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**FACULTY OF SOCIAL SCIENCES**

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**Cryptocurrencies and Financial Secrecy**

Bachelor thesis

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Prague, 4th May 2021

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Stanislava Poizlova

## Abstract

We study the short-term effect of the first global multilateral standard for automatic exchange of information (AEIO), the so-called Common Reporting Standard (CRS), on the volume of exchanges of money to cryptocurrencies. We hypothesize that following the introduction of information exchange between source countries and tax havens, the amount of money in the tax havens' currencies exchanged to cryptocurrencies increases. Our results complement prior findings of the literature that deposits in tax havens decrease following AEIO. Through our model, we find that CRS induced a 40% increase, on average, in the volume exchanged to/from Bitcoin. Around the time of the introduction of CRS, volume exchanged to/from Bitcoin increased the most for currencies GBP, CHF, and USD.

**Keywords** common reporting standard, cryptocurrencies, cross-border deposits, automatic exchange of information

**Title** Cryptocurrencies and Financial Secrecy

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## Abstrakt

Študujeme krátkodobý vplyv prvého globálneho multilaterálneho štandardu pre automatickú výmenu informácií (AEIO), takzvaného Common Reporting Standard (CRS), na objem výmeny peňazí za kryptomeny. Predpokladáme, že po zavedení výmeny informácií medzi zdrojovými krajinami a daňovými rajmi sa množstvo peňazí v mene daňových rajov, ktoré sa vymieňajú za kryptomeny, zvyšuje. Naše výsledky dopĺňajú predchádzajúce zistenia z literatúry, že po AEIO sa vklady v daňových rajoch znižujú. Prostredníctvom nášho modelu sme zistili, že CRS indukoval v priemere 40% zvýšenie objemu výmeny mien za/z Bitcoin/Bitcoinu. Približne v čase zavedenia CRS sa objem vymenený za/z Bitcoin/Bitcoinu zvýšil najviac pre meny GBP, CHF a USD.

|                               |  |
|-------------------------------|--|
| <b>Klíčová slova</b>          | common reporting standard, kryptomeny, cezhraničné vklady, automatická výmena informácií |
| <b>Název práce</b>            | Kryptoměny a finanční tajemství  |
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# Acronyms

|              |  |
|--------------|--|
| <b>AUD</b>   | Australian dollar  |
| <b>BIS</b>   | Bank for International Settlements                             |
| <b>BRL</b>   | Brazilian real   |
| <b>CAD</b>   | Canadian dollar  |
| <b>CEPII</b> | Centre d'Etudes Prospectives et d'Informations Internationales |
| <b>CHF</b>   | Swiss franc  |
| <b>CLP</b>   | Chilean peso   |
| <b>CNY</b>   | Chinese yuan   |
| <b>CRS</b>   | Common Reporting Standard                                      |
| <b>CZK</b>   | Czech koruna   |
| <b>DKK</b>   | Danish krone   |
| <b>EUR</b>   | Euro   |
| <b>FATCA</b> | Foreign Account Tax Compliance Act                             |
| <b>GBP</b>   | Pound sterling   |
| <b>HKD</b>   | Hong Kong dollar   |
| <b>HRK</b>   | Croatian kuna  |
| <b>HUF</b>   | Hungarian forint   |
| <b>JPY</b>   | Japanese yen   |
| <b>KRW</b>   | South Korean won   |
| <b>MXN</b>   | Mexican peso   |
| <b>NOK</b>   | Norwegian krone  |
| <b>NZD</b>   | New Zealand dollar   |
| <b>OECD</b>  | Organisation for Economic Co-operation and Development         |
| <b>PLN</b>   | Polish zloty   |

**RON** Romanian leu

**SEK** Swedish krona

**SGD** Singapore dollar

**TRY** Turkish lira

**USD** United States dollar

**ZAR** South African rand

# Bachelor's Thesis Proposal

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|                       |  |
|-----------------------|--|
| <b>Author</b>         | Stanislava Poizlová                    |
| <b>Supervisor</b>     | PhDr. Miroslav Palanský, M.A., Ph.D.   |
| <b>Proposed topic</b> | Cryptocurrencies and Financial Secrecy |

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**Motivation** Since the development of the first cryptocurrency, Bitcoin, in 2008 by Satoshi Nakamoto (Bustillos, 2013), cryptocurrencies became widely discussed, as for their potential and also for their threat. In 2019, the idea of Bitcoin as digital gold became more realistic, as it became more correlated to gold than all of the major altcoins (Torpey, 2020). The rising popularity of the cryptocurrencies poses threat for international taxation, creating an opportunity for criminal activity and enterprises (Reichel, 2019), where criminal organizations have been using cryptocurrencies from 2011 (Chowdhury, 2019). 24 million Bitcoin users accounted for illicit activities make around 25% of all Bitcoin users and 44% of all Bitcoin transactions. Cryptocurrencies are used in Ponzi schemes, drug trafficking, money laundering, and more. The first major criminal case of an illegal market place was Silk Road, where bitcoin was used as a payment method for illegal market operations (Foley et. Al). Moreover, Chowdhury (2019) found evidence in Google search data that illegal activity drives interest in Bitcoin. The tax havens are considered as taxation threats, due to their anonymity, lack of transparency, and no or nominal taxes. The cryptocurrencies were referred to as 'super tax havens' in many papers due to their similarity, but higher effectivity. The cryptocurrencies possess the most important characteristics of a traditional tax haven. However, they are not dependent on the existence of financial institutions, which makes tax evasion policies more difficult, as there is no institution to control (Marian, 2013). Secrecy jurisdiction enables people or entities to escape the rules, laws, and regulations of other jurisdictions elsewhere. Secrecy is used as a prime tool. Hong Kong is currently the most growing tax haven or secrecy jurisdiction due to its see-no-evil approach to financial regulations, which attracts offshore businesses (Tax Justice Network, 2020). Secrecy jurisdiction is really important for functioning and prospering tax havens or other tax evasion activities (eg. Crypto Tax Evasion). Therefore, my thesis addresses the threat of

cryptocurrencies being used for tax evasion and the correlation between financial secrecy and usage of cryptocurrencies.

**Methodology** I use the Financial Secrecy Index (FSI), which ranks jurisdictions according to their secrecy and the scale of their offshore financial activities. More specifically, I use the automatic exchange of information as my indicator from FSI. My goal is to find out to what extent the automatic exchange of information and its reforms correlate with the popularity of cryptocurrencies in individual countries and how it influences exchanges of cryptocurrencies among them, with emphasis on unregistered exchanges. I am mainly using Report on International Bitcoin Flows 2013-2019 from the Crystal Blockchain Analytics Platform (Bitfury Crystal, 2019).

**Expected Contribution** The most addressed issue in academic literature regarding cryptocurrencies is the implication of cryptocurrencies for the tax administration (Stewart and Johnston, 2012). Cryptocurrencies are examined mainly from the regulatory and institutional standpoint. Tax evasion is empirically well studied topic. However, as far as I am aware, no research connects these two topics and quantifies the issue of tax evasion and illicit financial flows via cryptocurrencies. My thesis could be used for further examination of these issues, as well as for empirically quantified research, which could support the theoretical problematic of cryptocurrencies.

## Outline

1. Introduction
2. Literature Review
3. Theoretical Part
  - (a) a. Transparency and Tax evasion
  - (b) Reforms in automatic exchange information
  - (c) Crypto Tax evasion
4. Empirical Part
  - (a) Contracting Data
  - (b) Analysis of Data
5. Results
6. Effects on the government budget
7. Conclusion

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Author

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Supervisor

# Chapter 1

## Introduction

The last few decades have seen a gradual implementation of multilateral agreements on the exchange of information (AEOI) on the beneficiaries of foreign bank accounts. The first initiative was the spread of Tax Information Exchange Agreements (TIEAs) in the early 2000s, where the information is exchanged either spontaneously or upon request. However, no significant impact of this limited type of international information exchange on international depositing patterns was found (Harry Huizinga 2004) and investors relocate to countries that do not exchange information yet (Johannesen 2014). In 2013, the Foreign Account Tax Compliance Tax (FATCA) became effective, under which information is automatically exchanged on accounts owned by US citizens abroad. However, under certain conditions, a unilateral FATCA regime causes increased cross-border tax evasion among residents of foreign countries (Dharmapala 2016). In 2016, the most powerful agreement on automatic information exchange became effective. Casi *et al.* (2020) proved that there had been a decrease in cross-border deposits to tax havens that entered CRS. However, according to Menkhoff & Miethe (2019) tax evaders adapt to established information exchange standards and use new disguises to hide their new income. The results of their analysis cast doubt on the effectiveness of current forms of information exchange. As AEOI is getting more powerful over the years, loopholes are being closed, and it is becoming more and more difficult to hide the identity of the actual owner of assets, the techniques to do so are becoming more sophisticated.

This thesis examines one potential way for investors to circumvent the AEOI, which has not yet been studied in this context - cryptocurrencies. The objective of this thesis is to examine the period around the introduction of CRS

and analyze the volume of Bitcoin exchanged from and to different currencies. Mainly, the focus will be on currencies used in tax havens and high-secrecy jurisdictions. This thesis partially replicates the work of Cusi *et al.* (2020) and builds on it further to analyze whether cryptocurrencies can explain at least part of the result that deposits in tax havens decrease following AEOI. Cusi *et al.* (2020) only partially answered where the money from tax havens is transferred and identified the United States as a potentially attractive jurisdiction for an investor to relocate to. However, it failed to identify perhaps the most significant threat of current tax administration —cryptocurrencies. We wish for this thesis to create a baseline for, surprisingly, not so researched topic of tax evasion through cryptocurrencies. The empirical analysis in this thesis employs an event study around the introduction of AEOI and estimates its impact on exchanges from and to cryptocurrencies.

The remainder of this thesis is structured as follows: Chapter 2 introduces the background of cryptocurrencies and the underlying technology, focusing on how criminal activities can benefit from these characteristics. In Chapter 3, we describe the used data and the construction of the dataset used in our models. Chapter 4 describes our dataset and replicates the results by Cusi *et al.* (2020). In Chapter 5, we introduce our empirical methodology, and we state our hypotheses. Chapter 6 analyzes the results of our model and the interpretation of our data. The overall conclusion is presented in Chapter 7.

# Chapter 2

## Literature Review

### 2.1 Blockchain and Cryptocurrencies

This section covers the overview of cryptocurrencies and their underlying technology —blockchain. The purpose of this section is to describe the nature of cryptocurrencies and use this information to show why they could be described as Super Tax Havens and how they weaken the effect of Money Laundering Regulations.

As cryptocurrencies are on the rise, there has been much debate about when *currency* can be defined as cryptocurrency. Like most currencies used widely, cryptocurrencies do not have an intrinsic value, but their value is set through transactions (Tredinnick 2019).

The value of Bitcoin or other cryptocurrencies is often compared to the value of gold. This is based on the simple idea that gold and Bitcoin do not have an intrinsic value. Their characteristics and social consensus made them valuable. Gold is specific with its scarcity, unique chemical feature, and used to cover the value of money, not vice versa. When we look at the value of silver or gold today, we will find that it continues to grow, as humans have discovered that mining gold and silver is becoming more and more difficult. The goods or resources with limited supply and demanding mining or access increase in value, mainly in the long term. Realizing where the value of gold lays gives us an excellent foundation for understanding cryptocurrencies and where their value arises. Individuals that believe in the value of gold and hold this resource as an investment are only a small step from understanding the meaning and value of cryptocurrencies. Some cryptocurrencies perhaps do not fall into this

description, but the most successful indeed do. Bitcoin, like gold, is limited. No more than 21 million bitcoins can ever exist, and this capacity will be reached in 2140 (Franco 2014). Mining of Bitcoin is becoming more demanding every four years since it emerged, thanks to halving. Slowly but surely, society starts to believe in the value of Bitcoin what increases its value as well. Satoshi Nakamoto created digital currency based on prior knowledge about the underlying value of different resources. Neither money nor gold would have value without social belief, consensus, and some institutions vouching for it. Dyhrberg (2016) showed in his research that for Bitcoin, there are significant similarities to gold and the dollar. However, it is essential to realize that it can never behave like other currencies due to its specific characteristics. On the other hand, it has a lot in common with gold. It possesses similar hedging capabilities, reacts to similar variables in the GARCH model, and reacts symmetrically to good and bad news. However, recent data show that Bitcoin is not a safe haven asset, rather a speculative one (Kristoufek 2020). Lansky (2018) provided an excellent overview of what cryptocurrency is and how it can be distinguished from electronic money or centralized digital currency. Overall, we summarize the characteristics discussed in existing literature in three features to specify the one-of-a-kind entity —cryptocurrency. By these three features: ensured limited anonymity, decentralization, and double-spending attack protection —could be defined only one type of currency —cryptocurrency (Lansky 2018). Contrary to traditional money, cryptocurrencies exploit strong cryptography to secure the exchange (Tredinnick 2019).

### 2.1.1 (Pseudo-)Anonymity

One individual can own millions of cryptocurrency accounts, and the amount of cryptocurrency held is not limited, only by the amount of cryptocurrency (Lansky 2018). The term pseudo-anonymity is relevant for many cryptocurrencies, also for Bitcoin. On the other hand, some cryptocurrencies try to achieve complete anonymity, such as Zcash (Zhang *et al.* 2020). It allows shielded transactions, which reveal nothing about sender, recipient, and amount of a transaction even though the transaction structure is very similar to Bitcoin. However, it is still possible to decrease the anonymity of Zcash (Zhang *et al.* 2020). Monero is also claiming to be entirely anonymous. However, as in the case of Zcash, Monero still does not provide traders with cloaks of invisibility (Möser *et al.* 2018).

Nowadays, cryptocurrencies can be exchanged online for goods or services. More and more companies or enterprises allow their customers to pay in some specified cryptocurrencies, usually Bitcoin. In these situations, the anonymity of the user's identity is determined by personal actions. In other words, how much detail the payer divulges during the transaction.

In an electronic world, the user's identity remains unknown with Bitcoin and is secured by a so-known 'hash'. Hash is a function that takes objects as input and returns strings of numbers and letters, also known as a 'Bitcoin address' or 'Public key'. The transaction's details are then added to the Blockchain (Franco 2014). Although the hash or public address shields the user's identity, this information is also permanently stored in the Blockchain. As a result, any transaction that person makes will be linked to that person if an address is ever linked to a person's identity. To put it another way, the traders have identifiers. However, the user's pseudo-anonymity may be changed with each transaction, making it more difficult to trace these transactions, thus more secure for the user. In the case of Bitcoin, only the Bitcoin address, the date and time of the transaction, whether it was received or sent, the amount of Bitcoin, and essential information regarding the origin or mining of that Bitcoin is shared (Lee 2015). However, every user should know that their transactional behavior is used to identify and verify account holders (Monaco 2015). While Bitcoin and other cryptocurrencies offer the possibility of pseudo-anonymous transactions, many platforms or storage services require some identification or documentation before use, such as Kraken, bitcoin.de, Rock Trading, or Bitstamp (Matkovskyy 2019).

### **2.1.2 Decentralization**

Banks and other financial institutions are centralized entities. In other words, every transaction or exchange between users or customers goes through the third party —financial institution —and after that reaches the recipient. These transactions take longer, depend on third parties, and attacks on bank accounts are more doable, as only one institution needs to be hacked. New Zealand's central bank has been recently hacked, and personal data has been stolen (Reserve Bank of New Zealand 2021). Much more of these situations are happening, and some are successful; some are not. Carnegie provides a good overview of Cyber Incidents Involving Financial Institutions, and last year more than 40 were added to their timeline (Carnegie Endowment for International Peace

2021). In other words, it is always easier to target one institution than thousands or millions of Bitcoin holders. It is essential to state that the security of Bitcoin or other cryptocurrency accounts is also not infinite. However, we will get to this topic later.

As a result of the disadvantages of a centralized system, the desire for a decentralized system arose. Thanks to Satoshi Nakamoto, the first decentralized currency was invented in 2008, and underlying technology —Blockchain (Nakamoto 2008). Whether 2008 for introducing Bitcoin was incidental or Satoshi chose a time when centralized banking failed for a given period is unknown, however intriguing.

Most cryptocurrencies use distributed ledger, Blockchain, to store transactions between the users. The information about transactions is recorded in 'blocks', which is public (Nakamoto 2008). The critical thing to say here is that trading cryptocurrencies cannot achieve desired decentralization without decentralized exchanges. If users trust centralized businesses or other third parties to buy or spend cryptocurrencies, the goal has not been reached (Medium 2018). Companies handling the exchange of cryptocurrencies, as Mt. Gox, can stop trading and file for bankruptcy, leaving traders in the same positions as clients of Lehman Brothers in 2008 (Feder *et al.* 2017). Centralized exchanges have four core functions that must be decentralized for us to talk about decentralized exchanges. For simplification, these four features could be stated as —trader's capital cannot be entrusted to a third party at any stage, orders must broadcast directly from trades to trades, orders must be matched directly between traders, and the exchange must be achieved without the involvement of an intermediary (Medium 2018).

### **Decentralized and anonymous cryptocurrencies made centralized and not anonymous by users**

Nowadays, most of the cryptocurrency exchanges are happening through some intermediary (Silfversten *et al.* 2020), even though it disrupts the anonymity and decentralization clause of the definition of cryptocurrency. Anonymous purchases can currently occur through bitcoin automats, decentralized stocks, P2P platforms, and some others. However, when using banks or centralized intermediaries to exchange cryptocurrency, these institutions often require proper identification. Thus, it can make holders of cryptocurrencies pay taxes from the profit and oblige to all the regulations in the given country.

