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Faculty of International Relations



Title of the bachelor's thesis:

Competitive advantage for a bank that opens itself to Virtual

Currency businesses – game theory

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Declaration:

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where states otherwise by reference or acknowledgment, the work presented is entirely my own.

Date:

Signature:

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Introduction

Most of the virtual currency businesses (VCBs) operate on a core idea of offering alternatives to traditional cash and payments methods. Nevertheless, they still do heavily rely on banks to conduct payments and other financial functions for them. Today, however, banks all around the world seem to apply heavy scrutiny against VCBs, making it very difficult for them to find any bank that would be willing to accept them as a customer. This is a major issue for all VCBs, as not having access to banking services affects most aspects of a VCB's daily operations like the ability to pay their employees or vendors easily. Bank accounts also enable VCBs to receive payments from vendors or investors easily. Not having a bank account also makes daily effective cash management almost impossible which forces capital supply of VCBs without bank to sit idly and not be invested before they are eventually used on VCB's business activities.

On the other side of this conflict are banks, which like any other profit-based business, have their relationship with customers build on potential risk and return. And the risks associated with accepting VCBs are indeed higher than regular customers. Banks are regulated entities tied to local legislation, that usually does not keep up with blockchain technology and requires additional investments into technology and into experts on the topic from the banks in order to comply with legislative pressure. This puts banks, which do choose to support VCBs and invest in the necessary technology, under pressure to secure as much of the market share as possible.

Another obstacle between the business relationship of VCBs and banks is the potential threat VCBs could pose to the future of traditional banking. Even though it may seem far-fetched today, the decentralization goal of cryptocurrencies that rely on peer to peer networks could pose an industry level threat to banks, and allowing the bank's potential rival to grow and develop when you have a chance to shut them down, while they are still in their cradle, should be considered as well.

The main goal of this thesis is to conclude if there is a competitive advantage for any bank, that would open itself to VCBs in today's market situation.

The secondary goals arising from this main goal are to identify the issues making the establishment of business relationships between VCBs and banks difficult, and to compare the banking situation between cannabis businesses and VCBs, as they are facing similar issues even though their respective industries are completely different.

Up to this point in time there has been almost no academic research done into this topic as it is a relatively new issue - only a little more than a decade old, with the peak attention being given to it in 2017, during the price peak of bitcoin. Yet the issues and effects of being underbanked have been haunting other business industries for many years now. Other, older money services than VCBs and, to my surprise, cannabis businesses are also facing similar scrutiny from the banks. Despite the lack of research making this topic challenging to look into, I find it to be very interesting and relevant to the future of VCBs.

The first chapter focuses on technical and legislative issues surrounding the current situation of banking VCBs. It explores the regional differences of the European, Southeast Asian, Chinese and the American markets, in order to find out, if there is a more crypto friendly bank region. The methodology used in this chapter is an expansive literature research. As there are not many primary sources on the topic, most of the sources are secondary sources that relate to the main issue of the chapter.

The second chapter compares the findings from the first chapter with the situation in the cannabis industries in order to find out what makes the VCB situation different and more complex in comparison to other industries from a banking perspective. The methodology for this chapter is the same as for the first chapter but the literature research contains many more primary sources, as the topic is more explored.

The third chapter describes a game theory model of two rival banks with different outlooks towards the VCBs and demonstrates how investing in this sector can be both beneficial and unprofitable depending on the factors described in chapter one and two that affects the banks decisions in real life. The methodology in this chapter is a systems analysis of the issues explored in the first two chapters. Out of this analysis a game theory model is created to further investigate these problems with a variety of parameters.

The last chapter, which is about the practical part, will study the situation of VCBs in the Czech Republic with the goal being to find out if it would be beneficial for a larger or a smaller bank to try and attract the VCB market as well as finding out the overall situation in the country. The methodology used in this chapter is a combination of literature review and information gathered from interviewing a medium sized Czech bank, a VCB and the Financial Analytical Unit of the Czech Republic. Additionally a special form was prepared for VCBs to learn about their situation in the Czech republic.

1. Current situation of banking virtual currency businesses

1.1 Defining VCBs

Virtual currency businesses are a very wide term and many different business models can hide behind it. They don't even have to be operating with virtual currencies like bitcoin directly. They may just be companies that are using blockchain- an unchangeable ledger that is allowing for transactions take place in a decentralized way. Blockchain-based applications are beginning to be applied in many different fields not just in the financial sector as is the common misconception (Zibin, Shaoan, & Hong-Ning, 2017)

A report focusing on the issues of banking VCBs done in 2016 on behalf of Coin Center has come with the following seven different VCBs types. These definitions from (Pratin, David, & Andrew, 2016, pp. 2,3) will be used for the rest of this thesis :

- “● **Wallets.** These businesses store the private keys needed to access a virtual currency address and spend the coins. There are various models of custody that wallet companies provide.
- **Exchanges.** These businesses create a marketplace where a fiat currency (or other asset) can be exchanged for a virtual currency, and vice versa.
- **Payment Processing.** These businesses enable various parties to transact in virtual currency by enabling merchant payments through their platform.
- **Specialized Service Providers.** These businesses provide various services to assist in the use of virtual currency, and include insurers, device manufacturers, platform designers, and compliance firms, among others.
- **Mining.** These businesses use special software to solve math problems that help authenticate virtual currency transactions and are rewarded with virtual currency. They may also manufacture hardware and sell it to others that mine virtual currency.
- **Blockchain.** These businesses are those whose business is based on blockchains and not the use of virtual currencies as a means of payment per se. They include blockchain analysis firms and smart contract companies, among.
- **Others.** They may be financial service providers to the extent their services also involve the Blockchain.”

1.2 the situation of legalization in the world

Having the VCBs divided like this is vital, as in every country the law in affecting VCBs directly and indirectly can make it harder for some of these business models to find a partner bank than for the rest. Also, what is most crucial for almost all of these businesses is the legality of Bitcoin and other related virtual currency instruments. The following figure shows the global situation of bitcoin's legality. Currently there are only 8 countries, where Bitcoin is illegal. These countries are Afghanistan, Algeria, Bangladesh, Bolivia, Pakistan, Viet Nam, Republic of Macedonia and Saudi Arabia. Official reasons for such a drastic measure differ for all these 8 countries: from not believing in the potential and trying to protect their investors to combating grey economy they claim cryptocurrencies create. However real reasons behind these decisions can only be guessed. (Coin Dance, 2020)

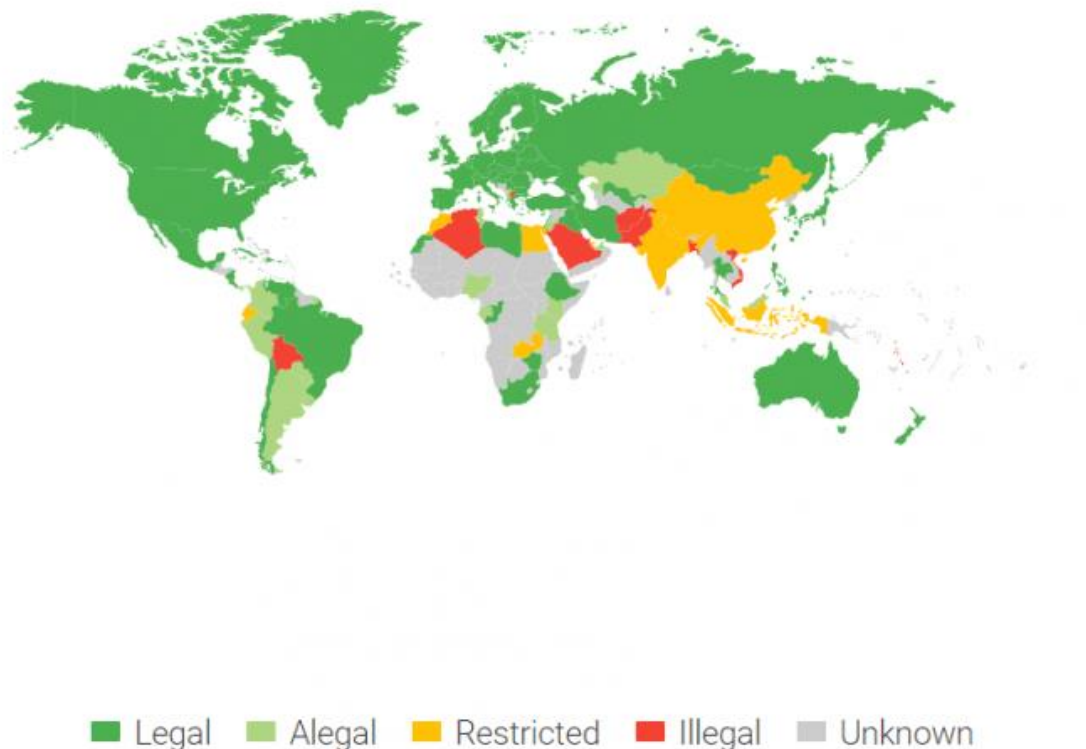


Figure 1- Global Bitcoin Legality (February 2020), source: (Coin Dance, 2020)

