the price development of cryptocurrencies.

Finally, it can be said that European regulatory notifications have no influence on the price development of cryptocurrencies and this is again confirmed by the examination of international regulatory notifications. Ultimately, it must be questioned whether this result is presented correctly, since confounding events cannot be ruled out at this point. During the selection, special attention was paid to this core problem, so that a clear view of the event can be guaranteed. Nevertheless, it should be noted that the EU financial authorities and European countries, through various regulatory measures, do not show any relevance on the cryptocurrency market, while China and the USA are particularly influential. If the EU does not manage to develop a corresponding position through clear measures and an increase in relevance in this area, then the EU will be left behind as a crypto location within the international competition. In addition, it must be questioned whether the EU has not already lost touch, because the expansion of cryptocurrencies and their relevance can currently be characterized as exponential and the authorities do not seem to be able to keep up with the adjustment of the regulatory laws.

4. Conclusion and Outlook

Cryptocurrencies are a construct created by the lack of trust in governments and banks during the 2007 economic crisis. Although the first approaches already existed in the 1980s, the technology for a corresponding implementation was lacking at the time. After governments and banks were heavily criticized for the effects of the economic crisis of 2007 to 2008, a first concept was created in November 2008 that described the Bitcoin software. The programmer Satoshi Nakamoto, who is still unknown today, is responding to this crisis with a decentralized currency that is independent of central banks and makes anonymous payments possible. It was only when the Bitcoin price experienced a boom in 2017 that the topic of cryptocurrency arrived in the financial mainstream as a former scene topic. Nowadays, cryptocurrencies and the blockchain are an integral part of everyday life. Although the original function as a means of payment is not yet given due to the high volatility, this concept will gradually replace the physical monetary system as the world becomes more digitalized. Although this system will not be called Bitcoin, central banks are increasingly discussing a digital currency based on a blockchain. It is therefore all the more necessary to set up an appropriate regulatory system in order to achieve price level stability with regard to cryptocurrencies. At this point, governments and banks have a differentiated perspective. While China and the USA are pioneers in this area and are building a stable regulatory system, the EU financial authorities only seem to be issuing packages of recommendations, as this topic is not considered to be of great relevance. Conversely, by implication, it is argued that cryptocurrencies are not a threat to the monetary system and for this reason there is no concern. It can therefore be deduced that there is only a need for action when the topic has reached a critical evolutionary point in the financial system and a corresponding trading volume can be identified. Individual countries such as Germany, Switzerland and Liechtenstein are more advanced in terms of the regulatory system for cryptocurrencies. However, these countries are too small and have an insignificant trade volume in relation to China and the USA, after which these countries could play a relevant role on the world market. These findings are clearly reflected in the investigation based on an event study. While European regulatory notifications do not have a significant impact on the Bitcoin price, international regulatory notifications, especially from China and the USA, have a significant impact on the Bitcoin price. If the European states do not act as a joint entity with the EU financial authorities on the world market, then international states will have a far lead and shape regulatory measures in the future.

Furthermore, it must be questioned whether the EU has not already lost touch with this topic and whether it is still possible to act on the same level as China and the USA. From both the descriptive and the inductive analysis, it can be deduced that the EU has already lost touch. In the descriptive analysis, it can occasionally be seen that the price of European regulatory reports is subject to a slight influence, but the influence within the inductive analysis is not significant. In order to question the robustness of this study, taking into account the quality criteria of reliability, validity and objectivity, further investigations were carried out which already clearly show a significant influence. Based on the calculation, the international regulatory reports are to be marked as significant and once again underline the correctness of the methodology. Only the topic of confounding events needs to be pointed out here. The selected time periods are subject to a conscious selection, which have largely been cleared of confounding events.