Moreover, as stated before, the decentralized systems are considered more secure from cyber-attacks and bankruptcy of institutions, as there is none. Using centralized systems for buying cryptocurrencies rips off the user of this added benefit, and the decentralized system is becoming at least semi-centralized with the same risks. The question then is: What is the point?. From the tax evasion point of view, centralized platforms for the exchange of cryptocurrencies give the institutions a better overview of the trades, and the identities of the users can be checked or reviewed more efficiently. It is not so easy with decentralized platforms. However, the transactions can still be traced and sometimes also pinned to the users.

### **2.1.3 Double spending attack protection**

The double-spending attack is a successful attempt to convince a merchant that the transaction has been confirmed and then convince the entire network to accept the other transaction (Chohan 2017). Double spending is not relevant to fiat money, as it is physically transmitted to the first recipient (Lansky 2018). However, for digital currencies it was more difficult to resolve that the digital currency owner —decentralized and centralized, cannot use the same currency unit to pay to two individuals. Blockchain technology was the first to solve the double-spending problem without using third parties, as it made the attacks or evidence tampering very difficult. This technology was not used before Satoshi Nakamoto, and now it is often used as a valuable tool and marketing hype. Any transaction confirmed for its legitimacy is inserted into a block using Blockchain technology; each block then joins to the previously validated blocks, ultimately creating a chain of blocks known as Blockchain. Each block contains three information —data about the transaction, hash of the block, and hash of the previous block. The first block is the genesis block, as it cannot point to any previous block. Everyone tests the logical continuation of all the values in the new block before accepting it and adding it to the chain to ensure that all the cost transfers are valid (Nakamoto 2008). If someone tampers with one block, the information on the block changes what causes the hash of this block to change as well. The blocks that come after this block would then be useless, as they would point to the hash of the block that no longer exists. Thus, all the blocks after the tampered block will have to be changed. It takes around 10 minutes to create a new block thanks to the proof-of-work technology used, which slows down creating new blocks. It is essential to understand that all

these new blocks would have to be confirmed again (Makoto Yano & Kishimoto 2020).

This issue is very technological, so only the main points were included. However, the most essential is that thanks to this technology, it can be argued that tampering with blocks and double transactions is impossible. Thus, making blockchain technology an excellent choice for cryptocurrency trade and much more. Some cryptocurrencies do not work on Blockchain, such as IOTA (Sarfranz *et al.* 2019). However, these are not under focus in this paper.

## 2.2 Illegal activities and Cryptocurrencies

Thanks to the nature of cryptocurrencies and their characteristics, it is not surprising that they became widely used in illegal operations and on the darknet. The threats squared up with the time due to the degree of anonymity given to cryptocurrency users and the dawn of the Dark Web via anonymous networks such as Tor I2P and others. There are more ways how money gets laundered using cryptocurrencies. The most used cryptocurrency in the illegal world and the real world is Bitcoin (Foley *et al.* 2018).

Before cryptocurrencies, cash was used as the transaction medium in illegal exchanges, as it cannot be monitored —only through the serial number. Cryptocurrencies for illegal activity are digitalized cash (Hendrickson & Luther 2021). They facilitated the growth of online 'darknet' marketplaces. The marketplace 'Silk road' is one of the most known marketplaces, where over \$4 million of Bitcoin was seized by the FBI. As stated before, Bitcoin is only pseudo-anonymous and as other cryptocurrencies emerged some part of darknet switched to more secure ones as Monero or ZCash or more popular ones as Ethereum. This caused a decrease in illegal activity in Bitcoin (Foley *et al.* 2018).

According to Foley *et al.* (2018), in 2017, around \$76 billion of illegal activity involves Bitcoin, which represents 46% of all Bitcoin transactions. On the other hand, the report from Chainalysis (2021) reports that around \$7.5 billion was the total cryptocurrency value sent and received by illicit entities in more than 20 cryptocurrencies that they track. This difference in numbers is immense. Moreover, they report that in 2017 only below 1% of all transactions in cryptocurrencies was for illicit purposes. The values of the Chainalysis report did not meet the values of the report by Foley *et al.* (2018), not even in 2019, when Chainalysis reported the highest crypto usage in illicit activities —\$11.5

billion. Chainalysis does not include low and medium-level typologies. No one knows which one of these papers is more precise or closer to the truth. The type of analysis, the overall scope, and the proportion of false positives/negatives cannot be determined. We could conclude that some illegal activity is happening through cryptocurrencies. However, it is not easy to quantify it correctly.

Overall, since 2017 the proportion of Bitcoin used in illegal activities dropped significantly. MIT-IMB AI Lab analyzed Bitcoin transactions, and only 2% of them were labelled illicit (Weber *et al.* 2019). The absolute amount of Bitcoin spent on criminal activities is still rising, despite its declining share. UN estimates that overall, from 2 to 5 percent of global GDP (\$1.6 to \$4 trillion) annually is related to money laundering and illicit activity (Weeks-Brown 2018). According to Cryptocurrency Crime and Anti-Money Laundering Report by CipherTrace (2021) \$3.5 billion of Bitcoin was sent from Criminal addresses in 2020. Therefore, we can say that only a small part of the illicit activities is financed through cryptocurrencies.

According to Rand Corporation, an estimated 99% of cryptocurrency transactions is performed through centralized exchanges, making them subject to regulation, like any other currency (Silfversten *et al.* 2020).

### **2.2.1 Real-life examples of illegal cryptocurrency usage**

In 2018, Japan's National Police Agency reported over 7000 cases of suspected money laundering linked to cryptocurrencies (The Japan Times 2019). Callaway Crain and Mark Sanchez are convicts for money laundering involving cryptocurrency in the United States. They were selling controlled substances on their website 'NextDayGear' on dark web and sold more than \$2.8 million worth of these (Rosenberg 2019). According to the August 2019 U.N. Security Council, North Korea sanctions committee report, the DPKR stole \$2 billion in cryptocurrency from banks and exchanges in 2019 and used it to finance their weapons of mass destruction (WMD) program. According to reports, North Korea has also been tied to extensive crypto exchange hacking (Council 2019).

In 2020, 29 French operatives were detained in connection with a terrorism financing operation that used cryptocurrency coupons. The vouchers purchased by these operatives were then credited to jihadist accounts opened abroad (CipherTrace 2021).

Larry Dean Harmon was arrested for money laundering. Around \$300 million in Bitcoin was transferred via his Helix service, which partnered with mar-

ketplace AlphaBay. Helix allowed users to send Bitcoin in a way that concealed both the transaction and the Bitcoin's owner (CipherTrace 2021). Movie2k.to was one of the largest platforms for sharing pirated movies. Over \$29.6 million worth of Bitcoin and Bitcoin Cash was seized from those implicated in the illegal movie streaming on this site (CipherTrace 2021). There are many situations like these reported and much more that is not known yet. It is challenging to measure whether harm outweighs the benefits. Many could argue that the gain is diminutive. However, as in Venezuela, there are situations where cryptocurrency represents the opportunity to store the value of people's assets. In 2018, Venezuela launched their own cryptocurrency Petro and it seems to be an attempt to bypass tough economic sanctions imposed by US government (Kepli & Zuhuda 2019). Without this possibility, the well-being of these people could be even worse. Moreover, the blockchain perhaps would not be developed.

## **2.3 Cryptocurrencies and tax haven similarities**

Cryptocurrencies, in their nature, are very similar to tax havens. The tax havens are considered as taxation threats due to their anonymity, lack of transparency, and no or nominal taxes. The cryptocurrencies were referred to as 'super tax havens' due to their similarity but higher effectiveness (Marian 2013). Cryptocurrencies possess the essential characteristics of a traditional tax haven. However, they are not dependent on the existence of financial institutions, which makes tax evasion policies more difficult, as there is no institution to control (Marian 2013). Cryptocurrencies were also referred to as 'tomorrow's tax havens' (French 2013). Thanks to the previous chapters, the difference between Tax havens and Cryptocurrencies should be apparent as well as where their power lies.

### **2.3.1 Cryptocurrencies, regulations and the threat they possess**

Many countries did not recognize cryptocurrencies as real currencies, thus did not impose on them or widen the regulations they have in place. Some countries allow it, some prohibit it, but most of them leave it unregulated (Kepli & Zuhuda 2019). This is understandable as regulations often lag behind the rapid growth of new technology. Now, the changes in rules and inclusion of Virtual

Currency Exchange platforms into some of the regulations or laws are happening. In the United States, whether the activities involving cryptocurrencies are subject to AML regulatory obligations depends on whether the person engaging in these activities falls within one category of 'financial institutions'. It is the most developed for the centralized Virtual Currency Exchanges (VCEs) (Tracy French 2019). In 2013, Marian described the development of the current tax-enforcement regime by the U.S. and its issues. The current Foreign Account Tax Compliance Act (FATCA) does not cover tax evasion through cryptocurrencies, as it is mainly focused on foreign financial institutions. There is a high chance that tax-evaders will abandon traditional tax havens and move in favor of cryptocurrencies. Since then, the rules did not change much until the statement from IRS on 31st December 2020. They intend to add virtual currency accounts as reportable under FBAR rules. The change should become effective since the 2021 tax year (Bright!Tax Expat Tax Services 2021). In Europe, the Fifth Money Laundering Directive added firms operating centralized cryptocurrency exchanges or custodial wallet providers to 'obliged entities' (European Parliament and Council 2018). In Australia, cryptocurrency is regulated as currency and a financial instrument such as a share in the company (Tracy French 2019). The centralized platforms offering cryptocurrency exchanges can be monitored more quickly, and it is easier to include them into the country's money laundering regulation. However, even in some centralized platforms, you cannot identify the account holder correctly. Thus, the enforcement of the regulation, policy, or law is still difficult. Not to mention decentralized/P2P virtual platforms where it is almost impossible.

Antonikova (2014) suggested that it is essential to have differential treatment for different types of virtual currencies to fight tax evasion. Nowadays, most of the regulations are focused on the exchange intermediaries or cryptocurrencies as such and do not distinguish among the different types or technology they use.

### **2.3.2 Regulations, their enforcement, spillovers and Chinese 'ban'**

The regulations of cryptocurrency intermediaries have been dominated. Several enforcement actions have already been taken mainly in the United States. Ripple Labs violated several requirements, from acting as a Money Service Business, through selling virtual currency without registration to failing to im-

plement adequate Anti-Money Laundering regulations. Murgio and Lebedev allowed customers to exchange cash for Bitcoin, knowing their customers were transacting in the proceeds of criminal activity (Hughes 2017).

The Chinese authorities severely restricted Bitcoin trading in China from January 2017 and officially passed regulation in September of the same year. This caused, probably due to geographical proximity, increase in Bitcoin trading volume with Korean won and Japanese yen. Some exchanged intermediaries, like Binance, moved their legal residency to Japan. The trade increase also happened in USD, however, as their data suggest 50% of U.S. dollar transactions occur at exchanges located in the United States. Therefore, this increase is probably influenced by other measures (Borri & Shakhnov 2020).

To conclude this section, it is essential to realize that if the approach on ban on cryptocurrencies will not be internationally integrated, then regulations will have international spillovers and will lead only to redirection of volume of cryptocurrencies traded to other country, intermediary, P2P platforms or more 'anonymous' cryptocurrencies. Therefore, even with the regulations in place attacking cryptocurrency exchange intermediaries, the users are very likely still protected or can find a way to be.

## 2.4 Common Reporting Standard and Google trends

As the motivation for this analysis was also used Google Trends. When we check the Google trends for topic: Common Reporting Standard in years from 2014 to 2018, the countries with the highest interest in the topic are tax havens. Specifically, —the Cayman Islands, Isle of Man, Guernsey, Bermuda, Luxembourg, and Jersey are the top 6 countries with the highest interest in this term on Google. This shows that tax havens are interested in and affected by this regulation. Therefore, it is essential to take a look also at different channels for tax evasion.

Figure 2.1 shows the top 15 countries and their interest in the topic of Common Reporting Standard in the years 2014-2018. According to Google Trends, the value 100 means the highest popularity, 50 the half popularity, and 0 that not enough data were collected for the topic or googled term. Figure 2.2 shows the interest or popularity of this term for all countries over the four years.

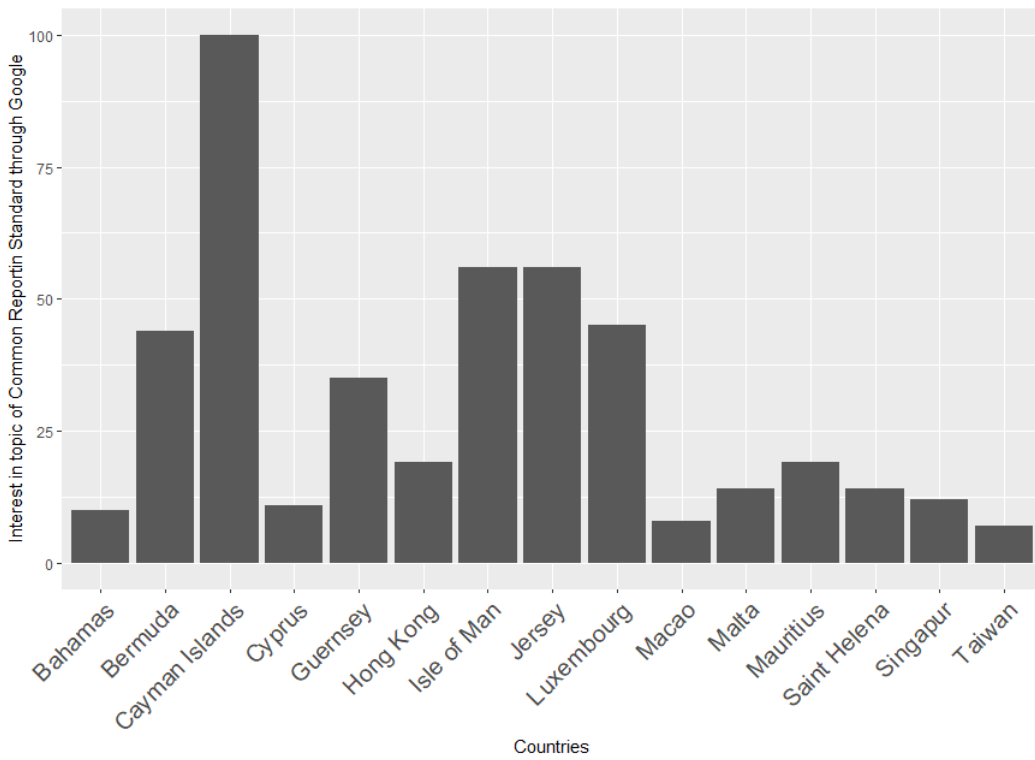


Figure 2.1: The volume of Bitcoin traded and its price in USD (2014-2018)

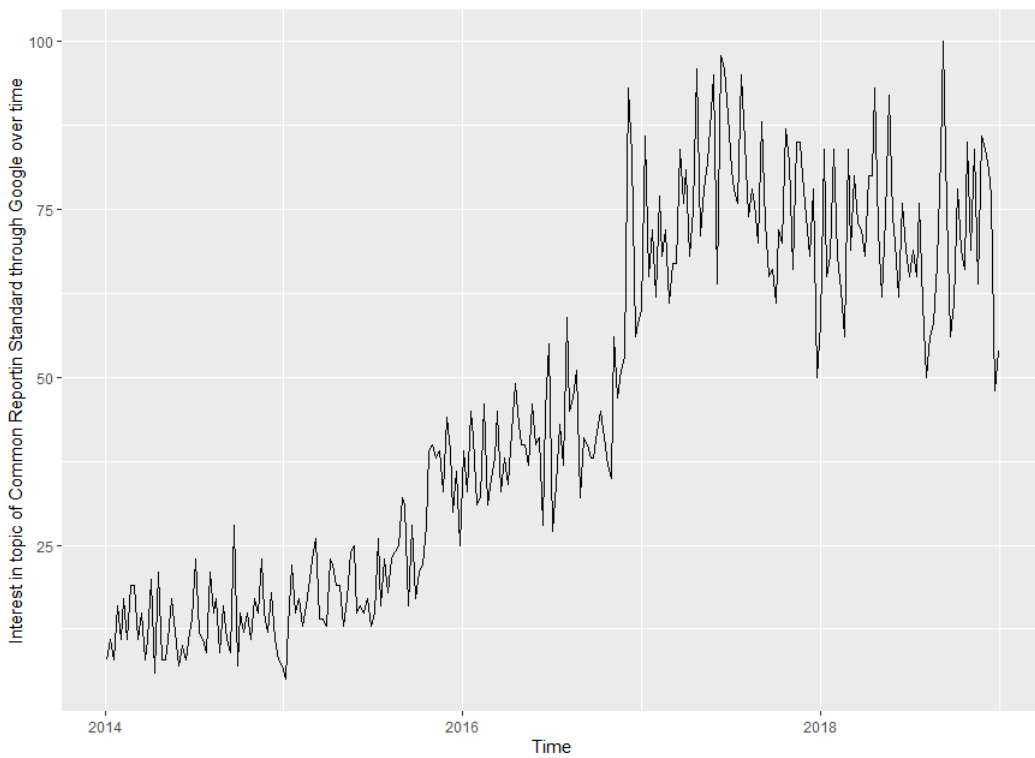


Figure 2.2: The volume of Bitcoin traded and its price in USD (2015-2016)

# Chapter 3

## Data and dataset construction

In this chapter, we will describe the data used in this thesis and their limitations. This will provide a more comprehensive overview of what is possible to be retrieved, mainly related to Bitcoin data. The emphasis will be on understanding why these particular data were chosen and why they are considered to be perhaps the most relevant for this research. The fundamental research and analysis are built on and motivated by a research paper written by Casi *et al.* (2020) called Cross-border tax evasion after the common reporting standard: Game over?. They analyzed the short-term effect of the first global multilateral standard for the automatic exchange of information (AEOI) on cross-border tax evasion. In this chapter, we will comment on their results and discuss the relevance. In the next one, we will reproduce some of their results and build on them.