**Alegal in this context means not within the framework or concept of law.*

*** Restricted situation is very specific for each of the restricted countries.*

The most complex situation are the countries marked as yellow in figure 1. Two countries which both are economic powerhouses dominate here. These countries are India and China. I will be focusing on the Chinese situation later in this chapter. Unlike China, India has a multi party democracy with large amounts of views and opinions on virtual currencies and blockchain, which leaves possibility for the situation to improve for all or at least some VCBs. As of April 2018, however The Reserve Bank of India (RBI) had imposed a ban on cryptocurrency trading which barred banks from serving cryptocurrency exchanges and firms (CNBC, 2018). This forced larger VCBs like Zebpay, an exchange and wallet provider, to shift out of India. Other Startups and companies have followed. At the same time economic affairs secretary Subhash Chandra Gargishas has been considering a state owned virtual currency – a digital rupee to fight of alternatives as bitcoin (Quartz India, 2019). As of this moment however the Indian Regulatory confirmed that the cryptocurrencies aren't banned but are only ring-fenced, forced to be processed in a person to person format. This means that If someone wants to buy cryptocurrencies using exchange, he must transfer the money directly to sellers account. The cryptocurrency is meanwhile kept on the exchange before the transaction is confirmed (Shetty, 2020).

The last major development in India happened on the sixth of march this year, when the Supreme Court of India overturned the ban of the RBI, because the decision conflicted article 19 of the Indian constitution, that protects certain rights and freedom like the freedom of to practice any profession. (Government of India, Ministry of law and justice, 1949) One must assume however, that the court came to this conclusion simply because there isn't any law strictly banning cryptocurrencies yet. Should the bill to ban cryptocurrencies move through Parliament this victory for VCBs could be easily negated. (Ratna, 2020)

The situation changes often in India and it is unwise for VCBs except for the strictly blockchain ones to expand into India before the situation becomes more stable with regards to cryptocurrencies.

Most of the world however is accepting cryptocurrencies and VCBs operating with them as can be seen from the overwhelming amount of green on the map of figure 1. It could be argued that some have legislatures that are friendlier than others. The most important decision from the state is how it chooses to define Virtual currencies as it has a large impact on legislation binding to it. This decision can affect taxation to great degree. Right now, there are four classifications most of the countries use: (Coin Dance, 2020)

1. **Currency.** Example countries: Luxembourg, Japan or Bulgaria
2. **Barter good.** Example countries: Austria or Canada
3. **Commodity.** Example countries: USA, China or France
4. **Property.** Example countries: Poland, New Zealand or India

Although defining virtual currencies as a currency is probably the most common and logical solution and one that countries like Czech Republic, Japan or Bulgaria decided for, it's hard to deny that Bitcoin and some other larger virtual currencies tend to act more like commodities than currencies or even securities. The answer on what Bitcoin and other virtual currencies are and represent will always vary depending on who you ask and the specific virtual currency you are dealing with. (Prentis, 2015)

The following figure shows major countries and how the taxation differs for cryptocurrencies there. This should help grasping the amount of differences that can exist and affect not only VCBs but individuals owning virtual currencies as well. (cryptoresearch.report, 2017)

Country	Classification	Taxation
Australia	<ul style="list-style-type: none"> Property 	<ul style="list-style-type: none"> Capital gains tax Goods Service tax is not applicable
Germany	<ul style="list-style-type: none"> Private money 	<ul style="list-style-type: none"> No capital gains tax. If owned less than one year, a progressive income tax of up to 45% applies for all gains. . Sales tax is not applicable
Switzerland	<ul style="list-style-type: none"> Foreign currency 	<ul style="list-style-type: none"> No capital gains tax Sales tax is not applicable
U.S.	<ul style="list-style-type: none"> Property 	<ul style="list-style-type: none"> Capital gains tax Sales tax is not applicable
U.K.	<ul style="list-style-type: none"> Asset or private money: Determined by court on a case-by-case basis 	<ul style="list-style-type: none"> Capital gains tax Sales tax is not applicable
Japan	<ul style="list-style-type: none"> Legal method of payment 	<ul style="list-style-type: none"> Capital gains tax Exempt from consumption tax
China	<ul style="list-style-type: none"> Virtual commodity 	<ul style="list-style-type: none"> No taxes

Figure 2- Cryptocurrency Tax Law by Country (December 2017), source: (cryptoresearch.report, 2017)

**situation might have changed in some of the above-mentioned countries. The point is to demonstrate major differences that exists in taxing cryptocurrencies.*

1.3 Situation in the USA

The Figure 2 classifies virtual currencies in the USA as property even though they were listed as commodity previously in the chapter. This is where the complexities begin for the United States of America. The Internal Revenue Service (IRS) treats virtual currencies as a property since 2014 and requires calculation of gains to be made after each and every exchange, which in the early days was really demanding on the taxpayer side, due to its volatile nature and impossibility to track on the side of IRS due to the lack of understanding of blockchain technology at the time. Even in 2020 this remains unchanged, ignoring the large amount of criticism it had faced from the start. IRS have provided taxpayers with new guidance in 2019 but still there are many cases of failing to report real income from working with cryptocurrencies, resulting in punishments from the IRS. (Internal Revenue Service, 2020) (www.coinbase.com, 2020).

However, the Commodity Futures Trading Commission (CFTC), that regulates U.S. derivatives market is regulating cryptocurrencies as commodities since 2015 which plays a major role when it comes to banking VCBs in the USA.

For the VCBs operating in the USA the business model having the most difficulty with establishing a bank relationship were exchanges and clearing houses. This is due to extra regulations being applied to them. (Pratin, David, & Andrew, 2016)

The extra regulation comes from the work with financial derivatives, which in case of VCBs are mostly currency derivatives (cryptocurrencies). Financial derivatives are basically an agreement to buy or a sell an asset in the future with a predetermined price and time. The predetermined price is derived from market factors like currency exchange rates, interest rates etc. (Rangarajan, 2012)

Why the crypto asset derivatives are so potent for the industry can be demonstrated on bitcoin. The operational requirements to safely manage cryptocurrencies are simply high and derivatives offer a new way for investors to avoid these operational obstacles. Another attribute Bitcoin has, is a set supply of 21 million coins that can be split to eight decimal places of itself, making sure the price ceiling will never be too high to prevent trading efficiently even if the price of bitcoin should skyrocket. Still the potential situation of trading volume increasing while the price of bitcoin remains stagnant must also be accounted for. Crypto derivatives expand the capacity of crypto markets, increasing their value by adding new assets to the 21 million coins. (Galen, 2019) The final reason for derivatives to be used in crypto world is the risk management

aspect. The main reason financial derivatives exist in the first place is to hedge against the risk transactions pose. (Imran, 2018) The largest derivatives in crypto are the over the counter (OTC) - custom derivatives. Even though the size of the OTC market cannot be accurately calculated, (Medalie, 2019) the estimates are as much as 65% of the entire crypto trading takes place on it. Right behind the OTCs in popularity are futures, a highly standardized contract which in the U.S. can be offered only by companies under CFTC regulation like the CME group. (Galen, 2019).

The following figure shows the volume in crypto derivatives. (Galen, 2019) BitMEX and Huobi are lightly regulated Asia-based exchanges, at least when compared to CFTC regulations or the regulation in Europe, where OKEx is domiciled. However, Malta is a special case, but more on this later in this chapter.