Nevertheless, this core problem cannot be ruled out. Finally, it can be said that this study shows clear results, which lead to the final analysis shown. With regard to the further research approach, it is also possible to check the trading volume again on the basis of the methodology. It is also possible to include further examination periods and examine them for significance. It is also possible to carry out an event study on a daily basis. However, the decision was made against such a procedure because the lasting effect of an event is of greater relevance for the investigation. The problem that can arise during a daily examination is that an influence can be determined for all reports. The lasting effect of an influence is decisive and not the effect of a limited time window. Above all, such an examination procedure has a lower informative value in the case of highly volatile prices, since the results are distorted and any influence can be described as significant. Finally, it can be deduced from the study that European regulatory reports have no influence on the Bitcoin price. In order to be recognized as a crypto hub in the world market, the EU needs to reconsider its attitude towards this issue and consciously question whether the regulatory measures are sufficient to develop a corresponding position. It is clear that cryptocurrencies are now an established system and are being accepted more and more around the world, by governments and banks. This is just one step that can trigger a new type of cryptocurrency and requires appropriate legislation to establish this topic in an existing system. Even if there are still uncertainties and these lead to bans on cryptocurrencies, this does not slow down the further development of cryptocurrencies. In addition, it must be questioned whether the general EU goal is to leave the crypto market largely unregulated. Above all, what risks this entails for consumers. This is a balancing act that the EU has to manage. On the one hand, it is important not to impede innovations through regulations, and on the other hand, legal certainty must be created. It can therefore be deduced that the EU does not view this issue in a transparent manner and that a specific path has not yet been developed. For this reason, the influence on the Bitcoin price is minimal or hardly noticeable.

References

- Arner, Douglas, Auer, Raphael, Frost, Jon (Stablecoins und Libra, 2020): Stablecoins risks, potential and regulation, in: *Financial Stability Review*, 19 (2020), No. 39, p. 95–123
- Auer, Raphael, Cleassens, Stijn (Bedenken, 2018): Regulierung von Kryptowährungen – eine Untersuchung von Marktreaktionen, in: *BIZ-Quartalsbericht*, 22 (2018), No. 3, p. 1–17
- Badev, Anton, Chen, Matthew (Validierung, 2014): Bitcoin Technical Background and Data Analysis, Washington: Federal Reserve Board, 2014

Barone, Raffaella, Masciandaro, Donato (Geldwäsche, 2019): Cryptocurrency or usury crime and alternative money laundering techniques, in: *European Journal of Law and Economics*, 47 (2019), No. 6, p. 233–254

Berentsen, Aleksander, Schär, Fabian (Smart Contracts, 2018): A Short Introduction to the World of Cryptocurrencies, in: *Federal Reserve Bank of St. Louis Review*, 100 (2018), No. 1, p. 1–16

Böhme, Rainer, Christin, Nicolas, Edelman, Benjamin, Moore, Tyler (Straftaten, 2015): Bitcoin Economics Technology and Governance, in: *Journal of Economic Perspectives*, 29 (2015), No. 2, p. 213–238

Brandt, Christopher, Werner, Thomas (Funktion Blockchain, 2018): Von Blockchain Smart Contracts Token und DAO erste Begriffsbestimmungen, in: *VDI Technologiezentrum* (Publ.), Blockchain eine Technologie mit disruptivem Charakter, Stand: March 2018, Düsseldorf: VDI Technologiezentrum, 2018, p. 6–8

Braunschweig, Christoph, Pichler, Bernhard (Nick Szabo, 2018): Die Kreditgeldwirtschaft Hintergründe und Irrtümer von Geld- und Finanzwirtschaft, Wiesbaden: Springer Gabler, 2018

Brown, Stephen J., Warner, Jerold B. (Signifikanztest, 1980): Measuring Security Price Performance, in: *Journal of Financial Economics*, 8 (1980), No. 3, p. 205–258

Brown, Stephen J., Warner, Jerold B. (Ereignis-Studie, 1985): Using daily stock returns the case of Event Studies, in: *Journal of Financial Economics*, 14 (1985), No. 1, p. 3–31

Brühl, Volker (Bedenken, 2017): Bitcoin und andere Kryptowährungen konsequente Regulierung und Aufsicht sind dringend geboten, in: *ifo Schnelldienst*, 70 (2017), No. 22, p. 13–17