### 3.1 Data

#### 3.1.1 Cross-border tax evasion after the common reporting standard: Game over? (Casi *et al.* 2020)

Casi *et al.* (2020) visualized and quantified the effect of Common Reporting Standard (CRS) on the deposits in tax havens that became part of this information exchange. Their paper used a dataset constructed based on the Bank for International Settlements (BIS) Locational Banking Statistics (LBS). They mainly focused on the outstanding quarterly volume of cross-border deposits and considered only the non-banking-sector deposits, representing a channel for tax evasion (Johannesen & Zucman 2014). There were three main limitations

on their data. The first one is that they could only observe the immediate owner of the deposit. However, here they conducted several more tests according to the well-established evidence of the use of shell companies. More specifically, when a German tax evader holds assets in Switzerland through a sham Panama company, the funds are assigned to Panama according to BIS (Johannesen & Zucman 2014). The second limitation is that the BIS statistics do not distinguish between an entity and individual ownership. However, they expect a reaction to the CRS also in entity-owned accounts because of the nature of CRS. Thirdly, they only look at bank deposits, not on the alternative channels for tax evasion. These limitations do not straightforwardly limit our research. However, it is essential to take them into account.

The deposit countries included all the publicly available countries at BIS and split them into tax havens and nonhavens. For the location of the owner of the deposit, they selected all EU and Organisation for Economic Co-operation and Development (OECD) countries. Their descriptive statistics on cross-border deposits found out that the United Kingdom, followed by the United States and France, has the most significant average volume of cross-border deposits. Among the tax havens, it is Switzerland, Luxembourg, and Hong Kong. Later on we will mimic this split in our event study and add variable language obtained from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) database.

### **Our contribution to this research**

In this thesis, we build on this existing research and extend it to study the interaction of automatic information exchange and the use of cryptocurrencies, which has, to the best of our knowledge, not been studied before in academic literature. Specifically, we ask whether the decrease in bank deposits in tax havens caused an increase in the volume of exchanges between Bitcoin and other currencies. We study whether the introduction of CRS made companies and individuals diverge to something new. Casi *et al.* (2020) partially answered where will be the money from tax havens relocated and identified the United States as a potentially attractive location. However, it failed to identify perhaps the most significant threat of current tax administration —cryptocurrencies.

Moreover, we will also take a look at cross-border deposits in specific tax havens to find out where the deposits decreased the most and provide a more precise overview of the decrease reported by Casi *et al.* (2020).

### 3.1.2 Bitcoin data

Bitcoin data are obtained from the server `data.bitcoinity.org` where all required data can be found and downloaded in `.csv` or `.xlsx`. In our case, we need exchanged volume of different currencies to Bitcoin, scaled to Bitcoin volume. However, the exchanges from a different currency to Bitcoin and also vice versa are considered. Therefore, we are unable to identify what type of exchange exactly happened. However, we assume that unexpectedly higher exchanged volume in Bitcoin is more likely to occur due to investment into this cryptocurrency than another way around. Moreover, we will take a look at overall higher exchange activity in cryptocurrencies in a defined period. This limitation stems from the fact that we monitor the exchanges from/to Bitcoin in more currencies in the same period. In many countries in our sample, the economic situations could be considered stable. Bitcoin is very volatile. Therefore, we will be taking a look at longer periods of the exchanges for these currencies and considering the countries that experienced unexpected peaks - not the increasing/decreasing trend over a longer period.

It is sufficient for us to consider data from 2014 to 2018 in monthly intervals to see the effect of CRS policy on cryptocurrency trade. Our analysis will try to follow the paper from Cusi *et al.* (2020) closely, so we try to use the same countries. However, not all the data for the currencies that these countries use are available, as they do not belong to the major worldwide currencies. Although we do not have all the data, these currencies would probably not represent much of a contribution, as we expect that money located in some of the smaller tax havens is not exchanged for the official currency there. However, they are more likely to be held in major world currencies, like United States dollar (USD) or Euro (EUR).

Moreover, the data downloaded identify different platforms from which these data were retrieved. The main ones —from which the highest volume was exchanged for given currency are written separately, and the smaller ones are pooled together. It is essential to state here that not all platforms are identical for each period and each currency. In the sense of currency, it is logical, as some currencies, e.g., Chinese yuan (CNY) are traded mainly through Chinese-based intermediaries. There are two main reasons why these data are not present. The first is that the platform did not exist in the given period —not on the market yet or ceased to exist due to bankruptcy as Mt. Gox. The second reason is that the data were not collected from the platform or were

unable to collect them. The first scenario is not so problematic, as we expect some redistribution among these. However, the second one could cause some troubles, and we will try to regard it or at least ease this effect in our model.

Twenty-six currencies were identified as meaningful for our further analysis. However, we cannot use data on ILS —, the currency of Israel, as no data were available after Israel entered CRS. This leaves us with twenty-five currencies. The currencies that are chosen fall within one or more of the following categories: country using this currency, as official currency, entered CRS; small tax havens that entered CRS are very likely to use this currency; currencies considered as safe haven currencies and the ten most traded currencies in the world. There is a significant overlap in these categories. However, there needs to be a proper explanation on two major currencies included —USD and Pound sterling (GBP). Lastly, the idea behind safe haven and most traded currencies has to be analyzed. This will be discussed in the section on the formation of the dataset. The data we obtained are collected from more cryptocurrency exchange platforms, decentralized and also centralized ones. The biggest ones are coinbase, kraken, bitfinex, bitstamp, gemini, bitbay, localbitcoins and others.

The main reason why this specific period was chosen is that it most precisely shows from which countries the Bitcoin is traded. In other words, we can, to some extent, approximate what are the currencies in which people hold money in tax havens, or we can identify currencies that are traded for cryptocurrencies the most in the specified period. Thus, we believe it provides a pretty accurate proxy of what impact CRS introduction had on cryptocurrencies in tax haven countries.

In Table 3.1 we provide descriptive statistics on the currencies of our interest in the period 2014-2018. Overall, the most Bitcoin is traded from/to CNY (23,09 million in Bitcoin), followed by USD (2,38 million in Bitcoin) and EUR (383,9 thousand in Bitcoin). We can see that during this period, the Min and Max values traded have an extensive range for many currencies, e.g., CNY, Japanese yen (JPY), or USD. Described also by the pretty high standard deviation in many cases. Thus, we could say that over this period, the interest in cryptocurrencies overall increased. Our tax haven currencies also follow this trend, and their popularity increased over this period.

In the case of CNY, it is essential to realize that the new policy was implemented in China, which caused the abrupt increase and then decrease of volume exchanged. We expect spillovers that increase volume exchanged in South Korean won (KRW) and JPY currencies, according to research done by

Borri & Shakhnov (2020). In Table 3.2 we take a closer look at the period six months before and after effective CRS date (how were these periods determined is further explained in the section for CRS). We can see that the variation in Singapore dollar (SGD) and CNY remained high. However, for the other currencies, it decreased a little bit what could indicate that the minimum values were occurring in the period more than six months before CRS Effective date. The mean value traded from our tax haven currencies increased for USD, GBP, and Swiss franc (CHF). However, SGD and Hong Kong dollar (HKD) did follow rather decreasing trend.

We also retrieved the Bitcoin price and Bitcoin volume traded from the same page as before to get an overview of some correlation between these two. In Figure 3.1 can be seen the overall amount traded in the period 2014-2018 in USD also with the bitcoin price trend. As expected, some dependence of these two variables is visible. The close-up is provided in Figure 3.2 where we take a closer look at the years 2015-2016. Here can be seen that around January and July 2016, the price of Bitcoin did not rise immensely. However, the volume traded did. This empirically strengthens our hypothesis and provides a nice overview of how the exchanged volume of Bitcoin was developing relative to its price.

Table 3.1: Descriptive statistics of currencies exchanged to Bitcoin  
(vice versa) in 2014-2018 in BTC volume

| Currency | Observations | Mean        | Stand.dev.  | Min       | Max          |
|----------|--------------|-------------|-------------|-----------|--------------|
| AUD      | 60           | 18976.69    | 13229.4     | 2664.01   | 46876.38     |
| BRL      | 60           | 5298.51     | 4381.54     | 1287.78   | 23657.54     |
| CAD      | 60           | 22792.47    | 13406.97    | 6271      | 57197.13     |
| CHF      | 60           | 4437.89     | 10311.25    | 10.27     | 43788.47     |
| CLP      | 60           | 98          | 65.26       | 7.68      | 312.71       |
| CNY      | 60           | 23097343.72 | 41592859.11 | 2419.95   | 173047579.07 |
| CZK      | 60           | 79.66       | 65.82       | 6.97      | 333.38       |
| DKK      | 60           | 35.84       | 23.77       | 1         | 80.63        |
| EUR      | 60           | 383964.07   | 229554.47   | 57519.17  | 887887.57    |
| GBP      | 60           | 58159.24    | 25597.33    | 8167.61   | 150330.86    |
| HKD      | 60           | 18134.96    | 24321.88    | 211.91    | 112428.51    |
| HRK      | 60           | 70.04       | 75.09       | 1.55      | 328.32       |
| HUF      | 60           | 19.08       | 12.36       | 3.35      | 51.4         |
| JPY      | 60           | 296349.38   | 287737.43   | 11.32     | 903823.05    |
| KRW      | 60           | 332241.8    | 387646.42   | 10150.19  | 1610186.52   |
| MXN      | 60           | 4599.44     | 4777.06     | 138.94    | 21426.87     |
| NOK      | 60           | 622.91      | 351.88      | 92.64     | 1757.32      |
| NZD      | 60           | 8055.96     | 12493.29    | 115.51    | 43814.81     |
| PLN      | 60           | 36645.84    | 17741.97    | 9220.37   | 82778.74     |
| RON      | 60           | 332.42      | 259.38      | 22.69     | 961.9        |
| SEK      | 60           | 1111.31     | 751.36      | 159.72    | 2582.21      |
| SGD      | 60           | 14763.2     | 16607.38    | 101.61    | 57854.59     |
| TRY      | 60           | 90.7        | 106.75      | 0.25      | 446.05       |
| USD      | 60           | 2384846.1   | 1050412.95  | 603948.04 | 4947777.21   |
| ZAR      | 60           | 1787.39     | 2030.71     | 172.33    | 8390.5       |

Table 3.2: Descriptive statistics of currencies exchanged to Bitcoin  
(vice versa) in period from t-6 to t+6 in BTC volume

| Currency | Observations | Mean        | Stand.dev.  | Min        | Max          |
|----------|--------------|-------------|-------------|------------|--------------|
| AUD      | 13           | 14695.69    | 6658.39     | 7744.13    | 31475.45     |
| BRL      | 13           | 6325.08     | 3553.57     | 3244.96    | 16324.88     |
| CAD      | 13           | 20609.27    | 4669.89     | 12807.57   | 27057.29     |
| CHF      | 13           | 131.85      | 61.2        | 53.49      | 284.95       |
| CLP      | 13           | 121.23      | 46.37       | 52.26      | 196.2        |
| CNY      | 13           | 21477229.16 | 52539188.86 | 4693.43    | 168225589.92 |
| CZK      | 13           | 160.09      | 70.63       | 79.73      | 333.38       |
| DKK      | 13           | 57.62       | 6.02        | 44.25      | 66.28        |
| EUR      | 13           | 464594.22   | 124683.52   | 295821.5   | 622985.63    |
| GBP      | 13           | 83727.54    | 23785.79    | 55988.15   | 150330.86    |
| HKD      | 13           | 417.04      | 117.21      | 211.91     | 626.77       |
| HRK      | 13           | 186.61      | 63.49       | 103.87     | 328.32       |
| HUF      | 12           | 29.41       | 7.49        | 16.82      | 40.42        |
| JPY      | 13           | 608023.96   | 213369.61   | 249148.15  | 903823.05    |
| KRW      | 13           | 146582.48   | 36038.37    | 101593.18  | 218069.18    |
| MXN      | 13           | 2000.59     | 766.23      | 385.78     | 3466.96      |
| NOK      | 13           | 719.02      | 120.52      | 461.27     | 902.97       |
| NZD      | 13           | 610.02      | 153.96      | 283.4      | 915.68       |
| PLN      | 13           | 45666.54    | 14348.41    | 32944.47   | 82778.74     |
| RON      | 13           | 637.76      | 168.63      | 457.89     | 961.9        |
| SEK      | 13           | 2116.08     | 323.55      | 1542.87    | 2582.21      |
| SGD      | 13           | 7456.57     | 6084.88     | 132.55     | 16669.17     |
| TRY      | 13           | 222.73      | 107.85      | 85.69      | 446.05       |
| USD      | 13           | 2876229.46  | 1004244.13  | 1623314.45 | 4947777.21   |
| ZAR      | 13           | 893.13      | 273.61      | 446.61     | 1265.57      |

Note: t=0: CRS Effective date for currency/country, visualized in Table 3.4

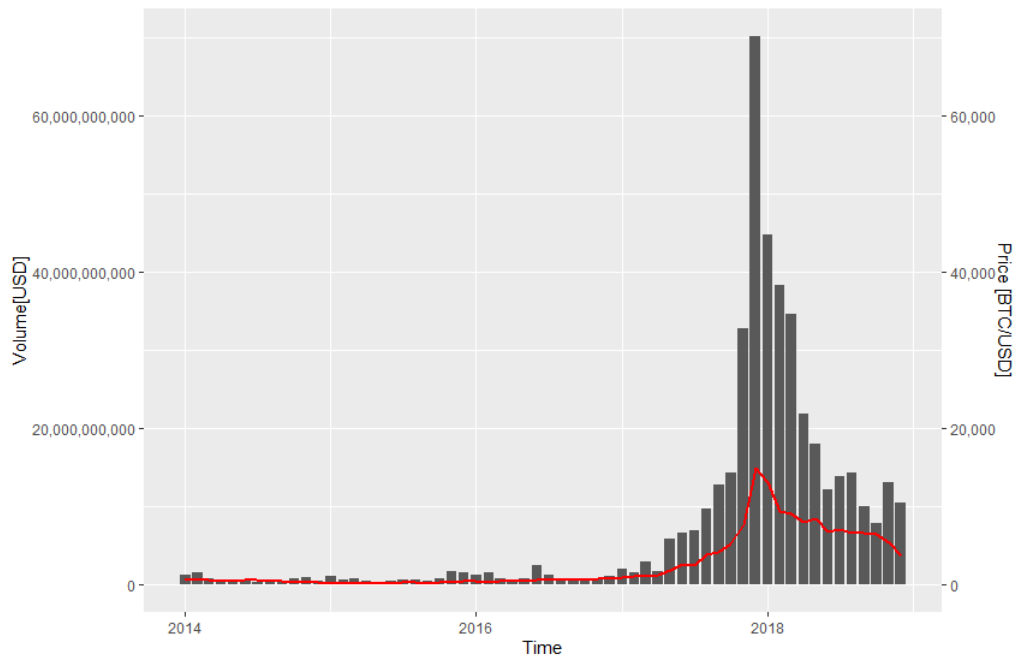


Figure 3.1: The volume of Bitcoin traded and its price in USD (2014-2018)

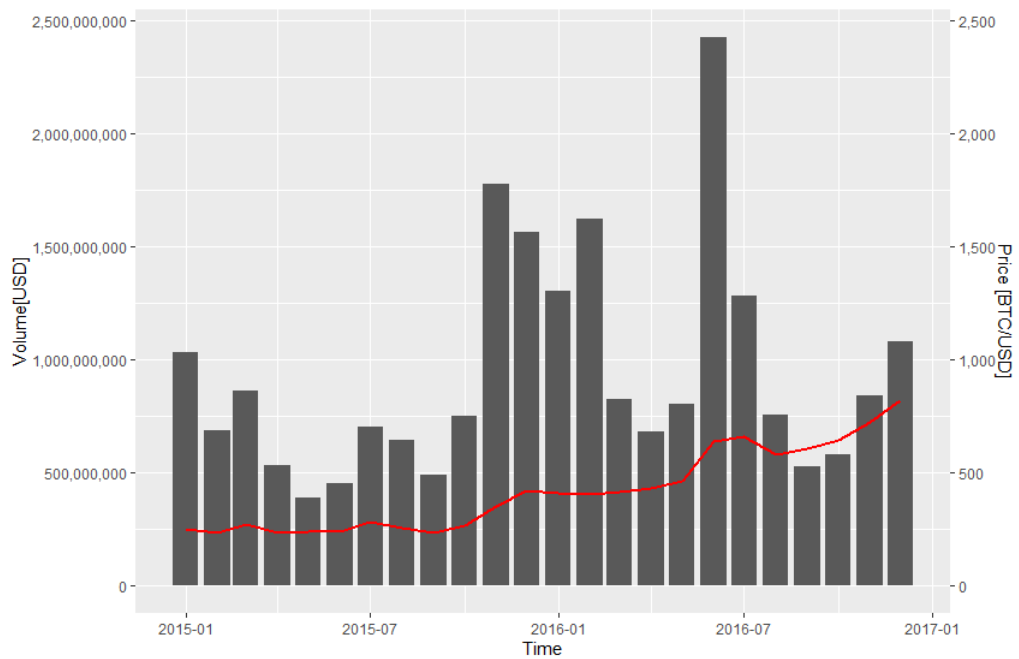


Figure 3.2: The volume of Bitcoin traded and its price in USD (2015-2016)

### 3.1.3 The Common Reporting Standard

The Common Reporting Standard is the second dataset we will need for our analysis. As stated before, the baseline for us are the same countries as used by Casi *et al.* (2020) . However, some will not be used because of not having sufficient data for these countries/currencies.