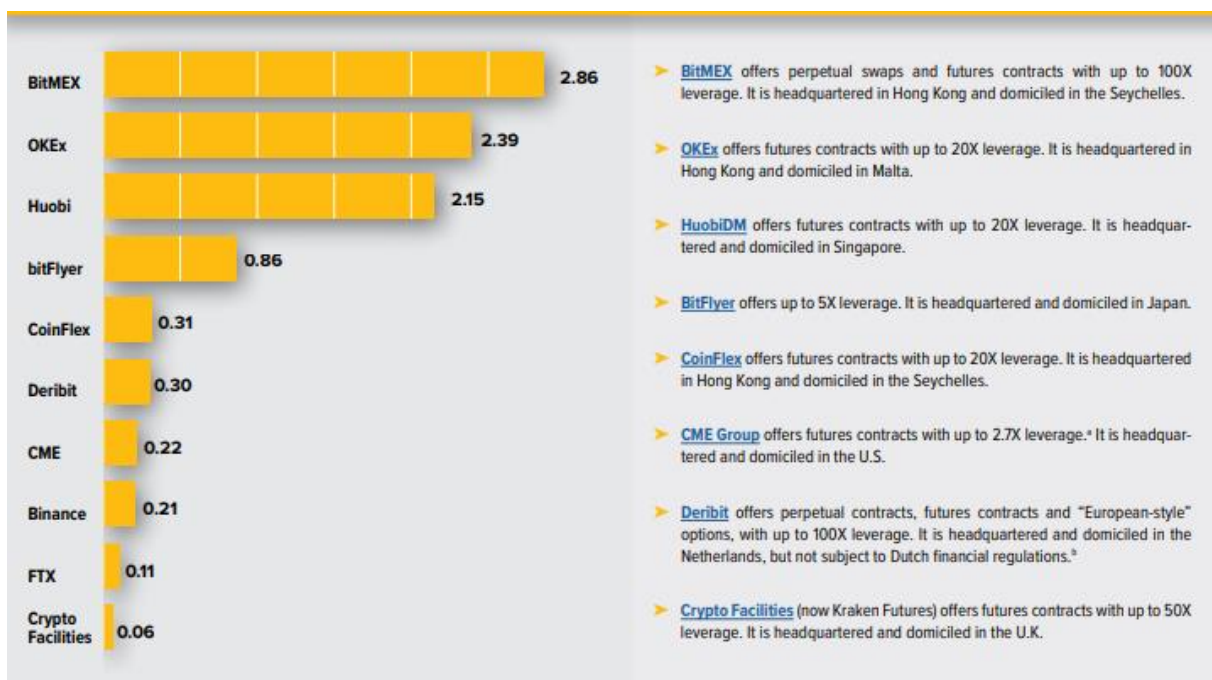


Figure 3- The largest bitcoin futures exchanges, source: (Galen, 2019)

*BTC futures and perpetuals, 30-day average reported volume (US\$ billions), Aug. 20–Sept. 29 of 2019

The conflict in regulation has been one of the many reasons for the slow fall of Bitfinex, a major Hong Kong-based exchange player on the market. CFTC issued a filing and charges against Bitfinex for failing to register as Futures Commission Merchant and \$75,000 civil monetary penalty was also issued. (CFTC, 2016) But from a banking perspective even more challenges come through showing how hard can it be to keep accounts open for such an exchange. Bitfinex

changed its bank multiple times. The last one in the U.S. was the bank Wells Fargo & Co that cut off Bitfinex due to legislative issues in March of 2018. (Magas, 2018) Bitfinex has decided to stop serving US individual and corporate customers altogether later that year. Even though the issues connected to Bitfinex are multiple ones with the biggest being the owner's connection to Tether, a controversial cryptocurrency (John, 2019), its story in the U.S. demonstrates how strict and devastating the legislation can be even for large VCBs especially if they are exchanges.

In the USA, the core legislation affecting relationships between virtual currency exchanges or clearing houses and banks can be found in the Commodity Exchange Act and regulations. This legislation is also maintained by the CFTC. The most important section for all the VCBs is the 17 CFR § 1.20 - The funds of customers with derivatives are to be segregated and separately accounted for. Defining Bitcoin and other cryptocurrencies as commodities by the CFTC happened in the year 2015 and in the year 2018 a federal judge Jack B. Weinstein of the U.S. District Court for the Eastern District of New York has confirmed Bitcoin and by extension other cryptocurrencies a commodity that can be regulated by the CFTC during a running case. (Bergman, 2018)

17 CFR § 1.20 requires entities, like derivatives clearing organizations or other intermediaries to deposit their customer's funds in banks and to obtain acknowledgment from these banks that the funds they have stored in the bank belongs in reality to the customers and not to the organizations directly. (Cornell Law School, 2020)

The implication of this makes banks less willing to sign and hold such accounts open. This combined with the unknowns of the new blockchain technology makes VCB exchanges suffer the most.

The situation doesn't get better for the other VCBs in the USA. Banks in the USA have reported that operational costs go far beyond other customers. These extra costs come from third party surveillance and their own monitoring of VCBs' funds sources. This then becomes very uneconomical for the banks, and, in order to balance these costs out, they increase monthly fees up to even \$25,000. This happens only in cases where the banks don't outright close the account to the VCB. This sum is incomparable with fees other businesses receive and such a situation must sooner or later end with the VCB closing the account on its own. (Pratin, David, & Andrew, 2016)

The need of such strict surveillance comes from the regulation background the banks in the U.S. are under. Putting aside the regulations which the bank must undergo only to be able to work as a bank, the legislation affecting the bank's decisions towards VCBs comes from financial sections of the USA PATRIOT Act and the Bank Secrecy Act (BSA). (FinCEN, 2020) (Office of the Comptroller of the Currency, 2020)

The Bank Secrecy Act forces the banks to report all transactions involving more than \$10,000 in one transaction or in two or more related transactions within 24 hours of reaching this sum. With all-time high for bitcoin being at \$19,891.00 on December of 2017 (www.coinbase.com, 2020) just trading half a bitcoin would force a reaction from a bank. BSA also requires banks to report any "suspicious activities" mostly connected to money laundering. (Office of the Comptroller of the Currency, 2020)

The Patriot Act has several sections dedicated to anti-laundering, to be exact section 319b and section 352, which together give the government and banks full power in seizing funds of individuals and entities. It also states specifics that each bank must comply to with anti-laundering programs like "the development of internal policies, procedures and controls; designation of a compliance officer; an ongoing employee training program; and an independent audit function to test programs." The 314 section of the PATRIOT Act forces any bank to comply with law enforcement and to share information of their customers with them. Similar legislature can be found all around the world but still the U.S. is much stricter and concrete. Failing to comply with these will result in either major fines or restrictions on a bank's line of business. (Office of the Comptroller of the Currency, 2020)

The Financial Crimes Enforcement Network (FinCEN) has put forth recommendations for U.S. banks to consider VCBs money services businesses (MSBs), which have been considered in the high banking world to be of higher potential risk than other customers. MSBs are defined as any businesses that transmits or converts money in any way. (FinCEN, 2019) The definitions of different types of VCBs mentioned at the start of this chapter we can tell that this isn't true for all of them.

According to the interviews done during the Coin Center research the banks have issues of differentiating all the different VCBs and navigating among them. This has two major reasons. The volume of customers is far too low for banks to really care and to invest in understanding the VCB's market and due so many state recommendations stating VCBs are high risk customers, they don't think differences among them could change this fact. The first reason

creates a so-called vicious cycle: The banks avoid opening accounts to the potential VCB customers and so they never have enough of these customers to really care about their market and differentiating between the ones with higher risk and lower risk. (Pratin, David, & Andrew, 2016)

As a result of the above-mentioned recommendations from state run organizations and the extra steps needed from the banks to handle the VCB industry complications properly, various VCBs have reported a great scrutiny from the U.S. banks. Some of the VCBs have also reported that the U.S. banks have put pressure on foreign banks not to accept VCB clients, else the U.S. banks would be forced to sever business ties with them. (Pratin, David, & Andrew, 2016) This suggests motives other than just risk management on the side of the U.S. banks as what customers foreign banks choose to accept does not affect them directly. More on this in the third chapter of this thesis.