Bülöw, Iris (Warnung EU-Aufsichtsbehörden, 2018): Europäische Aufsichtsbehörden warnen vor Kryptowährungen, < <https://www.dasinvestment.com/eba-esma-und-eiopa-europaeische-aufsichtsbehoerden-warnen-vor-kryptowaehrungen/> > (2018-02-13) [Access 2020-10-09]

Bundesanstalt für Finanzdienstleistungsaufsicht (Zweites Hinweisschreiben, 2018): Zweites Hinweisschreiben zu Prospekt- und Erlaubnispflichten im Zusammenhang mit der Ausgabe sogenannter Krypto-Token, Bonn: Bundesanstalt für Finanzdienstleistungsaufsicht, 2018

Bundesministerium der Finanzen, Bundesministerium der Justiz und für Verbraucher-
schutz (Eckpunkte Regulierung, 2019): Eckpunkte für die regulatorische Behand- lung
von elektronischen Wertpapieren und Krypto-Token, Berlin: Bundesminis-te- rium der
Finanzen, 2019

Bundesregierung (Empfehlung der ESMA, 2019): Empfehlungen der ESMA zu Initial
Coin Offerings und Kryptoassets, Köln: Bundesanzeiger Verlag, 2019

Bundesregierung (Änderungsrichtlinie zur vierten EU-Geldwäscherichtlinie, 2019): Ge- setz
zur Umsetzung der Änderungsrichtlinie zur Vierten EU-Geldwäscherichtlinie vom
12. Dezember 2019, in: *Bundesgesetzblatt*, 70 (2019), No. 50, p. 2602–2632

Cohen, Boyd (Erste Versuche, 2017): The Rise of Alternative Currencies in Post Capitalism,
in: *Journal of Management Studies*, 54 (2017), No. 5, p. 739–746

Crosby, Michael, Nachiappan, Nachi, Pattanayak, Pradan, Verma, Sanjeev, Kalyanaraman,
Vignesh (Geschichte Bitcoin, 2015): Blockchain Technology Beyond Bitcoin, Berkeley:
University of California, 2015

Crosby, Michael, Nachiappan, Nachi, Pattanayak, Pradan, Verma, Sanjeev, Kalyanaraman,
Vignesh (Nick Szabo, 2016): Blockchain Technology Beyond Bitcoin, in: *Applied
Innovation Review*, 2 (2016), No. 2, p. 6–19

Curran-Everett, Douglas (Standardabweichung, 2008): Explorations in statistics standard
deviations and standard errors, in: *Advances in Physiology Education*, 32 (2008),
No. 3, p. 203–208

Custers, Bart, Overwater, Lara (Faktenblatt, 2019): Regulating Initial Coin Offerings and
Cryptocurrencies a Comparison of Different Approaches in Nine Jurisdictions
Worldwide, in: *European Journal of Law and Technology*, 10 (2019), No. 3, p. 1–
29

De Filippi, Primavera (Rahmenbedingungen, 2014): Bitcoin a regulatory nightmare to a
libertarian dream, in: *Internet Policy Review*, 3 (2014), No. 2, p. 43–55

Eidgenössische Finanzmarktaufsicht (ICOs Schweiz, 2018): Wegleitung für Unterstel-
lungsanfragen betreffend Initial Coin Offerings, Bern: Eidgenössische Finanzmarktauf-
sicht, 2018

Eidgenössische Finanzmarktaufsicht (Ergänzung der Wegleitung, 2019): Ergänzung der Wegleitung für Unterstellungsanfragen betreffend Initial Coin Offerings, Bern: Eidgenössische Finanzmarktaufsicht, 2019

Europäische Zentralbank (Geldmenge Eurozone 2019, 2020): Entwicklung der Geldmenge M1 in der Euro-Zone von 1997 bis Mai 2020, <<https://de.statista.com/statistik/daten/studie/241800/umfrage/entwicklung-der-geldmenge-m1-in-der-euro-zone/>> (2020-02-03) [Access 2020-02-03]

European Banking Authority (Einordnung EBA, 2014): EBA Opinion on virtual currencies, Paris: European Banking Authority, 2014