Table 3.3 provides the overview of countries in our sample. It displays the exact date on which the CRS law was published in the official gazette (CRS introduction date) and the exact date from which financial institutions started to automatically collect information on foreign accounts (CRS Effective date) Casi *et al.* (2020). We are not interested in the date or year when the first exchange happened, as the information on the accounts would be already collected for the preceding year or period.

The only country not included in the previously mentioned paper is The People’s Republic of China. The dates for Introduction date and Effective date are more difficult to be acquired. However, the approximation according to (PWC China) and (Charles Kinsley 2017) is provided in Table 3.3.

Table 3.3: CRS introduction and effective date at national level —exact date.

| Country        | CRS introduction date | CRS Effective date |
|----------------|-----------------------|--------------------|
| UK             | 15 April 2015         | 01 January 2016    |
| Lithuania      | 25 June 2015          | 01 January 2016    |
| Austria        | 14 August 2015        | 01 October 2016    |
| Slovenia       | 28 August 2015        | 01 January 2016    |
| Cayman Islands | 16 October 2015       | 01 January 2016    |
| Isle of Man    | 23 October 2015       | 01 January 2016    |
| Romania        | 27 October 2015       | 01 January 2016    |
| Spain          | 17 November 2015      | 01 January 2016    |
| Jersey         | 01 December 2015      | 01 January 2016    |
| Malta          | 04 December 2015      | 01 January 2016    |
| Sweden         | 10 December 2015      | 01 January 2016    |
| Hungary        | 11 December 2015      | 01 January 2016    |
| Slovakia       | 15 December 2015      | 01 January 2016    |
| Belgium        | 16 December 2015      | 01 January 2016    |
| Norway         | 18 December 2015      | 01 January 2016    |

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|                            |                  |                 |
|----------------------------|------------------|-----------------|
| Germany                    | 21 December 2015 | 01 January 2016 |
| Latvia                     | 23 December 2015 | 01 January 2016 |
| Luxembourg                 | 24 December 2015 | 01 January 2016 |
| France                     | 28 December 2015 | 01 January 2016 |
| Italy                      | 28 December 2015 | 01 January 2016 |
| Netherlands                | 28 December 2015 | 01 January 2016 |
| Cyprus                     | 30 December 2015 | 01 January 2016 |
| Denmark                    | 30 December 2015 | 01 January 2016 |
| Mexico                     | 12 January 2016  | 01 January 2016 |
| New Zealand                | 12 February 2016 | 01 July 2017    |
| South Africa               | 02 March 2016    | 01 January 2016 |
| Australia                  | 18 March 2016    | 01 July 2017    |
| Portugal                   | 30 March 2016    | 01 January 2016 |
| Czech Republic             | 06 April 2016    | 01 January 2016 |
| Finland                    | 08 April 2016    | 01 January 2016 |
| Greece                     | 14 April 2016    | 01 January 2016 |
| Croatia                    | 19 May 2016      | 01 January 2016 |
| Hong Kong                  | 29 June 2016     | 01 January 2017 |
| Japan                      | 29 July 2016     | 01 January 2017 |
| Estonia                    | 02 August 2016   | 01 January 2016 |
| Panama                     | 27 October 2016  | 30 June 2017    |
| Singapore                  | 02 December 2016 | 01 January 2017 |
| Canada                     | 15 December 2016 | 01 July 2017    |
| Rep. of Korea              | 15 December 2016 | 01 January 2016 |
| Switzerland                | 18 December 2016 | 01 January 2017 |
| Brazil                     | 29 December 2016 | 01 January 2017 |
| Bahamas                    | 29 December 2016 | 01 January 2017 |
| Poland                     | 20 March 2017    | 01 January 2016 |
| Bermuda                    | 12 April 2017    | 01 January 2016 |
| Turkey                     | 20 May 2017      | 01 July 2017    |
| Chile                      | 21 July 2017     | 01 July 2017    |
| Aruba                      | 19 December 2017 | 01 January 2017 |
| United States              | Not Committed    | Not Committed   |
| People's Republic of China | 30 June 2016     | - July 2017     |

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### 3.1.4 Financial Secrecy Index and Identified Tax Havens

According to Cobham *et al.* (2015), the financial transparency may be characterized (1) by relevant information being placed on the public for all stakeholders to access; (2) by access on specific private financial data only by official authorities; or (3) by collecting, analyzing, and sharing relevant information effectively with foreign counterparts. Tax Justice Network, states that 'Financial secrecy occurs when there is a refusal to share financial information with legitimate authorities, such as tax authorities and police services. We are exercised with cross-border Financial Secrecy, of the kind created by secrecy jurisdictions.' Financial Secrecy Index is the most used Index for tracking Financial Secrecy around the world. It is essential to state that this Index has two components: Secrecy score and Global Scale Weight. The FSI ranks the jurisdictions by combining these two components in specified equation (Tax Justice Network 2015b). For our purpose, only the Secrecy score will be used in order to identify Secrecy Jurisdictions. We are not interested in the Global Scale Weight, as some additional 'fake positives' countries could be identified due to their high international impact, not the high Secrecy score needed for tax evasion.

The countries with the high Financial Secrecy score in 2015 provided by Tax Justice Network (2015a) were identified. The identified Secrecy jurisdictions that entered CRS and will be used for further analysis: Singapore, Switzerland, Isle of Man, Jersey, Bermuda, Aruba, Cayman Islands, Panama, and Hong Kong. The complete list of countries with their Secrecy score can be found in B.

### 3.1.5 Limitations of our data

As can be easily assumed, this approach and any other that could be chosen include many limitations, as we deal with data on cryptocurrencies. In other words, the data are often not available, not known, or cannot be measured accurately in a specified or determined way. Moreover, we can only observe some platforms that offer bitcoin exchanges. We can expect more illegal activity through decentralized platforms. However, here we are looking at the short-time effect change. Moreover, even in the case of centralized platforms, the regulations are difficult to be enforced. Our approach makes us pair currencies to countries. However, this is not always possible, as one currency can be used in more countries. Moreover, according to our research, we were unable to

determine in what currency are usually money in tax havens held, and thus it became part of our hypothesis. Lastly, we are working with two-way data. Thus, it is impossible to prove in detail that the currency was exchanged for bitcoin and not vice versa.

The other data that could be considered for our research were based on the legal residency of entities through which the Bitcoin was traded. This would make our country/currency split even more difficult. Moreover, according to research made by Borri & Shakhnov (2020), only 50% exchanges in USD happen through intermediaries located in the United States, and only 30% exchanges in EUR happen through intermediaries located in Europe. Therefore, we could not link this data to tax havens, as we would not know who is using the platforms. Moreover, not all countries have some cryptocurrency exchange intermediary based in their country. Thus, making it difficult to track for smaller tax-havens.

## 3.2 The Final Dataset

The primary dataset results from combining dataset on exchanged Bitcoin volume in specified currencies and its overlap with countries that entered CRS. To get a better sense of a split, Table 3.4 provides the countries from the CRS table linked to its official currency or the currency under which this country will be analyzed (e.g., Jersey - GBP).

In tax havens, some minor assumptions had to be made, as the official currencies there are usually not the most traded currencies. However, it could be expected that money located in these tax havens was held in different currencies, specifically the major ones.

In the case of Singapore and Hong Kong, the determined currencies are SGD and HKD, respectively. We do not expect much of an issue in these two, as these currencies are only used as official currencies by mentioned countries.

Switzerland and Liechtenstein use CHF as their primary currency. Liechtenstein entered CRS, as well as Switzerland, however, at different time. We do not expect this to be an issue, as Liechtenstein has also a high Financial Secrecy Tax Justice Network (2015a).

The Isle of Man and Jersey have both their currencies. However, they are of some GBP variance and are not accepted in the UK. Therefore, for these two tax havens, the determined currency could be used there to store money in GBP. If small and their currency countries are not widely used, it seems

logical to expect people or companies from England to keep money there in their currency. There is probably no need to undergo the exchange process for the official currency used in that country. Bermuda, Panama, Cayman Islands, and Aruba fall into the Isle of Man and Jersey category. Therefore, the USD was marked as the 'tax haven currency' for these four. Here, it is essential to mention that the United States and most of the other small countries that use USD did not enter CRS. We could expect the most significant influence on Bitcoin exchanged from the side of the United States. However, as the United States had already had FATCA in place in 2013, we do not expect American citizens or companies to switch to cryptocurrency trade abruptly, as there is probably no specific need in that period. Having said that, we should still consider the alternatives in our further analysis, as the United States has a worldwide influence in many other variables.

In the Table 3.4 are also shown the Introduction and Effective dates that will be associated with each currency. According to the previously stated split, some countries using or by us considered to be using the same currency did not enter into CRS simultaneously or did not have the same Introduction date. In this case, the first possible date was entered and recognized as an Effective date or Introduction date. Simply for the reason that we could expect some changes after the first country enters the information exchange. One exception has been made for EUR, where most countries had an CRS introduction date in December 2016.

One of the currencies that could bring some confusion is GBP. The United Kingdom entered CRS. However, the two tax havens —Isle of Man, and Jersey —entered CRS, as well. We suppose that in these two countries most of the cross-border deposits will occur in GBP, as their official currencies are not widely used and are of some GBP variant. Therefore, the different date for CRS effective and introduction date was chosen.

In Table 3.5 we can also see whether the currency will be identified in our further research as a tax haven currency, nonhaven currency, safe haven currency, one of the major currencies, or some combination of these.

Table 3.4: Currencies and defined CRS introduction and effective date

| Currency | Country/Countries  | CRS Introduction date | CRS Effective date |
|----------|--|-----------------------|--------------------|
| AUD      | Australia  | March 2016            | July 2017          |
| BRL      | Brazil   | December 2016         | January 2017       |
| CAD      | Canada   | December 2016         | July 2017          |
| CHF      | Switzerland  | December 2016         | January 2017       |
| CLP      | Chile  | July 2017             | July 2017          |
| CZK      | Czech Republic   | April 2016            | January 2016       |
| DKK      | Denmark  | December 2015         | Januray 2016       |
|          | Austria, Estonia,<br>Greece, Slovenia,<br>Lithuania, Spain,<br>Malta, Slovakia,<br>Belgium, Germany,<br>Latvia, Finland,<br>Portugal<br>Luxembourg, France,<br>Italy, Netherlands,<br>Cyprus | December 2015         | Januray 2016       |
| EUR      |  |                       |                    |
| GBP      | UK, Jersey, Isle of Man  | October 2015          | Januray 2016       |
| HKD      | Hong Kong  | June 2016             | January 2017       |
| HRK      | Croatia  | May 2016              | Januray 2016       |
| HUF      | Hungary  | December 2015         | Januray 2016       |
| JPY      | Japan  | July 2016             | January 2017       |
| KRW      | Rep. of Korea  | December 2016         | January 2016       |
| MXN      | Mexico   | January 2016          | January 2016       |
| NOK      | Norway   | December 2015         | January 2016       |
| NZD      | New Zealand  | February 2016         | July 2017          |
| PLN      | Poland   | March 2017            | January 2016       |
| RON      | Romania  | October 2015          | January 2016       |
| SEK      | Sweden   | December 2015         | January 2016       |
| SGD      | Singapore  | December 2016         | January 2017       |
| TRY      | Turkey   | May 2017              | July 2017          |
|          | Cayman Islands,<br>Panama, Bahamas,<br>Bermuda, Aruba,<br>United States  | October 2015          | January 2016       |
| USD      |  |                       |                    |
| ZAR      | South Africa   | March 2016            | January 2016       |
| CNY      | China  | June 2016             | July 2017          |

Table 3.5: Currencies and their characteristics

| Currency | Tax haven currency | Safehaven currency | Major currency |
|----------|--------------------|--------------------|----------------|
| AUD      |                    |                    | x              |
| BRL      |                    |                    |                |
| CAD      |                    |                    | x              |
| CHF      | x                  | x                  | x              |
| CLP      |                    |                    |                |
| CZK      |                    |                    |                |
| DKK      |                    |                    |                |
| EUR      |                    | x                  | x              |
| GBP      | x                  |                    | x              |
| HKD      | x                  |                    | x              |
| HRK      |                    |                    |                |
| HUF      |                    |                    |                |
| JPY      |                    | x                  | x              |
| KRW      |                    |                    |                |
| MXN      |                    |                    |                |
| NOK      |                    |                    |                |
| NZD      |                    |                    | x              |
| PLN      |                    |                    |                |
| RON      |                    |                    |                |
| SEK      |                    |                    |                |
| SGD      | x                  |                    |                |
| TRY      |                    |                    |                |
| USD      | x                  |                    | x              |
| ZAR      |                    |                    |                |
| CNY      |                    |                    | x              |

# Chapter 4

## Event study and data overview

In our empirical strategy, we will first partially replicate the results of Casi *et al.* (2020) and take a closer look on some countries. Then, we will show the volume of Bitcoin traded in specified currencies in the period before and after the country entered CRSs. We will do an extensive overview through event study for different currency types and analyze the data available at hand.

### 4.1 Replication of Casi *et.al.* results

We partially replicated the event study done by Casi *et al.* (2020), in order to check the data and get a better overview. We collected data from BIS Locational Banking Statistics. For our analysis, we focused on the quarterly volume of cross-border deposits from the non-banking sector, as we believe these are considered channels used for tax evasion. Our reporting countries are the countries where the deposits are located, thus reported as a liability. Our sample of reporting countries includes all countries for which data are publicly available at the bilateral level. We divided these countries into tax havens and nonhavens. Tax haven countries are Guernsey, Isle of Man, Switzerland, Hong Kong, Jersey, and Luxembourg. Nonhavens are Australia, Austria, Brazil, Belgium, Canada, Chile, Chinese Taipei, Denmark, Finland, France, Greece, Ireland, Italy, Korea, Macau, Mexico, Netherlands, South Africa, Spain, Sweden, United Kingdom, and the United States. The split is the same, as in the paper we are inspired by. For the location of the owner of the deposit, we also selected the same 41 countries. These are either EU countries or OECD member states, or both. We did not include Columbia in this split, as they entered OECD later on. According

to Casi *et al.* (2020), these split will ensure high cross-country comparability, as these have similar fiscal rules and regulations fighting tax evasion.

For the event study, we will work with data ranging from period  $t-4$  to  $t+4$ , where  $t$  is the CRS effective date. We are not grouping coefficients together at the end of the  $t+4$  and  $t-4$  period, as done by Casi *et al.* (2020). We are only interested in the period close to the CRS effective dates. Moreover, they used more types of fixed effects. However, it stated that the only ones needed were the country-pair fixed effects. Therefore, we decided to include one type into our regression. We consider this one the most relevant to our data —language. As stated before, more countries face the same tax evasion regulations. Therefore, we believe variable language is the most relevant here, as an individual from France could choose to input his deposits anywhere. However, it would be more likely to do so for a country that speaks the same language due to more efficient negotiation.

Our resulting model is shown below.

$$\ln(\text{Deposits}_{ijt}) = \sum_{k=-4}^4 \beta_k D_{jt}^k * \text{Havens}_j + \alpha_{ij} + \epsilon_{ijt}$$

$D_{jt}^k$  is the dummy variable indicating a point in time  $k$  periods from the CRS treatment, and it interacts with  $\text{Havens}_j$ , that takes values of 1 when the given country is a tax haven. We measure the effect on log volume of cross-border deposits between deposit country  $j$  and residence country  $i$  at the quarterly period  $t$ .  $\alpha_{ij}$  is the time-invariant country-pair fixed effect —language. In Figure 4.1, we see the plotted coefficients of this regression. We plot the coefficient estimates together with their confidence intervals at a 95 percent level. They turned out pretty high, probably due to the lower amount of fixed effect variables. Similarly to Casi *et al.* (2020), we find a decrease in bank deposits in tax havens following CRS effective dates. At this point, we will back up our findings by Casi *et al.* results, as they are very similar in overall trend, and their analysis was more precise.