Moon Banking is a recently new project made for crypto users to rate banks in their region. The conditions described in the previous paragraphs caused that when US banks were rated on Moon banking with a scale of -100 up to 100, they ended up with just 6. For the United States 2054 users have voted so far. A closer analysis reveals that the larger banks like JP Morgan Chase, Wells Fargo or Capital one tend to score below 0, while smaller banks like USAA or A+ Federal Credit Union score higher. This could be caused by them caring for their smaller amount of customers more and being more specialized. (moonbanking.com, 2020)

1.4 The situation in the EU

The situation in the European Union and the U.K. with respect to the cryptocurrencies and blockchain has been slightly more positive and welcoming when compared to the USA. However, VCBs have reported mixed results when procuring bank services from EU banks. (Pratin, David, & Andrew, 2016)

The EU legal framework with regards to cryptocurrencies has been changing and evolving since 2011. In the year 2012, when Bitcoin was still in its cradle, the ECB (European Central Bank) already wrote about its potential. (ECB, 2012) Regulatory challenges of tax evasion and money laundering needed to be addressed in Europe similarly as in the U.S. but due to Europe's decentralized nature only some aspects are being decided at the level of the union. Most of them are decided by each member state on its own. However, in 2018, the Council of European Union have requested a paper to be prepared by Bruegel on the topic. The paper argued for union-level regulation of exchanges and to set rules for Initial Coin Offerings (ICOs) to better control

risks and potential of the industry. (Demertzis & Guntram, 2018). The EU authorities have decided to avoid such regulations most aspects of VCBs but just few months later started preparing The European Union's 5th Anti-Money Laundering Directive (5AMLD) which came into effect 10th of January 2020. It is an EU wide effort of increasing transparency in crypto and pushing back against money laundering. (European Commission, 2019)

The main six points of 5AMLD go as follows :

- "Enhance transparency by setting up publicly available registers for companies, trusts and other legal arrangements;
- enhance the powers of EU Financial Intelligence Units, and provide them with access to broad information for the carrying out of their tasks;
- limit the anonymity related to virtual currencies and wallet providers, but also for pre-paid cards;
- broaden the criteria for the assessment of high-risk third countries and improve the safeguards for financial transactions to and from such countries;
- set up central bank account registries or retrieval systems in all Member States;
- improve the cooperation and enhance of information between anti-money laundering supervisors between them and between them and prudential supervisors and the European Central Bank." (European Commission, 2019)

For VCBs it means that the scope previously attached to 4AMLD is now concerning exchanges and wallet providers. 5AMLD prohibits anonymous transactions on cryptocurrency exchanges. This means that exchanges and wallet providers must have full user identification program to be ready to provide it to authorities. What can also affect VCBs is the new regime set up against banking from high risk third world countries, forcing businesses from such countries to establish EU bank account before taking part in EU business. (EUR-Lex, 2019)

Every member state has the option of modifying EU directives, reaching the set goal their own way. (European Commission, 2020) Most of the 28 countries have opted for registration practice for VCBs but for instance Netherlands have put Exchanges and wallet providers under obligation of gaining license from the Dutch Central Bank as well as hiring a designated team for controlling the handling of cryptocurrencies out of legal perspective. (Kennis- en Exploitatiecentrum Officiële Overheidspublicaties, 2019)

Failing to comply with 5AMLD will result in fines depending on country specific financial regulators. The new pressure on VCBs in Europe with know-your-customer (KYC) and anti-money laundering practices has had its effects on VCBs in Europe almost immediately. A UK Wallet provider Bottlepay that have raised \$2 million in seed funding in September 2019 closed its operations on December 13th of the same year stating in their final blog that costs of following 5AMLD would be too great and would affect their users experience greatly. (bottlepay, 2019) Of course, after Brexit, things can change in the UK as the EU legislation will no longer be binding for them.

Exchanges and wallet providers in EU are under the most legislative pressure out of all the VCBs similarly as in the U.S. Most of the decisions regarding banking VCBs come down to special legislation of the member states and the “mood” for crypto there.

Out of the 27 countries it is not simple to name the most crypto friendly country with banks willing to bank VCBs. There is one which has demonstrated a heavy form of commitment towards blockchain and to banking VCBs, even though the situation there is still far from perfect there for the VCBs.

Malta has been called magnet for cryptocurrencies and managed to attract the largest VCBs, including big exchanges like Binance to relocate there- (MaltaToday, 2019). In February 2018, the Maltese government has created Malta Digital Innovation Authority, to start promoting blockchain and to create a comprehensive regulatory framework for all the incoming VCBs. The prime minister of Malta Joseph Muscat had a speech later that year on the topic of crypto businesses and how Malta will be preparing for them. (Twitter, 2018) However, Binance still encountered issues with the Malta Financial Services Authority (MFSA), which is an autonomous body, not a state entity, meant to combat money laundering. MFSA stated that Binance never obtained a license from them which turned into a heated debate to which the CEO of Binance, MFSA and even the prime minister of Malta contributed (Haig, 2020) and resulted in a feedback statement from MFSA on security token offerings and the harmonization with the EU (Malta Financial Services Authority, 2020) Malta’s Junior Minister for Financial Services and Digital Economy, Bartolo Clayton reaffirmed the commitment to VCBs by Malta. (Haig, 2020)

The situation of banking VCBs in Malta is also far from perfect. The Times of Malta have contacted dozens of VCBs who have started to move or open their businesses in Malta and found out that banks are still, although politely, declining to open accounts for them claiming

it doesn't fit their risk appetite. The Times of Malta have also reached out to parliamentary secretary for financial services Silvio Schembri who told them, that he is aware of this issue and that some banks were willing to open accounts for blockchain-based companies but had less appetite for cryptocurrency operations. This is the same ignorance described by (Pratin, David, & Andrew, 2016) in 2016 for the U.S. banks and this ignorance continues to be decisive around the world. Mr. Schembri has been holding talks with banks in Malta in order to try and improve the banking situation. (Macdonald, 2019)

Malta still isn't the dreamed blockchain island many believed it to be, especially the banks keep avoiding some specific VCBs (exchanges mostly), that could be misused for money laundering or require heavy KYC. What is vital is that the Maltese government is working together with leaders in the industry like Binance to modify the legislation and the processes with the MFSA to create a healthy ecosystem in which the banks won't have to be worried.

European Union does not include all European countries. Switzerland and Liechtenstein are both considered to be more crypto friendly. Both these countries are ahead of Europe when it comes to solving one of the hot crypto topics of today, the tokenized securities. This is a major step in improving framework conditions for VCBs. (The Federal Council, 2019); (Principality of Liechtenstein, 2020). The KYC and AML regulations are implemented in a progressive way in these two countries, accounting for blockchain companies, not requiring any licensing to be done beforehand but following the recommendations will be necessary in order to secure banking services. (Helms, 2018) (GLI, 2020). The similarities between countries don't end there. They also don't pose any strict taxation on Natural persons or VCBs (Blockpit.io, 2019) (KPMG, 2019). Overall, the banks seem to be accepting cryptocurrencies and VCBs in both Switzerland and Liechtenstein although there are cases described on Moon banking from earlier in 2017, where this was not the case. Swiss banks have nevertheless already in 2017 claimed that the best days for crypto are still to come. (Moon Banking, 2020) (Bloomberg, 2017).