European Banking Authority (Einordnung EBA, 2019): Report with advice for the European Commission on crypto-assets, Paris: European Banking Authority, 2019
European Central Bank (Einordnung EZB, 2015): Virtual Currency Schemes a further analysis, Frankfurt am Main: European Central Bank, 2015

European Central Bank (Einordnung EZB, 2019): Crypto-Assets Implications for financial stability, monetary policy, and payments and market infrastructures, in: *Occasional Paper Series*, 19 (2019), No. 223, p. 1–39

European Central Bank (Stablecoin, 2019): In search for stability in crypto-assets are stablecoins the solution, in: *Occasional Paper Series*, 19 (2019), No. 230, p. 1–54
Fanusie, Yaya J., Robinson, Tom (Kategorien Regulierungsmeldungen, 2018): Bitcoin

Laundering an analysis of illicit flows into digital currency services, Wales: Elliptic, 2018
Finanzen.net (Kryptowerte stärker regulieren, 2019): Kabinett will Kryptowerte stärker regulieren und Geldwäsche bekämpfen, <<https://www.finanzen.net/nachricht/devisen-/kabinett-will-kryptowerte-staerker-regulieren-und-geldwaesche-bekaempfen-77889-23>> (2019-07-31) [Access 2020-09-23]

Foley, Sean, Karlsen, Jonathan, Putnins, Talis (Darknet, 2018): Sex drugs and bitcoin how much illegal activity is financed through cryptocurrencies, in: *Review of Financial Studies*, 32 (2018), No. 5, p. 1798–1853

Gerpott, Torsten J. (Funktion einer Ereignisstudie, 2009): Ereignisstudie, in: Baumgarth, Carsten, Eisend, Martin, Evanschitzky, Heiner (Publ.), *Empirische Mastertechniken eine anwendungsorientierte Einführung für die Marketing- und Managementforschung*, Wiesbaden: Gabler, 2009, p. 203–234

Glaser, Florian, Zimmermann, Kai, Haferkorn, Martin, Weber, Moritz Christian, Siering, Mi-

Chael (Unabhängigkeit Bitcoin, 2014): Bitcoin asset or currency revealing users hidden intentions, Tel Aviv: Twenty Second European Conference on Information Systems, 2014

Glatz, Florian, Ernst, Friederike, Lohkamp, Joachim, Ewald, Marcus (Blockchain allgemein, 2017): Blockchain Chancen und Herausforderungen einer neuen digitalen Infrastruktur für Deutschland, Berlin: Blockchain Bundesverband, 2017

Görke, Björn (Definition Event, 2009): Event-Studies, in: Albers, Sönke, Klapper, Daniel, Konradt, Udo, Walter, Achim, Wolf, Joachim (Publ.), Methodik der empirischen Forschung, 3rd edition., Wiesbaden: Springer Fachmedien, 2009, p. 467–484

Görke, Björn (Definition Event, 2009): Event-Studies, in: Albers, Sönke, Klapper, Daniel, Konradt, Udo, Walter, Achim, Wolf, Joachim (Publ.), Methodik der empirischen Forschung, 3rd edition, Wiesbaden: Springer Fachmedien, 2009, p. 467–484

Goldschmidt, Levin (Währung, 1868): Handbuch des Handelsrechts, Erlangen: Verlag von Ferdinand Enke, 1868

Grenda, Felix (Neuer US-Gesetzentwurf, 2018): Crypto-News neuer Gesetzesentwurf soll Cryptos als digitale Asset-Klasse neu definieren, <<https://cryptomondays.de/cryptonews-neuer-gesetzesentwurf-soll-cryptos-als-digitale-asset-klasse-neu-definieren/>> (2017-09-14) [Access 2020-10-14]

Grigo, Julia, Hansen, Patrick (Regulierungsansätze, 2019): Digitalwährungen stehen vor dem Durchbruch, in: ifo Schnelldienst, 72 (2019), No. 17, No. 6–9