In the previous chapter on Data and database construction, we had to group some countries together under one currency. Now, we will display trends in cross-border deposits reported by 3 countries - United Kingdom, Isle of Man and Jersey. We expect decrease in cross-border deposits and thus reallocation of money located there, very likely in GBP. This link is rather an approximation, as not all the money located in these countries have to be in GBP. However, we are talking here about one of the major currencies used. Thus, we believe this could be a good proxy or overview for our further research. We expect deposits

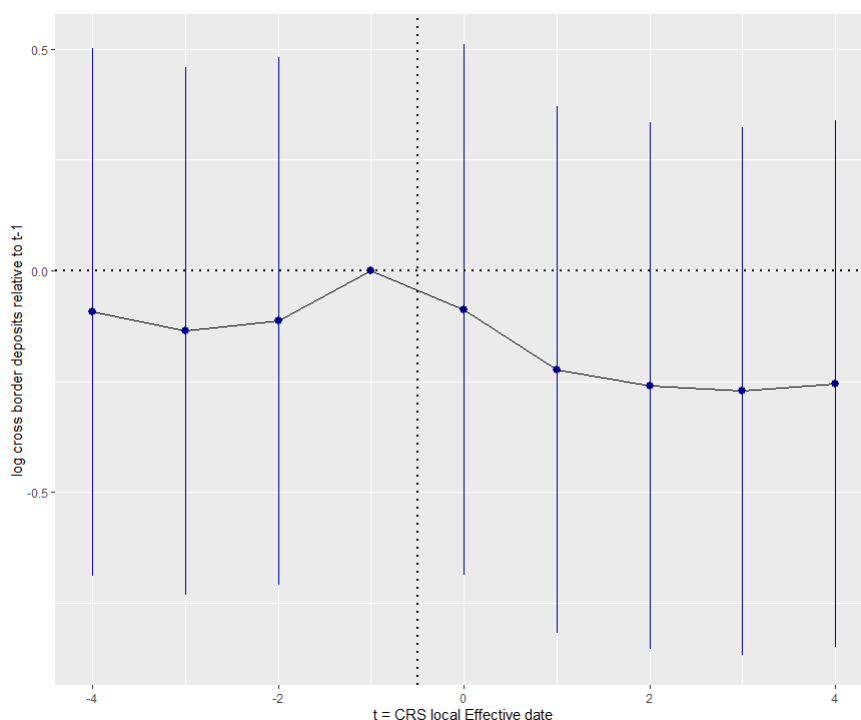


Figure 4.1: Event study test of reaction to CRS effective date in tax havens

to decrease in Isle of Man and Jersey, as these countries are tax haven. However, we do not expect significant change in United Kingdom deposits.

Figures 4.2, 4.3 and 4.4 confirm our hypothesis. The cross-border deposits decreased significantly over these two years in Jersey and Isle of Man. For the United Kingdom, we decided to plot a longer period, as the changes were a little bit unclear, and we could not exactly interpret what happened. This way we can see that there has been some decrease. However, the deposits started to increase significantly. Therefore, we do not expect decreases to be caused by CRS, rather normal volatility of deposits.

Casi *et al.* (2020) did not take a look at particular situations in tax havens only reported that due to CRS, there has been a reduction of 11.5% in cross-border deposits parked in Tax haven. We already visualized two tax havens, where the decrease is apparent. However, we decided to look also at deposits in the last 4 to determine where the deposits decreased the most.

We can see that declined after CRS effective date occurred in Jersey, Isle of Man, Guernsey, and partially Luxembourg. In the other two - Switzerland and Hong Kong the number of deposits increased immensely. This could be explained by the fact that Switzerland and Hong Kong remained probably the

most secretive. Thus, there is still a possibility to bypass the CRS through shell companies. In most Figures, we see the sudden drop one or two periods before CRS effective date. We suppose that this was when money was being relocated somewhere else, possibly also exchanged for cryptocurrencies. We will confirm this hypothesis in the next section.

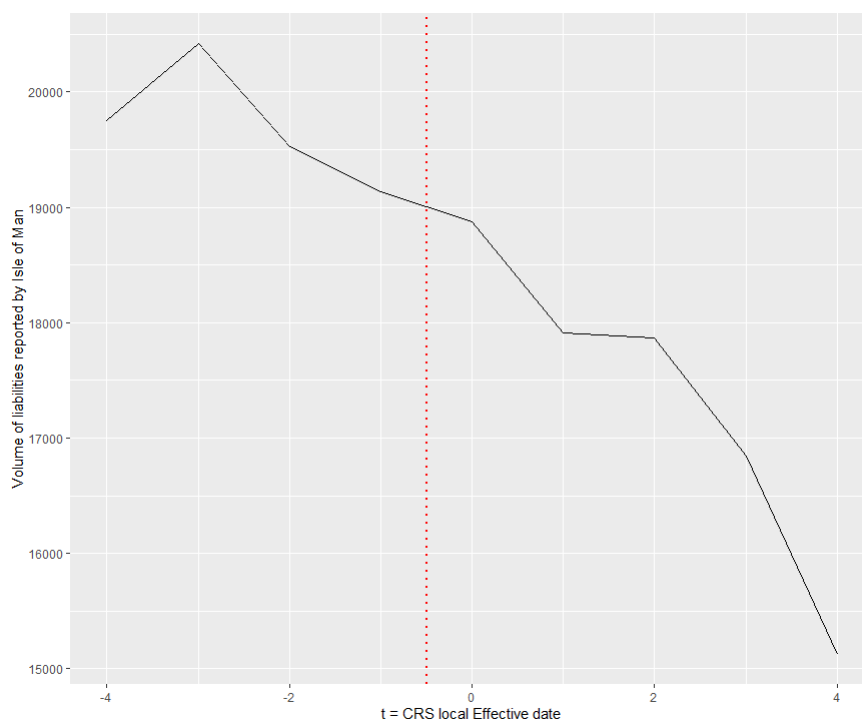


Figure 4.2: Liabilities - Isle of Man

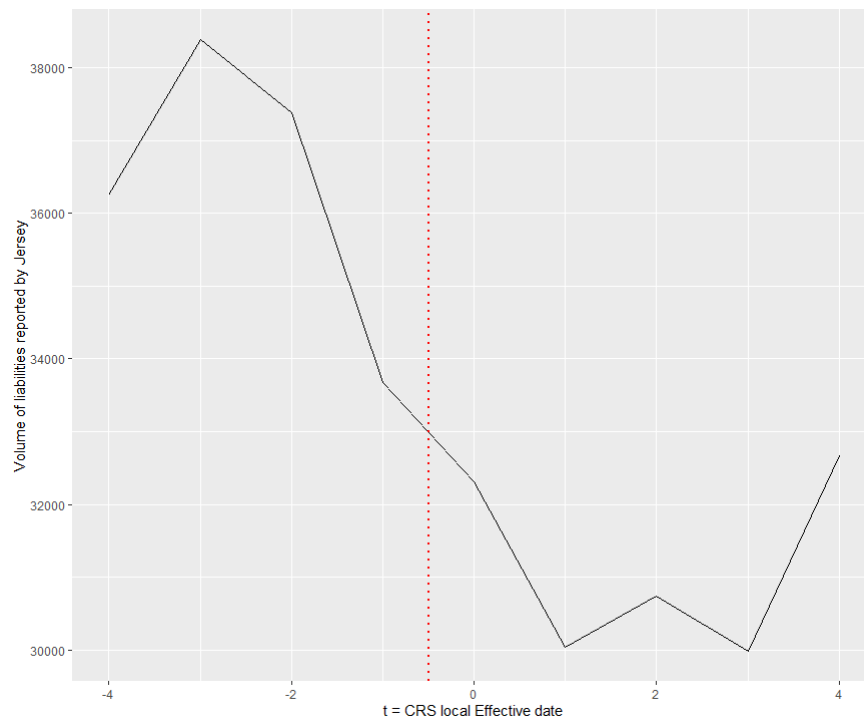


Figure 4.3: Liabilities - Jersey

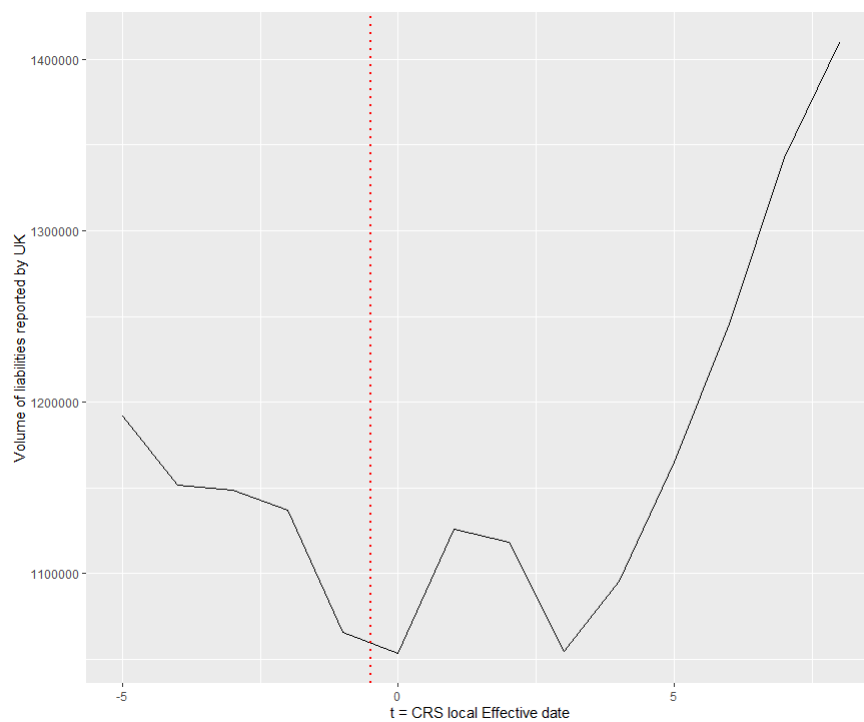


Figure 4.4: Liabilities - UK

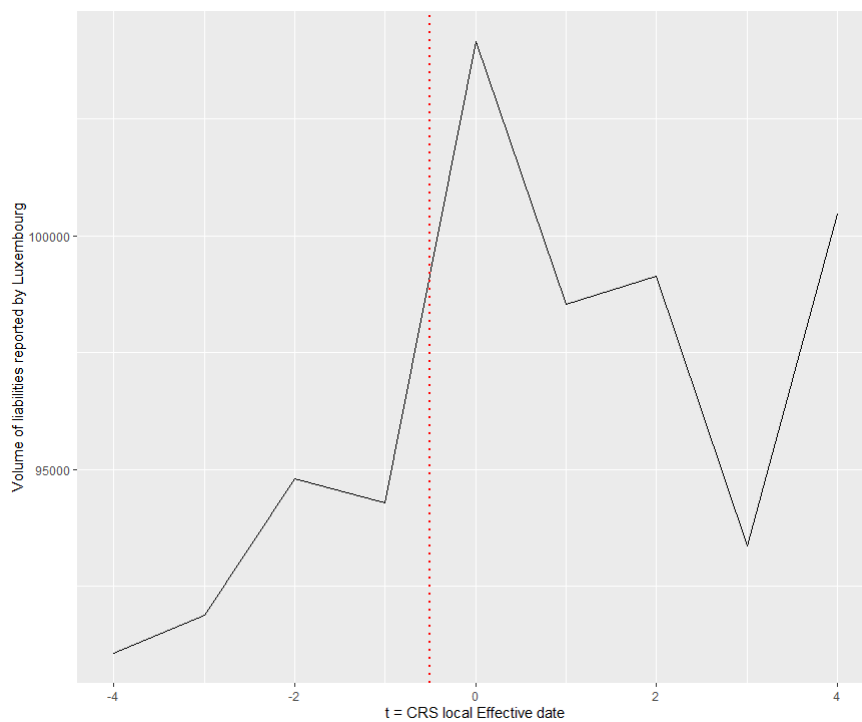


Figure 4.5: Liabilities - Luxembourg

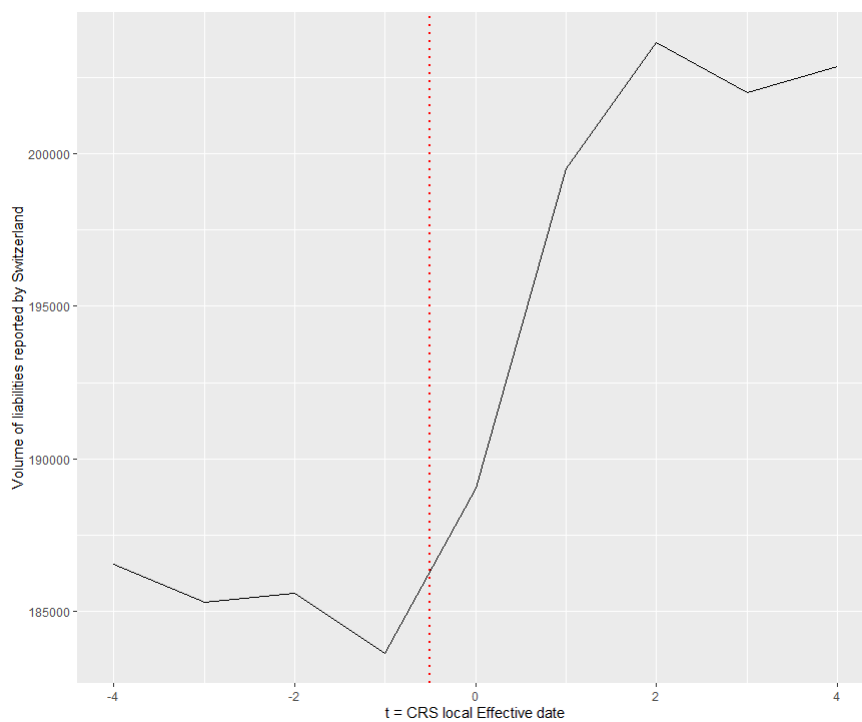


Figure 4.6: Liabilities - Switzerland

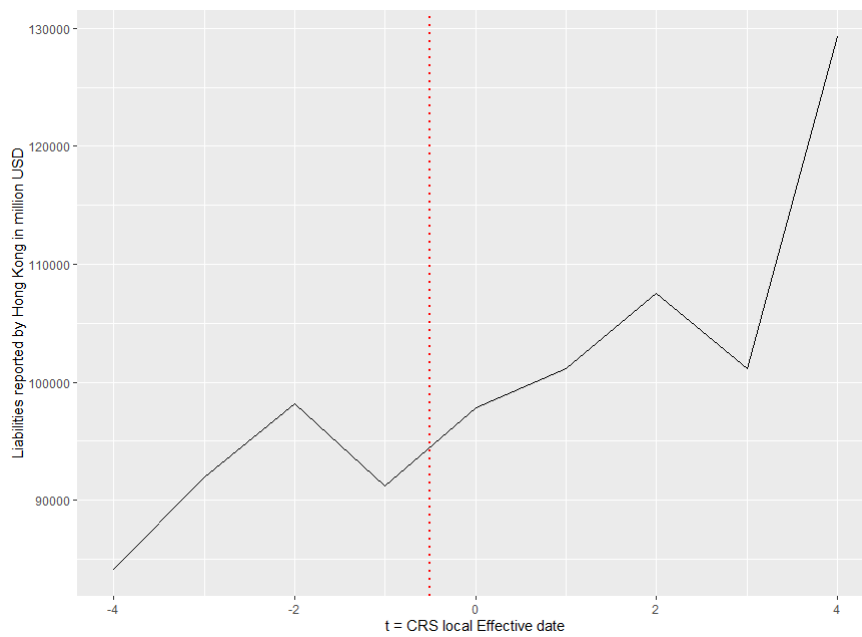


Figure 4.7: Liabilities - Hong Kong

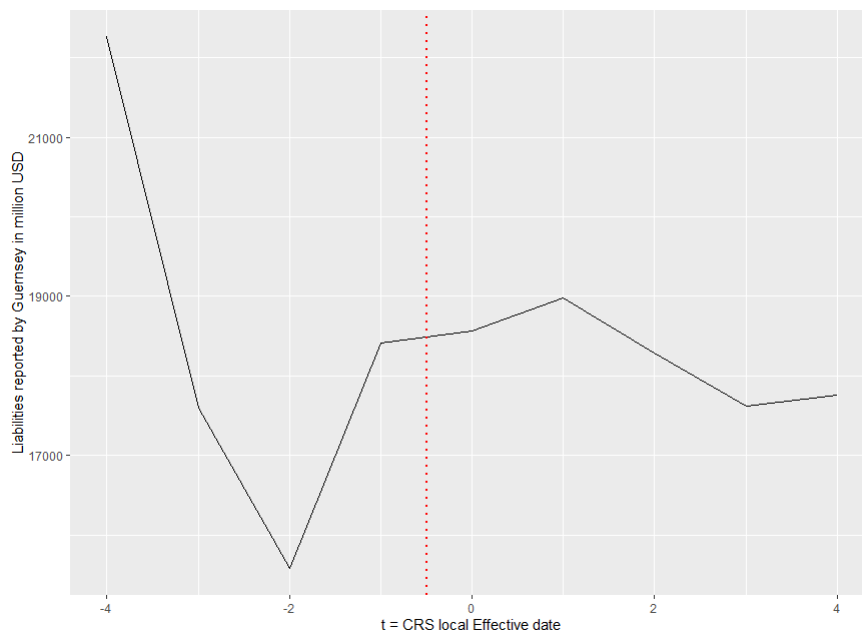


Figure 4.8: Liabilities - Guernsey

## 4.2 Overview of the data

We expect the increase in tax haven's currencies exchange for cryptocurrencies after the CRS became effective in tax havens. On the other hand, we do not expect a significant increase in non-haven currencies, as this should be driven only by market activity and other variables that we expect not to be affected by CRS. However, we assume that changes in some significant currencies will occur because of the type of currency held in tax havens. Figure 4.9 depicts the tax haven currencies, and their volume exchanged rescaled to period  $t=-1$ . In other words, the period is one month before the CRS effective date for a given country. We can see that after the implementation of CRS, the GBP increased unexpectedly and then continued to decrease in the following months. Currencies CHF and USD seem to reach a local maximum in period  $t=-1$ , so these could potentially be also of our interest. The SGD currency had high volatility over this period. HKD seems relatively stable, however, also experiencing some small peaks.