1.5 The situation in the Southeast Asia

The Southeast Asia region is a divided one, but China, Singapore and Hong Kong are all big players in the crypto industry, however Southeast Asia isn't coherent in this pro-crypto approach. In Viet Nam the State Securities Commission (SSC) and the State Bank of Viet Nam (SBV) are the main regulatory authorities for cryptocurrencies and ICOs. Viet Nam is one of the few countries in the world with an active prohibitive stance against any crypto assets and by extension VCBs, including banning them as a means of legal payment. Their reasoning is

that cryptocurrencies are inherently fraudulent. The SSC has banned any crypto-based activity for public companies, securities firms, fund managers and securities investment funds. (OECD, 2019)

Singapore and Hong Kong have both stood as beacons for the crypto world and VCBs when it came to taxes and coherent government legislation, though when it came to banking VCBs, similarly as in all other countries, there were and are ongoing issues. In Hong Kong, Bitcoin is defined as a virtual commodity rather than a currency and thereby is not regulated by Hong Kong Monetary Authority or by Securities and Futures Commission (SFC). Trading is regulated by the Customs & Excise Department of the Hong Kong Police Force. As of November 2018, there were some changes in Hong Kong, and the SFC has decided to regulate exchanges which offer investment advice, trade futures or on a margin. (Ashley, 2018) Perhaps a stepping stone for a more comprehensive regulatory framework. The year 2017 was brutal when it came to banks closing accounts, especially for exchanges more than other VCBs. ANX, Gatecoin and OKEx had all seen their accounts closed with the reason for the unexpected closing being “administrative measures”. (www.digfingroup.com) Hong Kong Institute of Bankers (HKIB) has been aware of this and has since been working on improving opinions of Banks on VCBs and other Fintech companies. HKIB has also recently welcomed 6 new virtual banks into its group, with focus on Fintech sector. (MarketsInsider, 2020)

Singapore has a more balanced and regulating approach to crypto made by the Monetary Authority of Singapore (MAS). MAS acts as the central bank and the regulatory body and its goal are to promote the innovation fintech companies provide, while protecting investors from scams at the same time. Virtual currencies themselves aren’t regulated but some activities surrounding them are. VCBs that want to issue digital tokens and exchanges will have to comply to MAS regulations. Other than that, all companies are required to comply with the anti-money laundering regulations imposed by MAS. (Franca & En-Lai, 2020)

When it comes to the banking sector, most Singaporean banks are crypto friendly, which would also explain the huge amount of VCBs in Singapore. Moon Banking also has Singapore on the positive side of reviews even though the number of votes isn’t large. (Moon Banking, 2020) DBS, Singapore’s largest, state-owned bank used to have negative stance against Cryptocurrencies, calling Bitcoin a ponzi scheme in 2017, however recently their attitude has shifted for the better with regard to VCBs. (Chandran, 2017) (Pan, 2019)

As mentioned at the start of this Chapter, China is a special country when it comes to cryptocurrencies, blockchain and VCBs. China's President Xi Jinping likes the blockchain technology and has made a public statement about it on October 24th of last year. *"We must take blockchain as an important breakthrough for independent innovation of core technologies, clarify the main directions, increase investment, focus on a number of key technologies, and accelerate the development of blockchain and industrial innovation."* (Martin, 2019) However Chinese government disapproves of cryptocurrencies. In 2017 there was ban on initial coin offerings (ICOs) and a crackdown on exchanges. The ban however did not affect Bitcoin's legal status as a property one can hold or exchange via peer to peer channels, similarly as in India. There are also news of the government or government officials accepting bribes from exchanges, which in return can operate under the radar. (Martin, 2019) The mining concerned companies were also pushed by the People's Bank of China to suspend their mining activities, however realistic implications of this remains unknown. (Chao, 2019) Chinese media claim that the reason for this is the use of cryptocurrencies for money laundering and other shady activities, although the real reason, many argue, is the outflow of capital that cryptocurrencies enable and that is outside their control, unlike the \$50,000 USD maximum of foreign capital that can be exchanged by a Chinese citizen in a year. At one point, 71% of Bitcoin mining hash power came from China. (Huang, 2019) (www.coinbureau.com, 2017)

Even establishing any VCBs in China is risky just from the nature of the government there. The situation of VCBs there and how they are banked is hard to comprehend. The Chinese government has way of pressuring even the private banks there. But the government seems supportive of any blockchain based businesses, that focus on use of the technology outside of cryptocurrencies. China Construction Bank has launched a blockchain based platform itself at the end of last year.

1.6 The risk factor of VCBs

In all the regions and countries mentioned so far, the theme of fear of VCBs being used for money laundering plays an important role and affects the possible banking relationships in a negative way. So how much potential for money laundering do virtual currencies really have? Most of the virtual currencies eliminate connections between a real person and the accounts that person uses. This is due to the accounts not requiring any identification. Also, there is possibility for anyone to create large amounts of such accounts which makes it almost impossible for anyone to control and backtrack all these transactions to a specific person. There are also tools like dark wallet with the sole purpose of protecting user's privacy. It achieves this

with stealth IP addresses and by coin mixing. On the other hand, with a proper use of the immutable transparent ledger system that is blockchain, where every transaction leaves a permanent mark, even if the real-world identities aren't recorded, the blockchain monitoring tools can be used to follow transactions to the associated identifiable parties. This transaction trail left on the blockchain allows authorities to view end to end history of funds flowing via the cryptocurrencies. "just follow the money" detective mantra is quite usable here. If we compare this to traditional bank transactions, where any information is shared among the institutions and can be manipulated, an accessible unchangeable blockchain ledger seems just a few upgrades away from being objectively better at preventing money laundering. (Valeriia & Oleh, 2018) (Robinson, 2019)

The following figure shows the development of illicit transactions in years 2017 – 2019. From the figure we can see that the volume of illicit transactions in 2019 has doubled compared to 2017, which is interesting because 2017 has seen a spike in bitcoin's and altcoins' value on the market and interest in cryptocurrencies in general. Still, in the year 2019 illegal activity made up only 1,1% of the total cryptocurrency activity around the world. (Chainalysis, 2020)

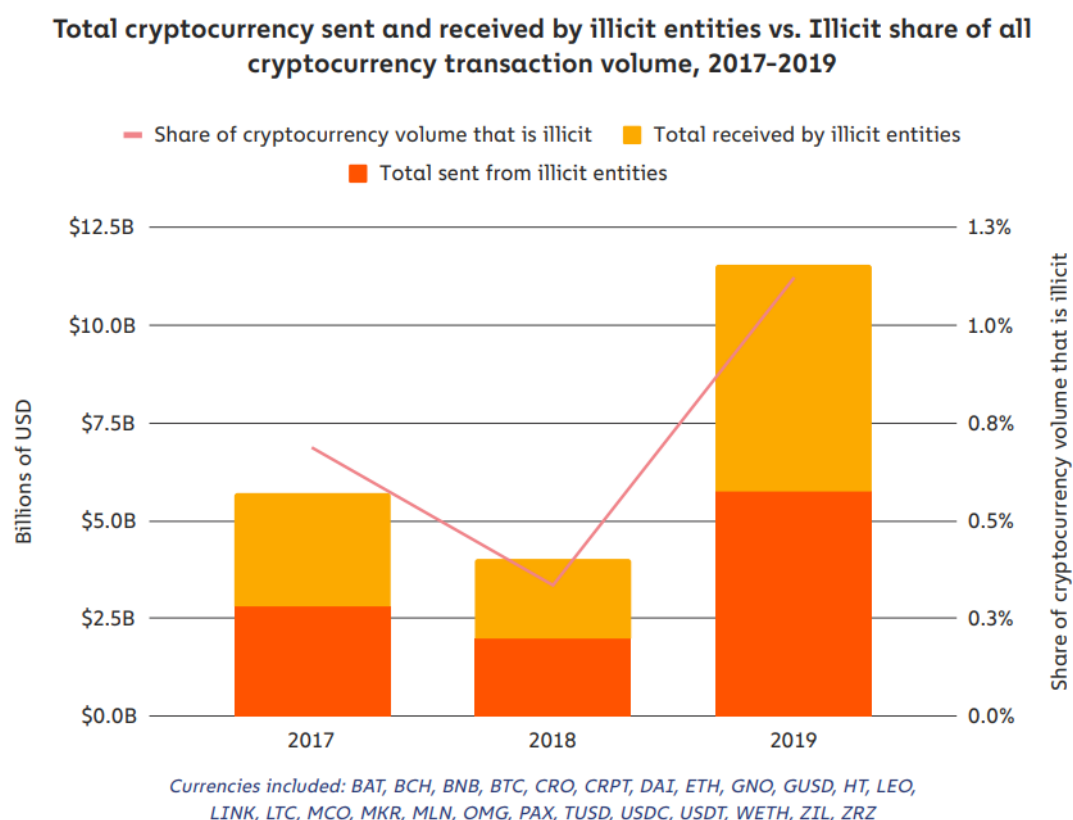


Figure 4- Total cryptocurrency sent and received by illicit entities vs. Illicit share of all cryptocurrency transaction volume, 2017-2019, source: (Chainalysis, 2020)