Hahn, Christopher, Wons, Adrian F. (Token, 2018): Initial Coin Offering, in: Hahn, Christopher (Publ.), Finanzierung von Start-up-Unternehmen, 2nd edition, Wiesbaden: Springer Gabler, 2018, p. 237–251

Handelszeitung.ch (Bitcoin-Börse in China schließt, 2017): Bitcoin-Börse in China schließt Kurs auf Talfahrt, <<https://www.handelszeitung.ch/invest/bitcoin-boerse-china-schliesst-kurs-auf-talfahrt-1482243>> (2019-06-27) [Access 2020-10-10]

Hanl, Andreas, Michaelis, Jochen (Marktkapitalisierung, 2017): Kryptowährungen ein Problem für die Geldpolitik, in: Wirtschaftsdienst, 97 (2017), No. 5, p. 363–370

Hanne, Benjamin, Eder, Emmeran (Interesse Bitcoin, 2019): Zwischen Boom und Bust, in: Euro am Sonntag, 21 (2019), No. 20, p. 28–30

Hein, Cathrin, Wellbrock, Wanja, Hein, Christoph (Dezentralität, 2019): Rechtliche Herausforderungen von Blockchain-Anwendungen, Wiesbaden: Springer Gabler, 2019

Hennies, Manfred, Raudjärv, Matti (Kapitalmärkte, 2018): Kryptowährungen Gedanken zur gegenwärtigen Situation, in: Estonian Discussions on Economic Policy, 26 (2018), No. 2, p. 34–37

Hileman, Garrick, Rauchs, Michel (Einfluss China, 2017): Global Cryptocurrency Benchmarking Study, Cambridge: Cambridge Center for Alternative Finance, 2017

Hinckeldeyn, Johannes (Distributed Ledger, 2019): Blockchain-Technologie in der Supply Chain Einführung und Anwendungsbeispiele, Wiesbaden: Springer Vieweg, 2019

Holtermann, Felix (Angst vor dem G20-Treffen, 2019): Angst vor dem G20-Treffen Bitcoin sinkt binnen Stunden um fast 3000 Dollar, < <https://www.handelsblatt.com/finanzen/maerkte/devisen-rohstoffe/kryptowaehrung-angst-vor-dem-g20-treffen-bitcoin-sinkt-binnen-stunden-um-fast-3000-dollar/24500018.html?ticket=ST-6376180-2C1gf0lz0Oh6gQsnxfVu-ap5>> (2019-06-27) [Access 2020-10-10]

Huillet, Marie (FINMA Regulierungsmeldung, 2019): FINMA gibt Richtlinie für Stablecoins heraus, bezieht Stellung zu Facebook Libra, < <https://de.cointelegraph.com/news/3-key-takeaways-from-switzerlands-new-stablecoin-guidelines>> (2019-10-11) [Access 2020-10-09]

Hungerland, Fabian, Quitzau, Jörn, Rotterdam, Jens (Regulierung Einleitung, 2017): Die Zukunft des Geldes das Geld der Zukunft, Hamburg: Berenberg, 2017

Kaiser, Ben, Jurado, Mireya, Ledger, Alex (Einfluss China, 2018): The Looming Threat of China an Analysis of Chinese Influence on Bitcoin, Princeton, Miami: Princeton University and Florida International University, 2018

Koens, Tommy, Poll, Erik (Begriffsverwendung Blockchain, 2018): What Blockchain Alternative Do You Need, in: Garcia-Alfaro, Joaquin, Herrera-Joanconmarti, Jordi, Livraga, Giovanni, Rios, Ruben (Publ.), Data Privacy Management Cryptocurrencies and Blockchain Technology, Cham: Springer Nature Switzerland, 2018, p. 113–129 Kondova, Galia, Simonella, Geremia (ICOs Schweiz, 2019): Blockchain in Startup Financing ICOs and STOs in Switzerland, in: *Journal of Strategic Innovation and Sustainability*, 14 (2019), No. 6, p. 43–48