For clarity, we decided to rescale our data also for period  $t=-6$  so we can see the overall trend. It may be expected to see some changes before the CRS local effective date, as the decision to relocate the money in tax haven could have come sooner or before the CRS effective date. Moreover, the new deposits could have stopped happening, and there could be immediate allocation of these to cryptocurrencies. Although we take the CRS effective date as a more significant one, the CRS introduction date could also have some impact on choices in this period. We believe that six months period is long enough to get a good overview of the changes and maybe look for the local maxima. However, not too long to be affected by many other variables that could cause big changes in our data. The results can be seen in Figure 4.10. In this case, we see that USD followed a rather increasing trend with the highest exchange to/from Bitcoin among these. The CHF peaked in time  $t=-1$ , as before and GBP peaked in time  $t=0$ . We can also see a little bit higher activity in HKD in time  $t=-1$ . Moreover, also the SGD reaches a local maximum in period  $t=-2$ .

Safe haven currencies identified in more papers are CHF and JPY, sometimes also EUR is mentioned or included in this list (Cho & Han 2021). In times of uncertainty, it is believed and logical that many investors or companies turn to these to store their money in the best possible way. Therefore, we also look at these currencies, as some additional higher activity in these could be present. As both Switzerland and Japan entered the CRS, we could perhaps see some

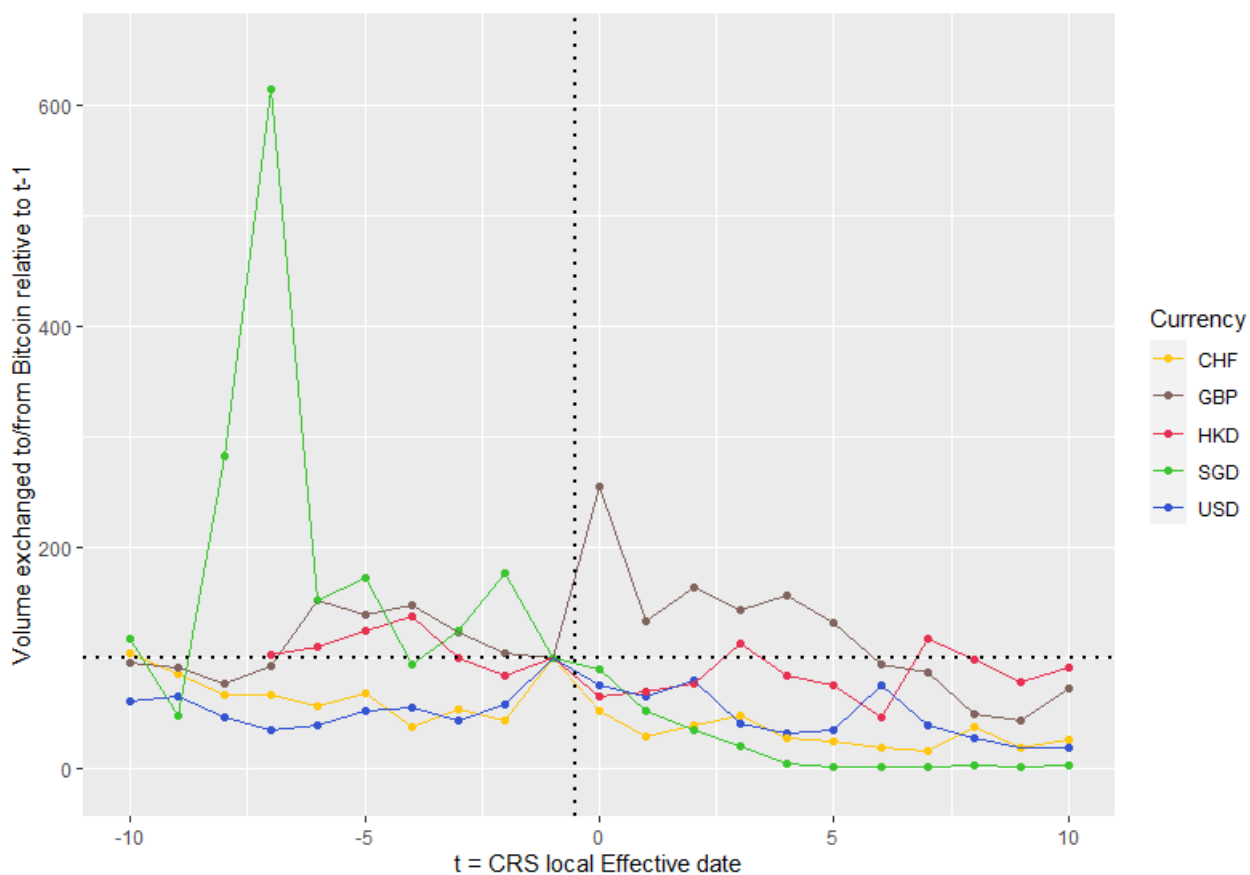


Figure 4.9: The volume of Bitcoin exchanged for tax haven currencies - 20 months effect

additional activity. This is visualized in Figure 4.11. We can see that JPY is rather decreasing, and EUR peaked during this period the most. If we would take a look at a longer period, we could see that EUR is following a rather increasing trend during the two years, so we do not expect this trend or peak to be caused solely by CRS. This visualization can be seen in Appendix A.

Some of the major currencies were not yet visualized. Out of the 10 we identified, the remaining ones are Australian dollar (AUD), Canadian dollar (CAD), CNY and New Zealand dollar (NZD). These are visualized in Figure 4.12. The CNY is bottoming out almost to zero, as it reached the peak in  $t=-6$ . Due to many different regulations on cryptocurrencies in China, this is not surprising. On the other hand, NZD is peaking. However, it follows this trend further, so we are more likely to talk about the general trend and gradual increase overall. In the case of CAD and AUD, we can see some higher activity in these. However, AUD is later peaking and then bottoming out. CAD is maintaining its trend till period  $t+8$  and then decreasing, as well. The remaining currencies

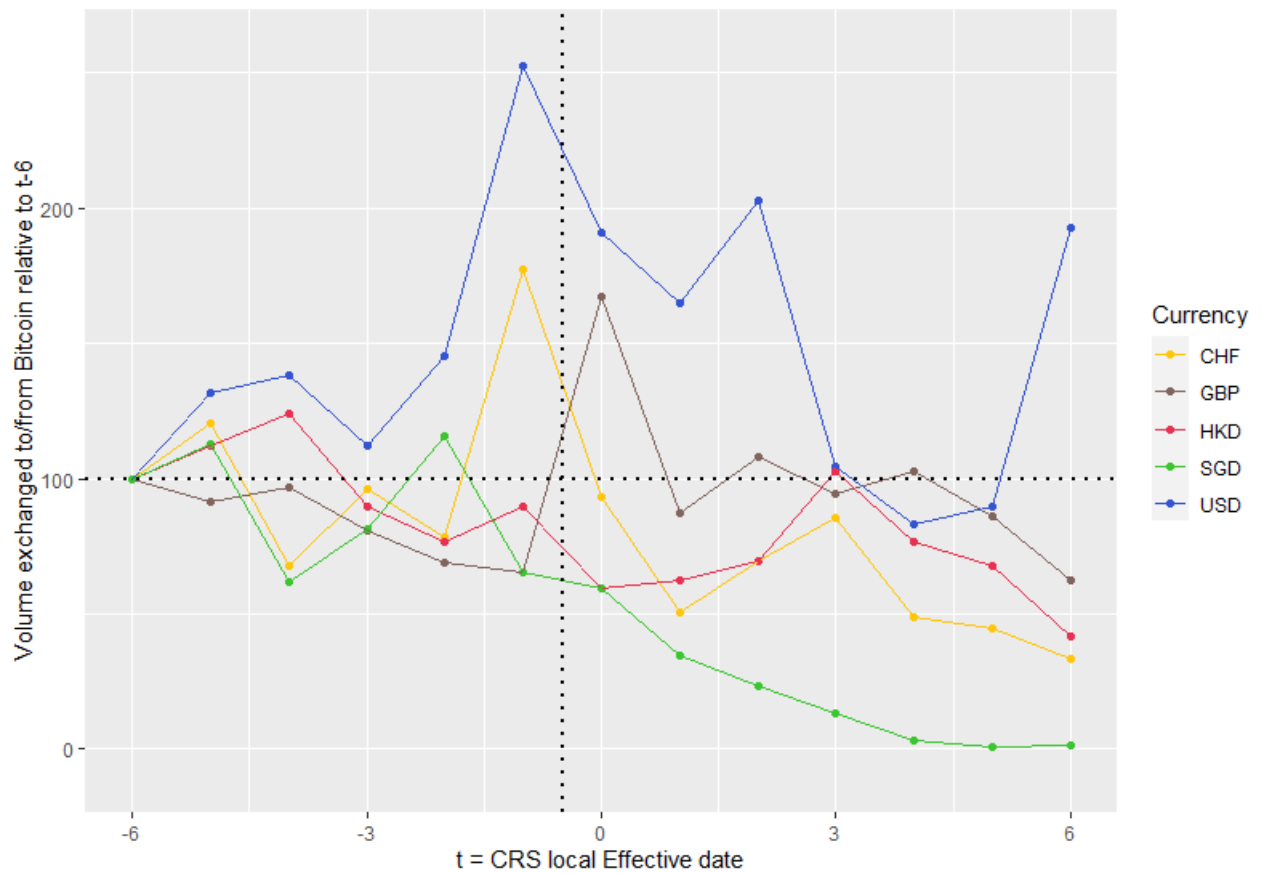


Figure 4.10: The volume of Bitcoin traded for taxhaven currencies - 12 months effect

are visualized in Appendix A.

At this point, we see some peaks in the period close to CRS local effective date. However, we cannot precisely say that our currencies do not follow some general trend, as many mentioned are peaking in this period. Therefore, we will take a closer look at it with the following model. The two-year trend of all currencies can be found in Appendix A for better understanding of general trends and the currencies we will perhaps decide to take a closer look at, as they did not follow their general trend, rather unexpected increases.

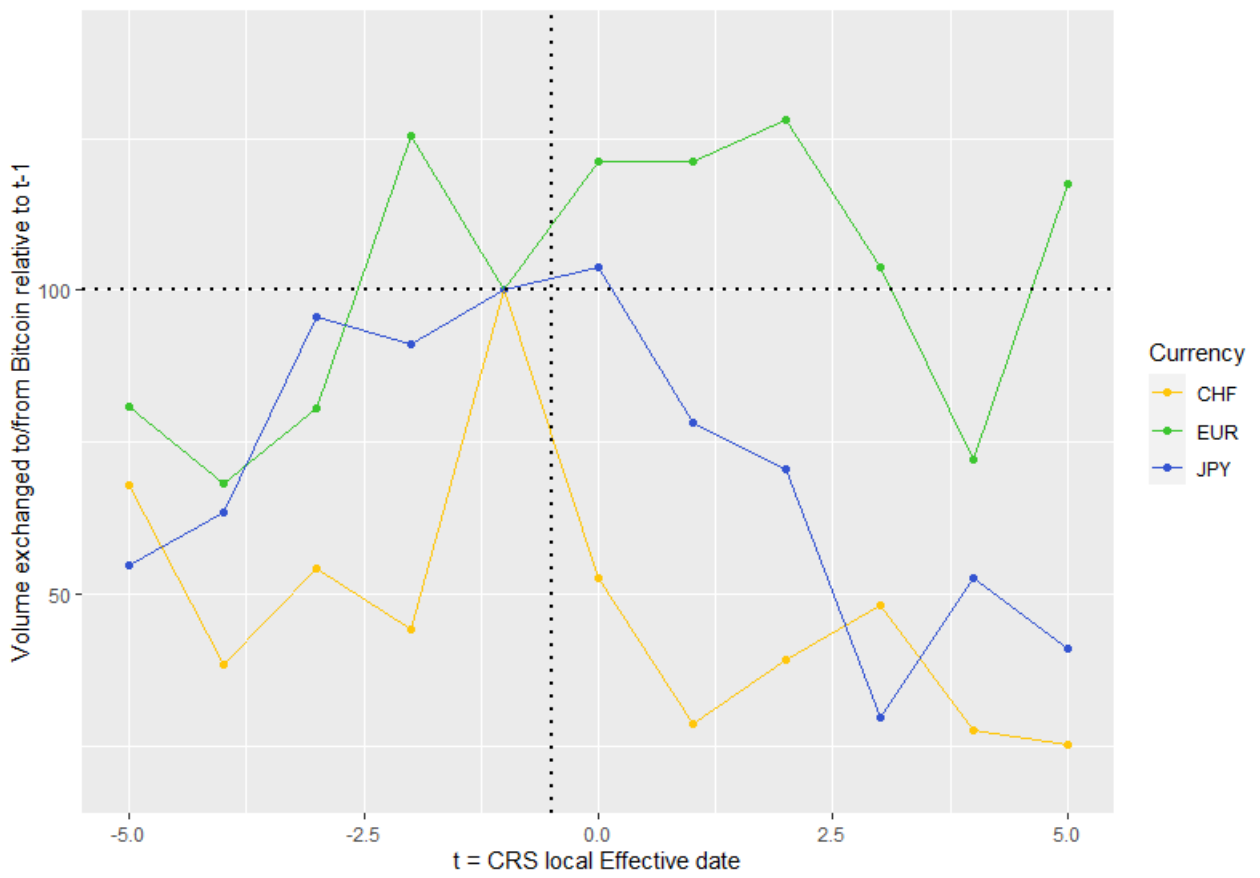


Figure 4.11: The volume of Bitcoin exchanged for safehaven currencies

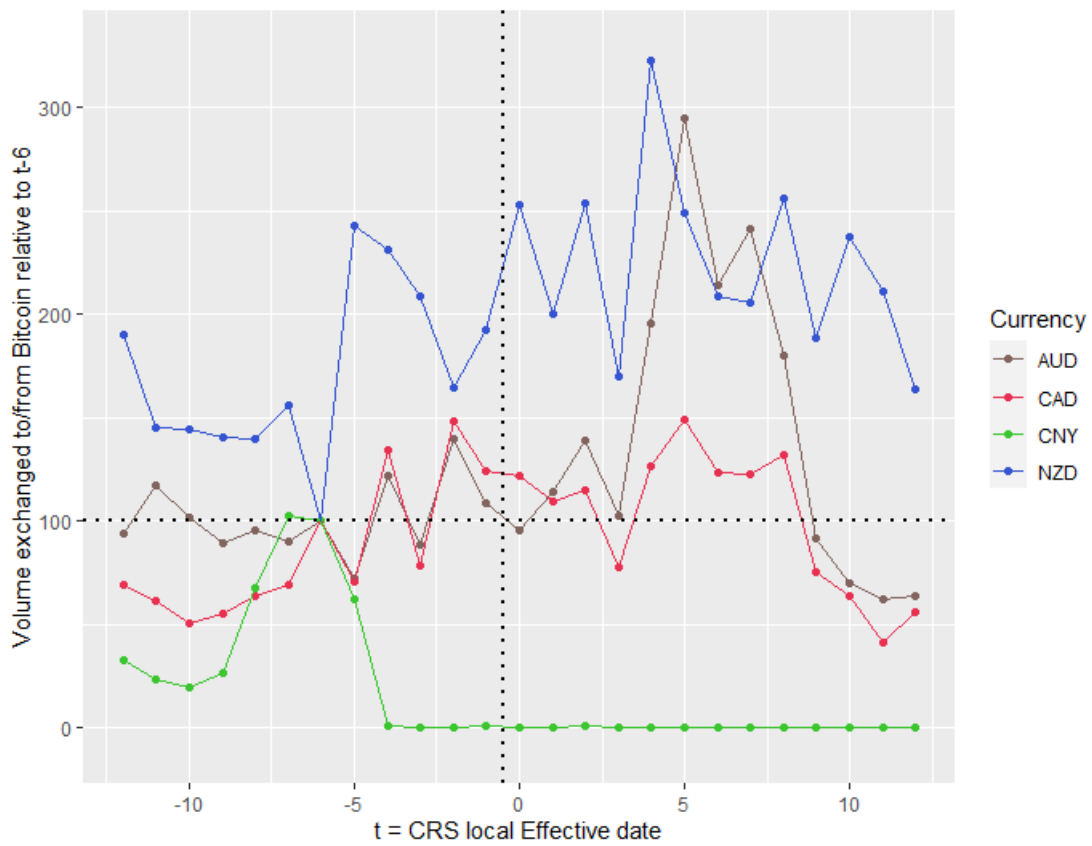


Figure 4.12: The volume of Bitcoin traded in major currencies

# Chapter 5

## Methodology and hypothesis

In this chapter, we present the analysis that we chosen for our data and also explain the econometric methods that are needed for the estimation. We work with panel data, as they obtain cross-sectional parameters. We observe an effect of international regulation. Therefore, the econometric method of choice is difference-in-differences.