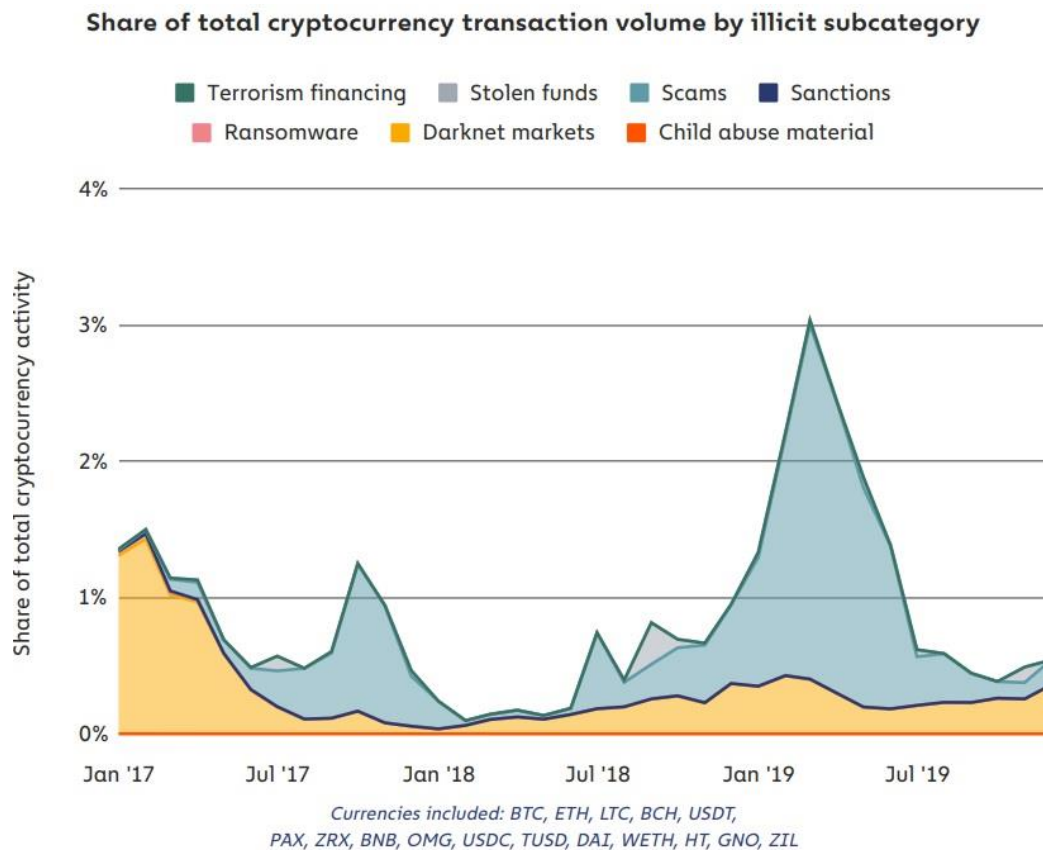


Figure 5 - Share of total cryptocurrency transaction volume by illicit subcategory, source: (Chainalysis, 2020)

The Graph above shows the percentages of each crime category during half a year. The biggest group here is scams, which is not surprising due to it being a new technology and a perceived chance for a layman to make easy money. Together in 2019 the scams accounted for \$8.6 billion in transactions. However, most of these crime subtypes are connected by money laundering. This is due to every criminal earning from cryptocurrencies eventually must hide the origins of their funds in order to convert them later into cash. Another important finding is that terrorism financing and child abuse material subcategories are basically nonexistent. Especially fears of banks and other institutions that terrorist cells will end up using cryptocurrencies are misplaced. (Chainalysis, 2020)

The following graph shows the types of services receiving illicit bitcoin from the years 2016 to 2019. Even though the only currency taken into consideration here is Bitcoin the results are still very accurate as Bitcoin continues to be the most traded and most popular cryptocurrency. From the graph we can see that the amount of illicit bitcoins in exchanges is growing. In the year 2019 \$2.8 billion has been traced in Bitcoin from illegal entities to exchanges. And over \$1,4 billion went to the top two most used exchanges (in terms of trading volume) – Binance and Huobi. (Chainalysis, 2020)

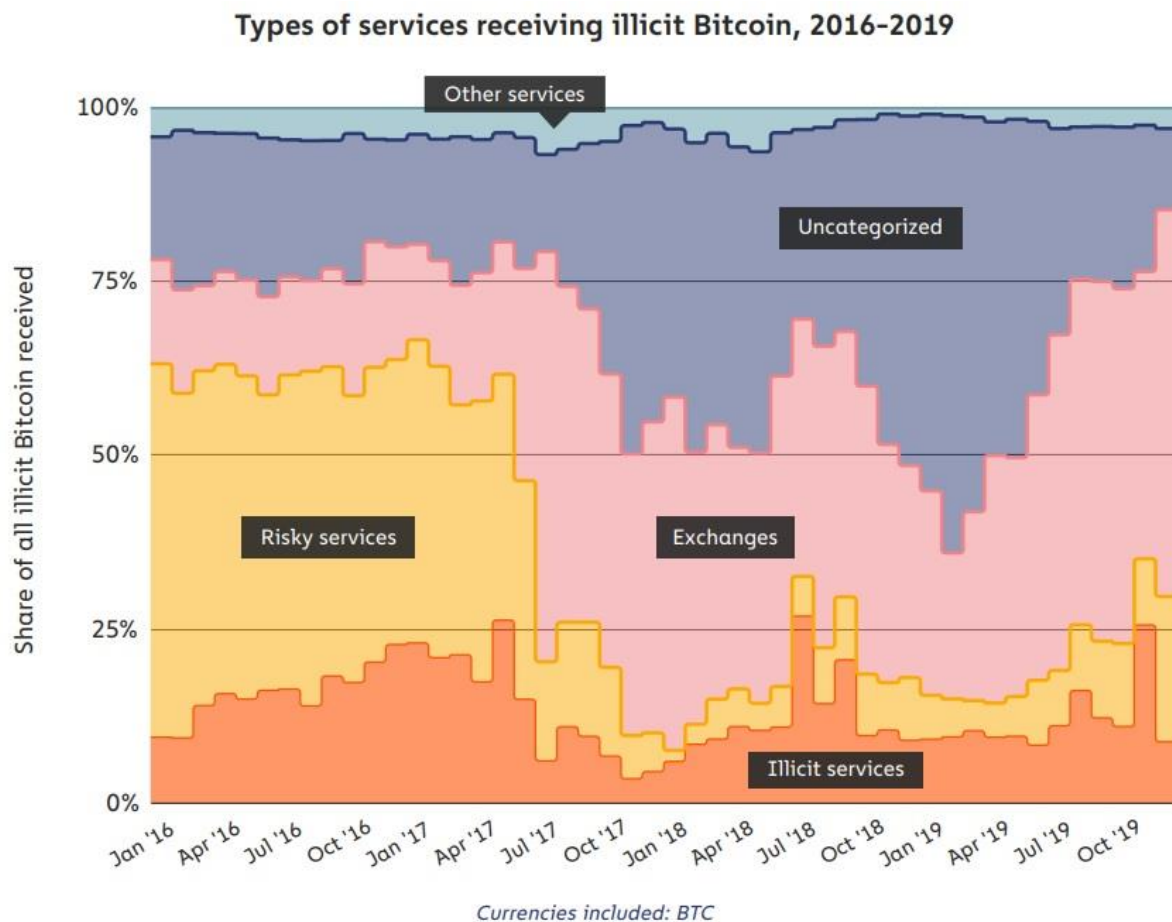


Figure 6- Types of services receiving illicit Bitcoin, 2016 – 2019, source: (Chainalysis, 2020)

" Please note that risky services include P2P exchanges, mixing services, high risk exchanges, and gambling sites. Illicit services include ransomware addresses, sanctioned entities, darknet markets, and addresses associated with scams and stolen funds". (Chainalysis, 2020)

The following figures look at the amount of accounts used in these illicit transactions on both Huobi and Binance. The green bars represent the total number of unique accounts in each receiving category. The bars are based on total amount of bitcoins in USD. The yellow and red bars represent the total amount of bitcoin received collectively by all accounts. Yellow is for non-criminal funds and red is for the illicit funds. From figure 6 we can see that in the \$100M - \$1B category there are only 31 accounts. We can also see that the criminal sources create only a smart part of the total amount received, but still just the 31 accounts have accepted illicit funds worth \$163 million in bitcoin. (Chainalysis, 2020)