Krombholz, Katharina, Judmayer, Aljosha, Gusenbauer, Matthias, Weippl, Edgar (Datenschutz, 2016): Für bare Münze Nutzerinnenerfahrungen mit Sicherheit und Datenschutz bei Bitcoin, in: Meier, Michael, Delphine, Reinhardt, Wendzel, Steffen (Publ.), Sicherheit

- 2016 Sicherheit, Schutz und Zuverlässigkeit, Bonn: Gesellschaft für Informatik, 2016, p. 137–148
- Lo, Stephanie, Wang, Christina J. (Einfluss Bitcoin, 2014): Bitcoin as Money, in: Current Policy Perspectives, 14 (2014), No. 4, p. 1–28
- Lu, Lerong (Ursache Preisanstieg, 2018): Bitcoin speculative bubble financial risk and regulatory response, in: *Butterworths Journal of International Banking and Financial Law*, 33 (2018), No. 3, p. 178–182
- Lukas, Arnold J. F. (Kryptoverwahrungsgeschäft, 2020): Blockchain tokens from the perspective of German civil law an updated view, Mainz: Johannes Gutenberg University, 2020
- MacKinlay, Craig A. (Aufbau einer Ereignisstudie, 1997): Event Studies in Economics and Finance, in: *Journal of Economic Literature*, 35 (1997), No. 1, p. 13–39
- Marian, Omri Y. (Straftaten, 2015): A Conceptual Framework for the Regulation of Cryptocurrencies, Chicago: University of Chicago Law Review, 2015
- Marume, S. B. M., Jubenkanda, R. R. (Erläuterung Dezentralität, 2016): Centralization and Decentralization, in: *Journal of Research in Humanities and Social Science*, 4 (2016), No. 6, p. 106–110
- Mattila, Juri (Definition Blockchain, 2016): The Blockchain Phenomenon, Helsinki: Research Institute of the Finnish Economy, 2016
- McWilliams, Abigail, Siegel, Donald (Abnormale Rendite, 1997): Event Studies in Management Research: Theoretical and Empirical Issues, in: *The Academy of Management Journal*, 40 (1997), No. 3, p. 626–657
- Müller, Lukas, Reutlinger, Milena, Kaiser, Philippe, Kaiser J. A. (Crypto Valley Schweiz, 2018): Entwicklungen in der Regulierung von virtuellen Währungen in der Schweiz und der Europäischen Union, in: *Zeitschrift für Europarecht EuZ*, 20 (2018), No. 3, p. 80–102
- Nakamoto, Satoshi (Whitepaper Bitcoin, 2008): Bitcoin: A Peer-to-Peer Electronic Cash System, o. O., 2008
- Pauser, Stephan H. (Betrachtungszeitfenster, 2007): M&A in der Bauindustrie Wertefekte und Erfolgsdeterminanten, Wiesbaden: Deutscher Universitäts-Verlag, 2007
- Pichl, Lukas, Kaizoji, Taisei (Bitcoin Volatilität, 2017): Volatility Analysis of Bitcoin Price