### 5.1 Methodology

In the case of a valid parallel trends assumption, Equation 5.1 depicts difference-in-differences regression that could be used.

$$\ln(\text{Volume\_exchanged})_{ct} = \beta_0 + \beta_1 \text{CRS}_{ct} + \beta_2 (\text{CRS}_{ct} * \text{TH}_c) + \sum_{k=1}^{25} \beta_k C_{kc} + \sum_{i=-6}^6 \beta_i \text{PERIOD}_{it} + \epsilon_{ct} \quad (5.1)$$

Variables  $\text{CRS}$  and  $\text{TH}$  are the dummy variables identifying currency and taxhaven, respectively.  $\text{CRS}$  is 1 when the CRS is effective in the given country and zero otherwise. The  $\text{TH}$  is one for currencies identified, as tax haven currencies and 0 otherwise. The sum  $\sum_{k=1}^{25} \beta_k C_{kc}$  is a sum of 25 dummy variables for each one of our examined currencies. The dummy variable currency —  $C$  is equal to one, when  $k=c$ . We can apply this also on dummy variable  $\text{PERIOD}$ , that equals one, when  $i=t$ . Period represents the time dummies from  $t-6$  to  $t+6$ .

From the graphical representation of volume exchanged in Appendix A for different countries can be certainly concluded that the assumption for the parallel trends does not hold. The reason for this is perhaps that Bitcoin is highly volatile, there are different regulations in action for different countries and much more. Although the assumption about parallel trends is likely invalid, we can at least partially treat it according to Joshua D. Angrist (2014). There exists a possible control for deviating trends in forms of interaction terms of dummy  $C$  variables and period or time variable  $t$  (Joshua D. Angrist 2014). When this interaction term is included, there is a lower risk that the coefficients related to CRS variable accumulate the general trade development in respective currencies and the final results will be biased. In other words, this interaction term controls for fixed differences between currencies.

$$\ln(\text{Volume\_exchanged})_{ct} = \beta_0 + \beta_1 \text{CRS}_{ct} + \beta_2 (\text{CRS}_{ct} * \text{TH}_c) + \sum_{k=1}^{25} \theta_k (C_{kc} * t) + \epsilon_{ct} \quad (5.2)$$

Equation 2 5.2 adds non-parallel trends control in form of dummy variables. These dummy variables are made up of dummy variable interaction terms of dummy variables  $C$ , currency, and period  $t$  that acts, as dummy variable and is equal to one if the CRS was in place in given month. We could refer to it, as to term that combines treatment and post period. This model then presumes that in the absence of a treatment effect, volume traded in currency  $c$  deviate from common year effects (Joshua D. Angrist 2014).

Furthermore, we have to deal with the heteroskedasticity in our model. The Breusch-Pagan test discovered heteroskedasticity with p-value  $< 2.2e - 16$  for period from  $t-6$  to  $t+6$ . Thus, we reject the null hypothesis and have enough evidence to say that heteroskedasticity is present in our model. In order to be able to rely on our estimates and assess their statistical significance, we will use White standard errors. This way we can use t-tests and F-tests.

The difference-in-differences model will be applied to examine our data also for smaller and bigger period. Thus the period variable  $t$  can be altered. However, that will be stated in the process.

## 5.2 Hypothesis

As could be probably expected, the hypothesis is that the volume of Bitcoin traded will increase for Tax haven currencies after CRS local effective date. We expect some changes to happen also before this date, as the decision to relocate money could have come sooner than the same month as CRS became effective. Therefore, we will be mainly looking on the period 6 months before and after the CRS local Introduction date. From the overview of our data we can already see that not all the Tax haven currencies behave equally and have also different trends. In this model we will mainly focus on currencies with higher activity around CRS effective date and will also compare it with our data overview and the overall trending of volume exchanged in this currencies. There were also some regulations in China that we have to keep in mind.

# Chapter 6

## Results and interpretation

This section reports on the results of the analysis of our difference-in-differences model. Then these results are linked to our data overview and the findings of Casi et al. research.

### 6.1 Difference-in-differences model

Table 6.1 refers to a general impact of CRS local effective dates on volume in Bitcoin exchanged. Model (1) is focused on the period from  $t-1$  to  $t+6$ , where  $t = \text{CRS local effective date}$ . We are using the data rescaled to period  $t-1$ . In all the other columns, the data are used for period  $t-6$  to  $t+6$ , where the data are rescaled to period  $t-6$ . Tax haven currencies (SGD, HKD, CHF, USD, and GBP) are in the treatment group. In all the models, the currency-specific trend control is used. In Appendix B, can be seen the results without currency-specific trend control. The comparison of these two indicates how important the currency-specific trend control is. If the controls are not used, exchange trends specific to the given currency are included in the variables of our interest. If these controls were not introduced, the non-parallel trends would occur in our model. We could observe which currencies significantly differed from one another. However, this is not in our interest. Moreover, as we are talking about cryptocurrency exchanges, there is high volatility and unexpected shocks. It is perhaps impossible to take into account all of the variables that could have an impact on the volume of Bitcoin exchanged. We can see from Figure 4.10, that SGD is bottoming out over this period. There could be multiple reasons for this. The SGD was most traded through the itbit platform based in Singapore and the USA. In 2015, they became fully regulated in the United States. In other words,

they started to be treated like real financial institutions. In the second half of 2017, Singapore introduced some regulations against cryptocurrencies that could potentially harm the trade. However, none of these explicitly describe why this exchange started to bottom out in the first half of 2017, and it could be said that on itbit, it never really recovered. Moreover, this could have also been influenced by some regulations in other countries and the international spillover. However, we could not discover what happened at this exchange platform that could cause this effect.

Model (1) shows the statistical significance of the CRS (local) effective date at 5 percent level, estimating its effect at 33.7 percent increase in the volume of Bitcoin exchanged. The CRS local effective date in interaction with Tax haven currencies (CRS eff. date\*Tax haven) proved to be statistically significant. The estimated effect of this variable is 85.5 percent decrease in volume exchanged. When we take a look at Figure 4.9, the results are probably apparent. In this period, the volume of exchanges was decreasing for all the Tax haven currencies, but one —GBP. If we would look deeper and check the coefficients for all currencies interacted with CRS local effective date, we would see that for GBP this estimate is statistically significant and its effect is at 91.2 percent increase in the volume of Bitcoin exchanged.

Model (2) shows the statistical significance in all its variables at a 5 percent level. The estimated effect of CRS local effective date increases a little bit to 39.2 percent. We can see that the exchanges in Tax haven currencies were increasing over the whole period, with the effect of 35.1 percent. The effect of interaction term decreased to 50.3 percent.

Model (3) shows very similar results to Model (2). The CRS local introduction date did not prove to be significant. This was expected, as we are working with monthly data and some countries had CRS introduction and effective date in the same month.

In Model (4), we included a dummy variable for the period t-1 of the CRS local effective date. However, it did not prove to be significant. Neither on its own nor with the interaction of Tax haven variable. The other three variables proved to be statistically significant at 5 percent level. They have the same sign and similar estimate to the model before.

Model (5) is the extension of Model (4), where also the dummy variable for the period t-2 of the CRS local effective date is included. Once more, they did not prove to be significant. The signs, estimates, and statistical significance of the other variables remained similar.

Table 6.1: Impact of CRS on volume exchanged in Bitcoin

|                              | <i>Dependent variable:</i> |                     |                     |                     |                     |
|------------------------------|----------------------------|---------------------|---------------------|---------------------|---------------------|
|                              | (1)                        | (2)                 | (3)                 | (4)                 | (5)                 |
| CRS effective date           | 0.337**<br>(0.149)         | 0.392**<br>(0.172)  | 0.392**<br>(0.172)  | 0.461**<br>(0.191)  | 0.461**<br>(0.190)  |
| Tax haven                    | -0.140<br>(0.099)          | 0.351**<br>(0.141)  | 0.354**<br>(0.150)  | 0.329**<br>(0.144)  | 0.324**<br>(0.135)  |
| CRS eff. date*Tax haven      | -0.855***<br>(0.232)       | -0.503**<br>(0.253) | -0.507*<br>(0.259)  | -0.619**<br>(0.291) | -0.620**<br>(0.290) |
| CRS Introduction date        |                            |                     | 0.006<br>(0.075)    |                     |                     |
| CRS eff. date (t-1)          |                            |                     |                     | -0.083<br>(0.100)   | -0.094<br>(0.107)   |
| CRS eff. date (t-2)          |                            |                     |                     |                     | 0.013<br>(0.097)    |
| CRS eff. date(t-1)*Tax haven |                            |                     |                     | 0.137<br>(0.180)    | 0.109<br>(0.231)    |
| CRS eff. date(t-2)*Tax haven |                            |                     |                     |                     | 0.034<br>(0.182)    |
| Constant                     | 4.605                      | 4.635***<br>(0.087) | 4.629***<br>(0.115) | 4.649***<br>(0.091) | 4.646***<br>(0.093) |

*Note:*

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

## 6.2 The final interpretation

In the section before, we found out that overall the currencies were exchanged more to Bitcoin due to CRS. The overall effect of CRS was estimated at 33.7 to 46.1 percent increase in the volume of Bitcoin exchanged. The volume exchanged from/to Bitcoin also increased for tax haven currencies over the whole period. However, not specifically in period  $t=0$  when CRS became effective. These findings are also supported by Chapter 4, where we could see that volume exchanged for all tax haven currencies was peaking at  $t-1$ , except GBP.

When we take a look at the overall CRS local effective date impact on the volume of Bitcoin exchanged, we see that it has a positive sign and proves our hypothesis. However, it is essential to realize that we visualize and measure the exchange from and to Bitcoin. We hypothesize that increases for tax haven currencies are due to CRS, as there are some unexpected peaks, the currencies then followed a very similar trend, as before CRS. However, when we consider all the currencies, this is more difficult to generalize. Therefore, we have to keep in mind that we only approximated the effect.

In summary, thanks to the data overview, we discovered that there had been an increase in tax haven currencies close to the period of CRS local effective date. Moreover, thanks to our model, we proved our findings as the volume exchanged for tax haven currencies increased. We know that overall currencies were exchanged from/to Bitcoin more when CRS was introduced.

# Chapter 7

## Conclusion

In this study, we analyze the short-term impact of the introduction of the CRS. This is the most international standard for the automatic exchange of information that has ever been introduced on cross-border tax evasion. Casi *et al.* (2020) tried to quantify the impact of this standard and identify a potential alternative. However, we contributed to this research by analyzing country-level results for individual tax havens, i.e., which specific tax havens are responsible for the overall decrease observed by Casi *et al.* (2020). Moreover, we also looked at the potential channel of tax evasion - cryptocurrencies. We took a look at different currencies and the volume exchanged to or from Bitcoin. We employed an event study that has never been done before, even though tax evasion and illegal activities in cryptocurrencies are becoming more of a 'hot topic' these days. Over the last few years, the number of regulations on cryptocurrencies was increasing. However, they seem only partial and sometimes not compelling enough.

When we consider drops in cross-border deposits in tax havens and the alternative proposed by Casi *et al.* (2020), we can see that the cross-border deposits in the United States did not increase enough. From the beginning of 2015 to the end of 2017, the cross-border deposits held in the United States increased by approximately 50,000 billion USD (Casi *et al.* 2020). Moreover, the number of deposits in the United States was growing continuously from 2010 to 2018, with no sudden drops or increases. Thus, if we would consider the continuous overall trend, then the change would be imminent. Therefore, we believe that cryptocurrencies were also used for tax evasion purposes.

Our findings are difficult to quantify precisely. We found out that there has been an increase in volume exchanged in more tax haven currencies close

to the period of CRS effective or introduction date. Specifically in currencies GBP, CHF, HKD, and USD. We estimated that the overall volume traded in cryptocurrencies increased due to CRS by approximately 30 percent in a comparable period. Even though this percentage cannot be stated to be accurate as we track both exchanges, we believe that the overall higher volume exchanged could have been caused by CRS itself. We also identified tax havens for which the exchanges decreased over the whole period — Jersey, Isle of Man, and Guernsey. Overall, there occurred a sudden drop in cross-border deposits closely before the CRS effective date for all tax-havens.

We believe that our thesis opened many additional questions and alternatives for further research. With accurate data on cryptocurrencies, we could approximate these changes more efficiently and precisely. If the data for cryptocurrency exchanges on a country level were once available, there would be a possibility of linking these data to BIS Locational Banking Statistics and calculating the precise results and connections. Moreover, as we witnessed some increase in cryptocurrency exchanges after introducing the automatic exchange of information, we could expect similar trends in the future. Our model could be further expanded with more variables treating the external shocks.

At this point, the data are limited. However, we believe that the baseline for further research on tax evasion through cryptocurrencies has been set and can be developed further.