Figure 7 is a modified version of the previous one where only funds known to be connected to illegal activity are considered. From there we can see that it is small amount of accounts

representing most of the crime. In the last three brackets in figure 7, the 810 combined accounts represent 75% of all illicit bitcoin received on Binance and Huobi. (Chainalysis, 2020)

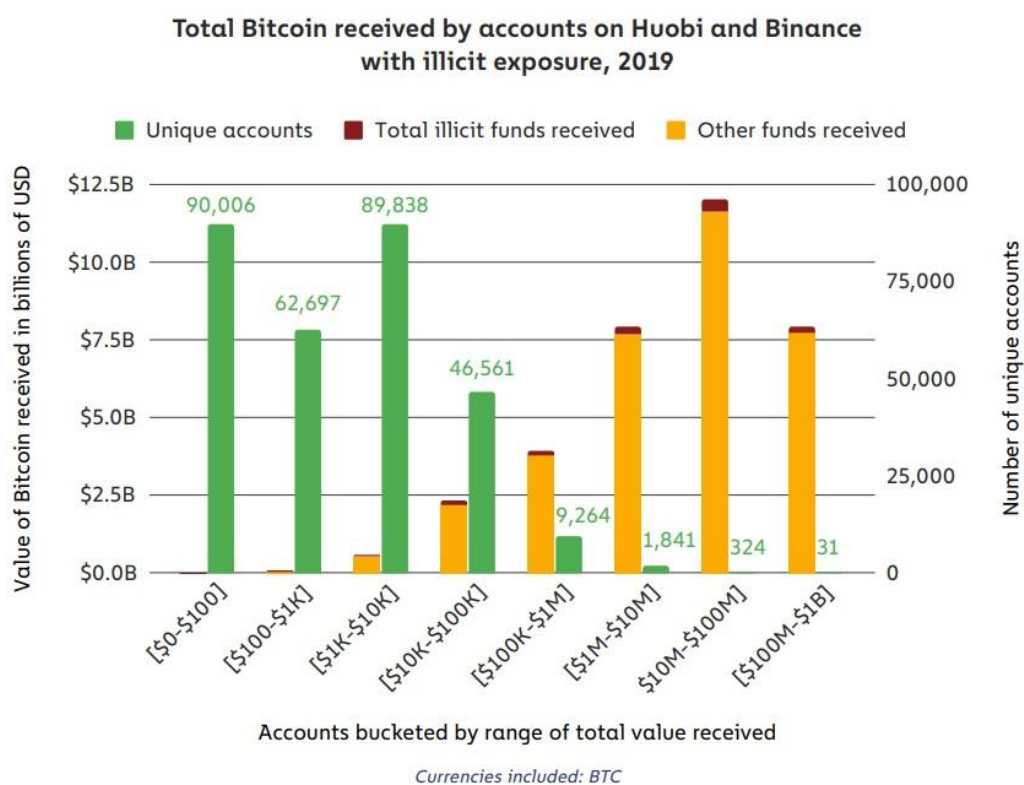


Figure 7- Total Bitcoin received by accounts on Huobi and Binance with illicit exposure, 2019, source: (Chainalysis, 2020)

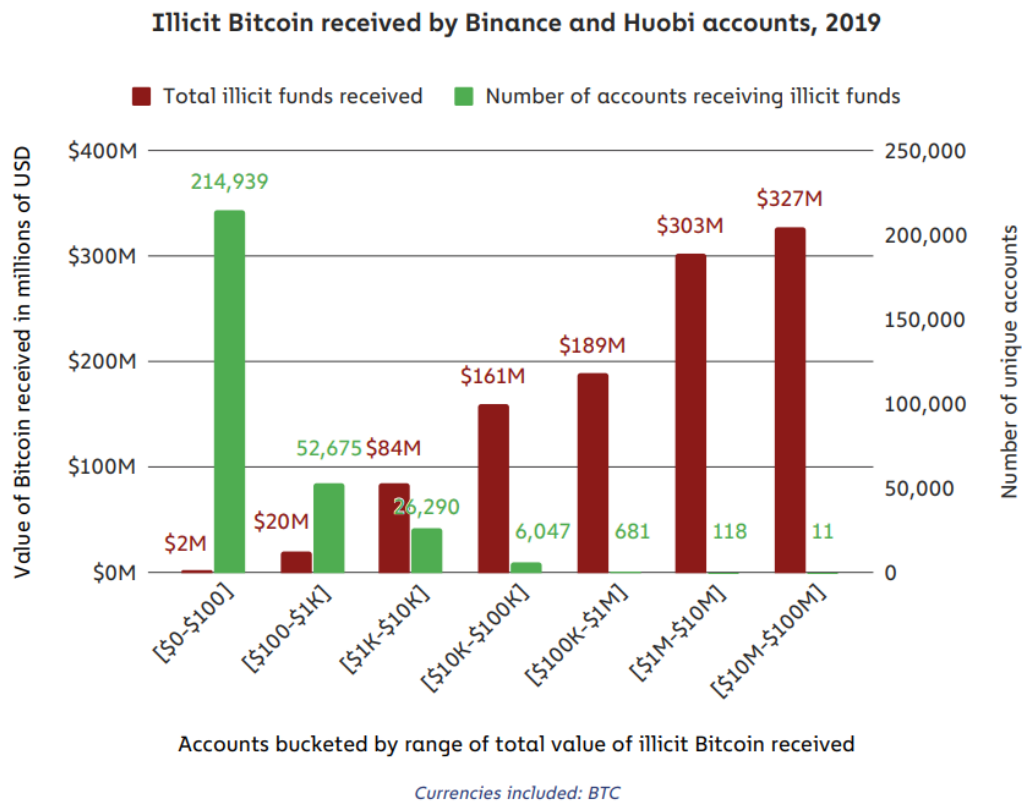


Figure 8 - Illicit Bitcoin received by Binance and Huobi accounts, 2019, source: (Chainalysis, 2020)

From the data it seems that most of the illegal activity comes from larger enterprises. According to the analysis done by Chainalysis the tracks lead to OTCs (Over The Counter) brokers. (Chainalysis, 2020) Using our definitions from the start of the chapter they would fall under the VCB category of payment processing. OTC brokers make the transactions between individual sellers and buyers, that don't want to transact directly on an open exchange, easier and anonymous. This in turn attracts criminals. However the importance of OTCs seems to be growing, due to liquidity on big exchanges being low and volatile. This is where OTCs step in and eliminate any price slippage and provide liquidity to crypto by matching buyers and sellers on their networks. (Medalie, 2019)

The OTCs also aren't that strictly watched by legal entities as exchanges are, making serving illegal customers easier for them either knowingly or unknowingly. The major issue arises here. Separating the legitimate OTCs and the ones who specialize in money laundering is extremely hard and has to be done manually. The most typical way how to launder using cryptocurrencies today seems to be exchanging bitcoin and altcoins for tether before cashing out into fiat. (Chainalysis, 2020)

Considering the data at hand, is it correct of the banks to assume all the VCBs a risky customer out of the fear of money laundering? Definitely no.