- Time Series, in: Quantitative Finance and Economics, 1 (2017), No. 4, p. 474–485
- Pilkington, Marc (Datenschutz, 2015): Blockchain Technology Principles and Applications, Burgundy: University of Burgundy, 2015
- Pinna, Andrea, Ruttenberg, Wiebe (DLT Beispiel, 2016): Distributed ledger technologies in securities post-trading, Frankfurt am Main: European Central Bank, 2016
- Rabe, Lena (Marktkapitalisierung Bitcoin, 2020): Ranking der größten virtuellen Währungen nach Marktkapitalisierung im Februar 2020, <<https://de.statista.com/statistik/daten/studie/296205/umfrage/marktkapitalisierung-digitaler-zahlungsmittel/>> (2020-02-03) [Access 2020-02-03]
- Rasinski, Anna (Etymologie Blockchain, 2017): Blockchain-Technologie Analyse ausgewählter Anwendungsfälle und Bewertung rechtlicher Aspekte, in: Anzinger, Heribert (Publ.), Analysen und Berichte zum Wirtschafts- und Steuerrecht, 2017, Ulm: Institut für Rechnungswesen und Wirtschaftsprüfung, 2017, p. 1–160
- Reinhuber, Nikolaus (Währung, 1995): Grundbegriffe und internationaler Anwendungsbereich von Währungsrecht, Bd. XV, Berlin, New York: Walter de Gruyter, 1995
- Sandner, Philipp, Groß, Jonas (Besondere Stellung Deutschland, 2019): Blockchain-Strategie ein wichtiger Schritt, in: Wirtschaftsdienst, 99 (2019), No. 1, p. 744–745
- Schäfer, Dorothea (Herausforderung Regulierung, 2017): Banken und Bitcoin: Vernetzung muss verhindert werden, in: DIW Wochenbericht, 84 (2017), No. 49, p. 1146–1146
- Schäfer, Stefan (Bitcoin-ETF, 2019): SEC verschiebt erneut Entscheidung zu Bitcoin ETF, <<https://www.btc-echo.de/sec-veschiebt-erneut-entscheidung-zu-bitcoin-etf/>> (2019-09-25) [Access 2020-10-13]
- Schuster, Thomas, Liesen, Arndt (z-Wert, 2017): Statistik für Wirtschaftswissenschaftler ein Lehr- und Übungsbuch für das Bachelor-Studium, 2nd edition., Berlin: Springer Gabler, 2017
- Schwarzer, Marius (Einleitung abnormale Rendite, 2003): Kursreaktionen auf Unternehmensmeldungen bei unterschiedlichen Unternehmenssituationen, Hildesheim: Universität Hildesheim, 2003
- Schweizerische Depeschenagentur (Liechtenstein Blockchain, 2019): Liechtenstein prescht bei Blockchain-Technologie vor, Zürich: PricewaterhouseCoopers, 2019
- Securities and Exchange Commission (Bitcoin-ETF, 2019): Release No. 34-87071 File

- No. SR-NYSEArca-2019-39, Washington: Securities and Exchange Commission, 2019
- Silver, Jeremy (Blockchain und DLT, 2018): Blockchain in Action State of the UK Market, London: Digital Catapult, 2018
- Sixt, Elfriede (Token, 2017): Bitcoins und andere dezentrale Transaktionssysteme, Wiesbaden: Springer Fachmedien, 2017
- Spitz, Stephan, Pramateftakis, Michael, Swoboda, Joachim (Etymologie Krypto, 2011): Kryptographie und IT-Sicherheit, 2. Aufl., Wiesbaden: Vieweg & Teubner Verlag, 2011
- Trentin, Alexander (Chinas Präsident, 2019): Wie Chinas Präsident die Bitcoin-Rally ausgelöst hat, < <https://www.fuw.ch/article/bitcoin-mit-staerkster-rally-seit-eineinhalb-jahren/> > (2019-10-29) [Access 2020-10-20]
- Umlauft, Thomas (Zahlungsmittel, 2018): Is Bitcoin Money an Economic-Historical Analysis of Money its Functions and its Prerequisites, London: International Atlantic Economic Conference, 2018
- Vogel, Marion (Verbot, 2016): Relevanz & Risiken von virtuellen Währungen am Beispiel von Bitcoin, 3. Aufl., Hof: Hochschule Hof, 2016
- Wätjen, Dietmar (Etymologie Krypto, 2018): Kryptographie Grundlagen Algorithmen Protokolle, 3. Aufl., Wiesbaden: Springer Vieweg, 2018
- White, Lawrence H. (Definition Kryptowährung, 2014): The Market for Cryptocurrencies, Fairfax: George Mason University, 2014
- Wolla, Scott (Wertstabilität, 2018): Bitcoin Money or Financial Investment, St. Louis: Federal Reserve Bank, 2018
- World Bank Group (Shared Ledger, 2017): Distributed Ledger Technology and Blockchain, Washington: International Bank for Reconstruction and Development, 2017
- Zhang, Bryan (Inkonsistente Terminologie, 2018): Distributed Ledger Technology Systems, Cambridge: University of Cambridge, 2018