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# Appendix A

## Graphs

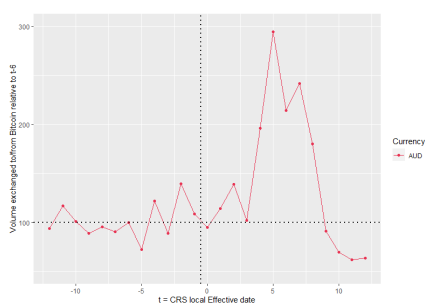


Figure A.1: The volume of Bitcoin exchanged from/to AUD

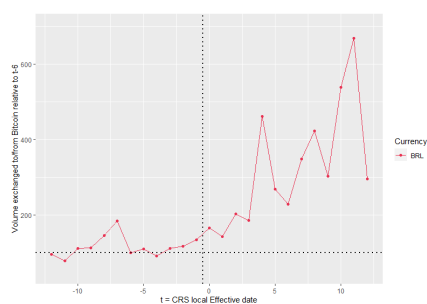


Figure A.2: The volume of Bitcoin exchanged from/to BRL

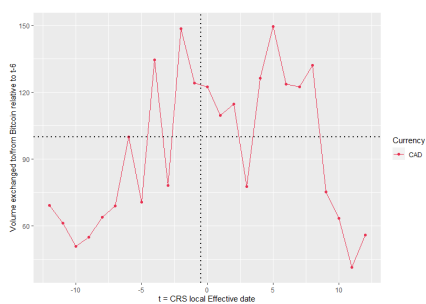


Figure A.3: The volume of Bitcoin exchanged from/to CAD

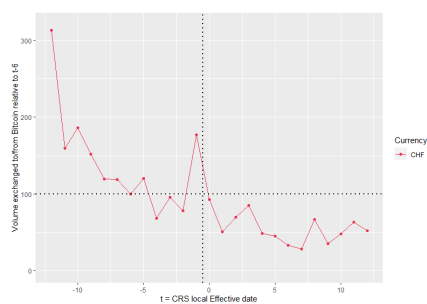


Figure A.4: The volume of Bitcoin exchanged from/to CHF

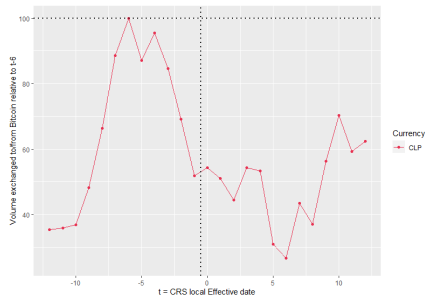


Figure A.5: The volume of Bitcoin exchanged from/to CLP

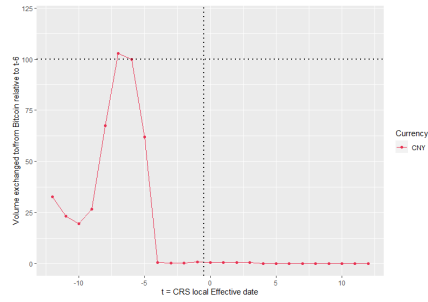


Figure A.6: The volume of Bitcoin exchanged from/to CNY

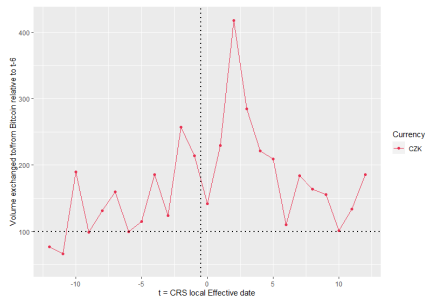


Figure A.7: The volume of Bitcoin exchanged from/to CZK

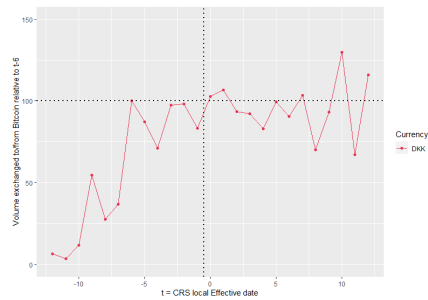


Figure A.8: The volume of Bitcoin exchanged from/to DKK

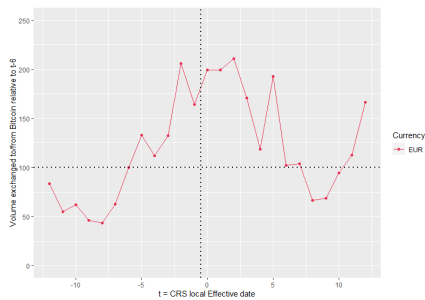


Figure A.9: The volume of Bitcoin exchanged from/to EUR

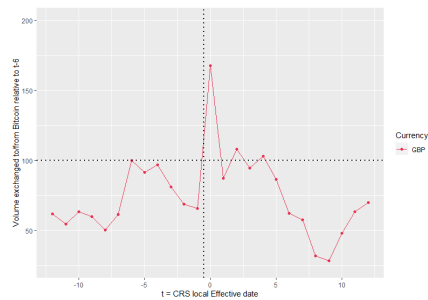


Figure A.10: The volume of Bitcoin exchanged from/to GBP

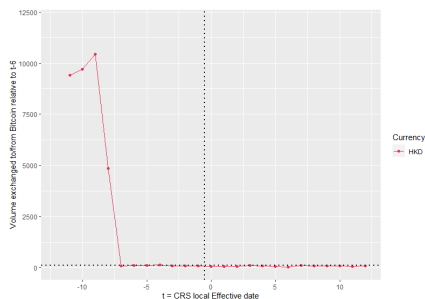


Figure A.11: The volume of Bitcoin exchanged from/to HKD

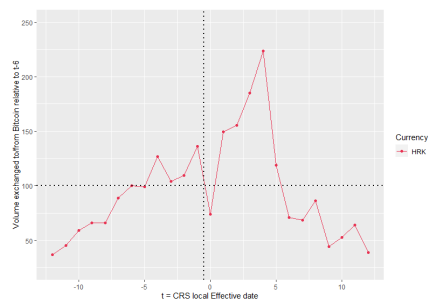


Figure A.12: The volume of Bitcoin exchanged from/to HRK

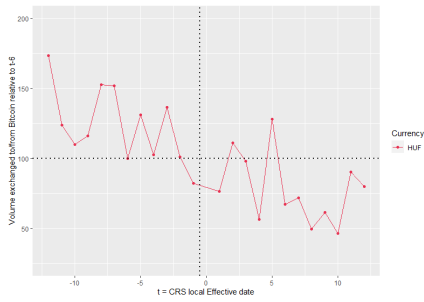


Figure A.13: The volume of Bitcoin exchanged from/to HUF

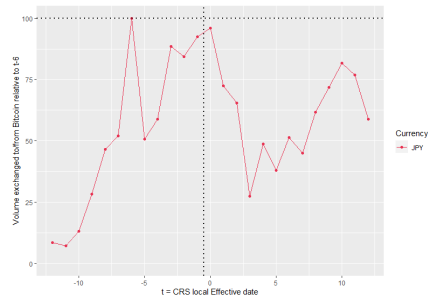


Figure A.14: The volume of Bitcoin exchanged from/to JPY

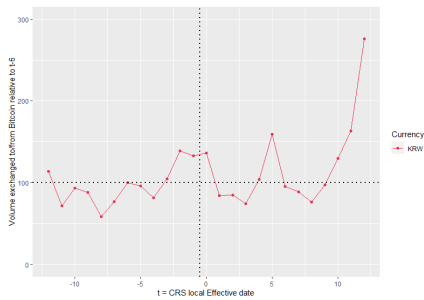


Figure A.15: The volume of Bitcoin exchanged from/to KRW

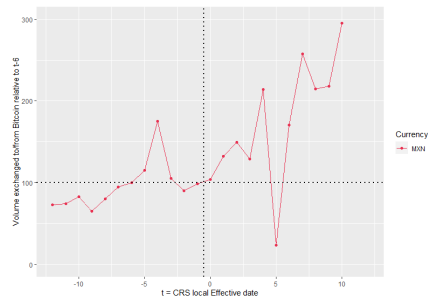


Figure A.16: The volume of Bitcoin exchanged from/to MXN

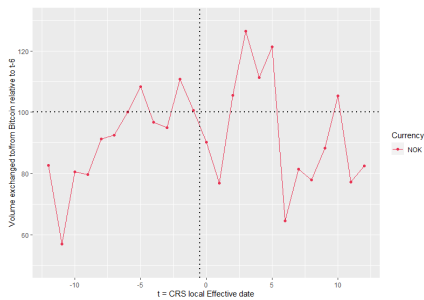


Figure A.17: The volume of Bitcoin exchanged from/to NOK

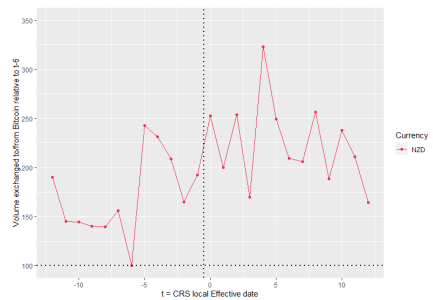


Figure A.18: The volume of Bitcoin exchanged from/to NZD

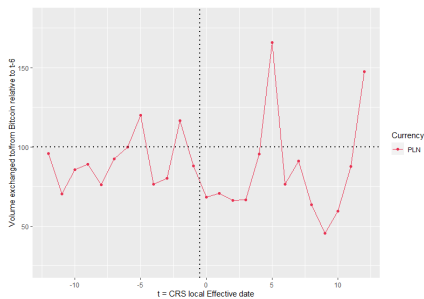


Figure A.19: The volume of Bitcoin exchanged from/to PLN

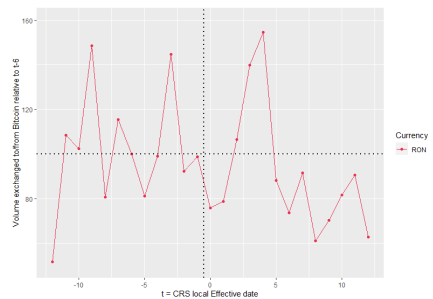


Figure A.20: The volume of Bitcoin exchanged from/to RON

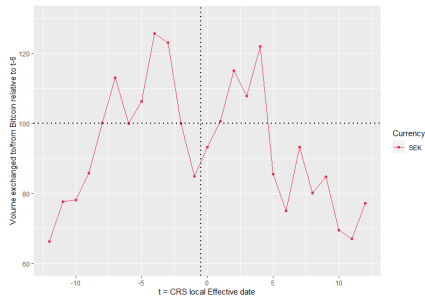


Figure A.21: The volume of Bitcoin exchanged from/to SEK

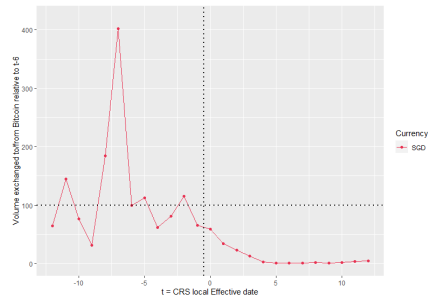


Figure A.22: The volume of Bitcoin exchanged from/to SGD

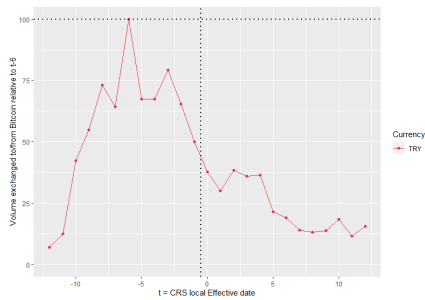


Figure A.23: The volume of Bitcoin exchanged from/to TRY

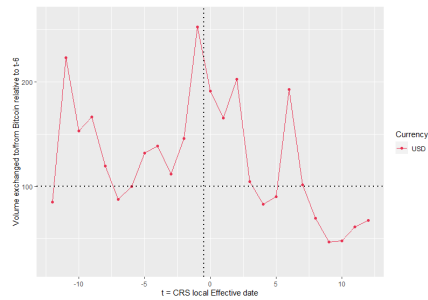


Figure A.24: The volume of Bitcoin exchanged from/to USD

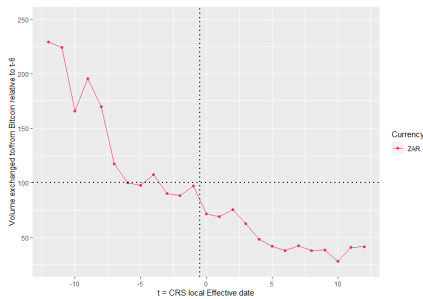


Figure A.25: The volume of Bitcoin exchanged from/to ZAR

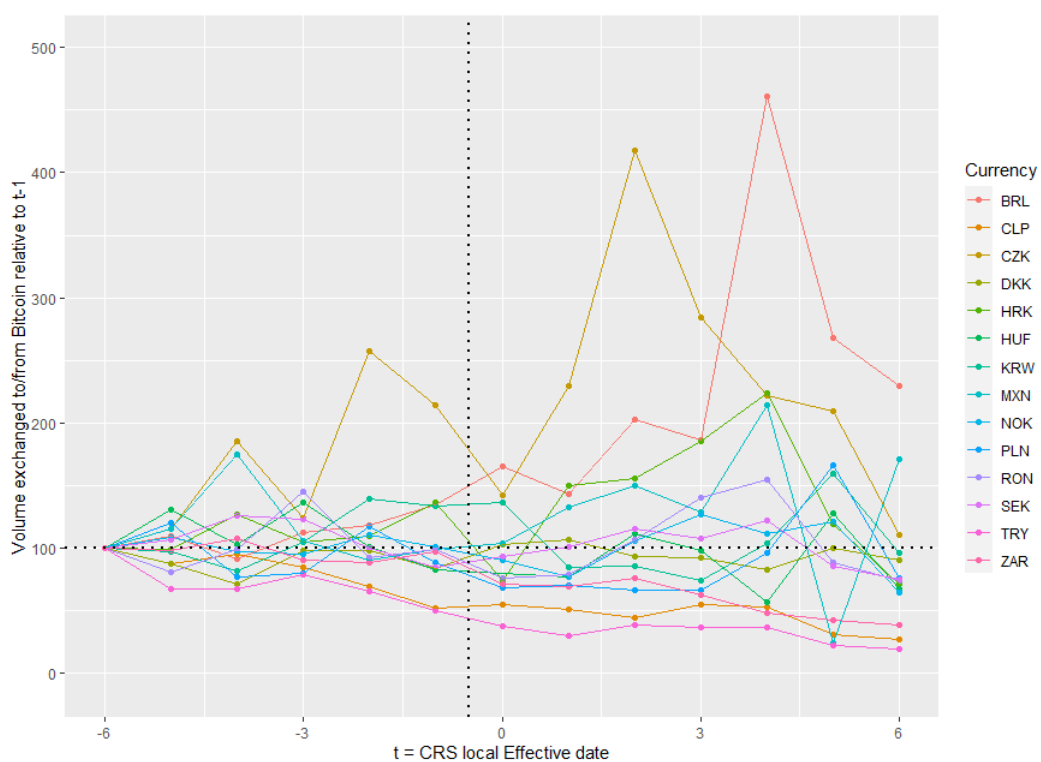


Figure A.26: The volume of Bitcoin exchanged in period t-6 to t+6

# Appendix B

## Tables

The models without non-parallel control dummy. Otherwise they are the same as in Chapter 5. The baseline model used is defined below. We can see that signs of some estimates changed and also overall they are less statistically significant.

$$\ln(\text{Volumeexchanged})_{ct} = \beta_0 + \beta_1 \text{CRS}_{ct} + \beta_2 (\text{CRS}_{ct} * \text{TAXHAVEN}_c) + \sum_{k=1}^{25} \beta_k \text{CURRENCY}_{kc} + \epsilon_{ct}$$

Table B.1: The model without non-parallel control dummy

|                              | <i>Dependent variable:</i> |                     |                     |                     |                     |
|------------------------------|----------------------------|---------------------|---------------------|---------------------|---------------------|
|                              | (1)                        | (2)                 | (3)                 | (4)                 | (5)                 |
| CRS effective date           | -0.080<br>(0.167)          | -0.209**<br>(0.088) | -0.254**<br>(0.121) | -0.127*<br>(0.072)  | -0.127*<br>(0.072)  |
| Tax haven                    | -0.245<br>(0.376)          | 0.315<br>(0.202)    | 0.358*<br>(0.196)   | 0.293<br>(0.206)    | 0.281<br>(0.216)    |
| CRS Introduction date        |                            |                     | 0.109<br>(0.109)    |                     |                     |
| CRS eff. date(t-1)           |                            |                     |                     | -0.098<br>(0.082)   | -0.094<br>(0.062)   |
| CRS eff. date(t-2)           |                            |                     |                     |                     | -0.005<br>(0.104)   |
| CRS eff. date* Tax haven     | -0.660*<br>(0.384)         | -0.422**<br>(0.194) | -0.438**<br>(0.188) | -0.577*<br>(0.319)  | -0.577*<br>(0.319)  |
| CRS eff. date(t-1)*Tax haven |                            |                     |                     | 0.183<br>(0.303)    | 0.130<br>(0.405)    |
| CRS eff. date(t-2)*Tax haven |                            |                     |                     |                     | 0.067<br>(0.328)    |
| Constant                     | 4.970***<br>(0.201)        | 4.958***<br>(0.130) | 4.874***<br>(0.144) | 4.975***<br>(0.134) | 4.976***<br>(0.143) |

*Note:*

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

These data were retrieved from Tax Justice Network (2015a)

Table B.2: Ranking of jurisdictions according to their Secrecy Score

| Rank according to Secrecy Score | Jurisdiction                  | Secrecy Score |
|---------------------------------|-------------------------------|---------------|
| 1                               | Samoa                         | 85.89         |
| 2                               | St Lucia                      | 82.96         |
| 3                               | Liberia                       | 82.89         |
| 4                               | Brunei Darussalam             | 82.78         |
| 5                               | Antigua and Barbuda           | 80.96         |
| 6                               | Marshall Islands              | 79.48         |
| 7                               | Bahamas                       | 79.02         |
| 8                               | Nauru                         | 78.91         |
| 9                               | Belize                        | 78.86         |
| 10                              | Lebanon                       | 78.76         |
| 11                              | Barbados                      | 78.29         |
| 12                              | St Kitts and Nevis            | 78.03         |
| 13                              | St Vincent and the Grenadines | 77.98         |
| 14                              | United Arab Emirates (Dubai)  | 77.44         |
| 15                              | Andorra                       | 76.59         |
| 16                              | Dominica                      | 76.16         |
| 17                              | Liechtenstein                 | 76.04         |
| 18                              | Cook Islands                  | 75.92         |
| 19                              | Grenada                       | 75.89         |
| 20                              | Guatemala                     | 75.69         |
| 21                              | Malaysia (Labuan)             | 75.33         |
| 22                              | Monaco                        | 74.36         |
| 23                              | Bahrain                       | 73.67         |
| 24                              | Switzerland                   | 72.59         |
| 25                              | Panama                        | 72.36         |
| 26                              | Mauritius                     | 72.22         |
| 27                              | Hong Kong                     | 72            |
| 28                              | Botswana                      | 71.38         |
| 29                              | Turks and Caicos Islands      | 71.27         |
| 30                              | Seychelles                    | 71.17         |
| 31                              | Uruguay                       | 70.86         |

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|----|------------------------|--------|
| 32 | Macao                  | 69.84  |
| 33 | San Marino             | 69.56  |
| 34 | US Virgin Islands      | 69.33  |
| 35 | Anguilla               | 69.24  |
| 36 | Singapore              | 68.96  |
| 37 | Curacao                | 67.74  |
| 38 | Aruba                  | 67.714 |
| 39 | Montserrat             | 67.36  |
| 40 | Ghana                  | 67.11  |
| 41 | Gibraltar              | 67.09  |
| 42 | Macedonia              | 66.40  |
| 43 | Bermuda                | 66.27  |
| 44 | Cayman Islands         | 65.24  |
| 45 | Jersey                 | 64.93  |
| 46 | Turkey                 | 64.07  |
| 47 | Vanuatu                | 86.64  |
| 47 | Isle of Man            | 63.8   |
| 48 | Guernsey               | 63.56  |
| 49 | Philippines            | 63.06  |
| 50 | Saudi Arabia           | 61.08  |
| 51 | British Virgin Islands | 60.2   |
| 52 | USA                    | 60     |
| 53 | Japan                  | 57.52  |
| 54 | Germany                | 56.36  |
| 55 | Luxembourg             | 55.11  |
| 56 | Costa Rica             | 54.58  |
| 57 | China                  | 54.29  |
| 58 | Chile                  | 53.92  |
| 59 | Austria                | 53.71  |
| 60 | Russia                 | 53.56  |
| 61 | Israel                 | 52.76  |
| 62 | Brazil                 | 51.84  |
| 63 | Slovakia               | 50.11  |
| 64 | Cyprus                 | 49.82  |
| 65 | Malta                  | 49.53  |
| 66 | Netherlands            | 48.49  |
| 67 | New Zealand            | 46.48  |

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|     |                    |         |
|-----|--------------------|---------|
| 68  | Canada             | 45.84   |
| 69  | Iceland            | 45.6    |
| 70  | Mexico             | 45.02   |
| 71  | Latvia             | 44.67   |
| 72  | Estonia            | 44.24   |
| 73  | Korea              | 44.14   |
| 74  | Australia          | 43.47   |
| 75  | France             | 42.54   |
| 76  | South Africa       | 41.57   |
| 77  | Belgium            | 40.89   |
| 78  | United Kingdom     | 40.84   |
| 79  | Ireland            | 40.37   |
| 80  | Portugal (Madeira) | 39.4    |
| 81  | India              | 39.19   |
| 82  | Norway             | 38.49   |
| 83  | Greece             | 36.4    |
| 84  | Poland             | 36.29   |
| 85  | Sweden             | 36.02   |
| 86  | Hungary            | 35.93   |
| 87  | Czech Republic     | 35.18   |
| 88  | Italy              | 35      |
| 89  | Slovenia           | 33.96   |
| 90  | Spain              | 32.69   |
| 91  | Finland            | 31.38   |
| 92  | Denmark            | 30.87   |
| NA7 | Maldives           | (76-84) |
| NA7 | Paraguay           | (75-83) |
| NA7 | Gambia             | (73-81) |
| NA7 | Tanzania           | (73-81) |
| NA7 | Bolivia            | (72-80) |
| NA7 | Taiwan             | (67-75) |
| NA7 | Dominican Republic | (65-73) |
| NA7 | Venezuela          | (64-72) |
| NA7 | Montenegro         | (60-68) |

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