Most of the money laundering is happening in payment processing enterprises – the OTCs. If the banks were able to successfully identify and separate such companies from the rest of VCBs during the interviews, they would avoid the main risk creators, that do unwillingly cast shade on the entire crypto-industry. This in turn would gain them new customers. It is true, that most of the VCBs will inevitably use exchanges too, endangering them potentially in receiving illicit funds too. However, the amount of accounts this happens to be relatively small and with time and proper counter measures done by exchanges the money laundering is bound to be eradicated most likely sooner than in fiat cases of money laundering. The Financial Action Task Force (FATF), that sets standards for combating money laundering to its 200 member countries has issued new guidelines in June 2019, actively trying to advise on how to fight against the money laundering. (FATF, 2019). Binance has already announced partnership with Coinfirm, a risk management platform company to address lack of highest anti-money laundering security standards recommended by FATF. (Binance, 2019)

1.7 1st chapter conclusion

The situation of banking VCBs around the world is not ideal. Banks unwillingness to bank VCBs is caused by multiple complications. The first and biggest is the legislation. AML and KYC exist in some shape or form in every country and the banks first need to adapt to handling this for blockchain based companies. This requires some initial investment into technology and into qualified personnel that some banks just want to avoid. The next big issue are the misconceptions about VCBs and cryptocurrencies. The first one is the alleged illicit activities. Recent studies have shown that the VCBs aren't involved in absurdly large amounts of criminal activity and blockchain even makes it easier for the state organs to counteract them. The second misconception banks make is that all the VCBs are the same thing. throwing all the VCBs into the same bag even though only some (exchanges, OTCs) are “riskier” for banks to deal with. Some banks also just seem to have an agenda against cryptocurrencies (not blockchain) but the situation seems to be evolving for the better together with a more comprehensive legal framework and naturally with time. When it comes to specific regions and countries, there are some much more open and stable for banking VCBs now. So choosing where to reside with your company is an important decision too.

2. Comparison with the cannabis situation

2.1 Situation in Canada

It's hard to imagine a more different industry to the VCBs than the marijuana related businesses (MRBs) and yet they have been facing the exact same scrutiny from the banks. This is despite the fact that MRBs have been legalized in the territory they operate in.

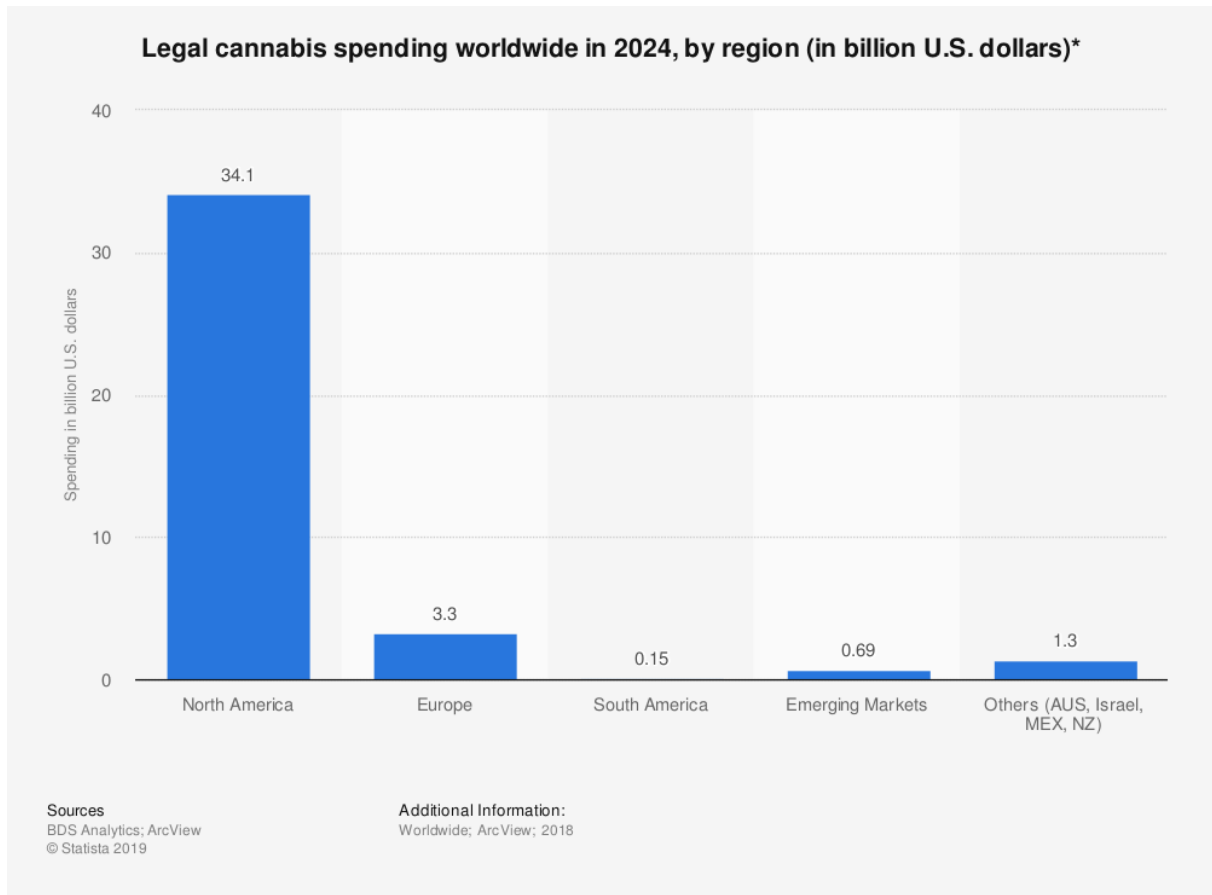


Figure 9 - Legal cannabis spending worldwide in 2024, by region (in billion U.S. dollars)* source : (BDS Analytics, 2018)

The above figure shows a prediction for legal spending on cannabis around the world. Clearly United states and Canada create most of the MRB's market and shall be the focus of the rest of the chapter.

Canada was the second country in the world (BBC, 2018), after Uruguay to legalize cannabis for recreational purposes and not only for medical purposes across the country. This happened on 17th October of 2018, when the Cannabis act came into force in Canada. (Government of Canada, 2018) This has led to an expansion of the MRBs in Canada as any adult could access

marijuana, unless territory specifics prevented him from it, as each Canadian territory can adjust the law how it sees fit. (Government of Canada, 2018).

Major banks all over Canada are still cautious and do show a level of scrutiny against MRBs. Mike Mckee, Partner and CFO of Muse Cannabis store had the following to say to the situation: (Woodin, 2019)

“I was running around meeting so many different people and bankers trying to get something sorted out,” he said. “It was a lot of meetings. Basically, I got turned down at everyone except Bank of Montreal.”

Bob Potter, CEO of Phytron Technologies Inc. has faced similar issues as Mike with his company: (Woodin, 2019)

“As soon as you mention the cannabis business, they say ‘No, can’t help you,’

These are all smaller companies but how is the situation for the bigger cannabis players? It seems to be much better. Canopy Growth Corp. and Aurora Cannabis Inc. are two Canadian multibillion-dollar companies and they never face any shortage in funding from the bigger banks. (Woodin, 2019) (Vanmala, 2018)

There are, however cases of banks like Credit Union that are allowing cannabis companies to have an account opened with them but charging them extra (as much as 500 U.S. dollars per month) for hiring an external auditor to ensure that Credit Union remains compliant with Canada’s rigorous regulatory system for cannabis. (Woodin, 2019) These extra costs may be insignificant for large companies but not for the smaller ones. This was the also a solution some banks have chosen when dealing with VCBs in the U.S. as described in the previous chapter. Another explanation is the larger network of connections, bigger companies tend to have.

Why are Canadian banks still so reluctant when it comes to banking MRBs and are there any similarities with VCBs? Unlike VCBs, there are no technical complications with adapting the AML and KYC protocols for blockchain and the legal status of cannabis isn’t ever changing as with cryptocurrencies. Still Scott Betts, the vice-president of risk management, credit and compliance at G&F Financial Group in Canada claims there is more involved with it than with a typical business membership. Mostly, that financial institutions (mostly banks) are required to watch and compare purchasing records from the province’s liquor board to prevent supplies from the black market. (Woodin, 2019)

Another issue for the MRBs is the interconnection of the banking world in the North America. Deepak Anand, CEO of the global cannabis supply and distribution company Materia Ventures sees major issue in the fear of Canadian banks being on the offside of U.S. federal regulations almost as if it had bigger impact on them then the Canada regulations do. Anand's recommendation for the Canadian banks with such fear is to restrict cannabis-related business accounts from conducting international transactions to avoid legal conflicts among the banks. This was already Implemented by G&F Financial. (Woodin, 2019) Such a form of solution is good and makes sense for the cannabis industry as being local doesn't damage it as much unlike with the VCB industry, which is global when it comes to customers. However, limitations in forms of avoiding specific cryptocurrencies with shady tendencies like tether, that is confirmed to be used more in illicit transactions could pose a partial solution for banks, when it comes to banking VCBs.

2.2 The situation in the USA

In the United States the situation is drastically different for each of the states as can be seen on figure 10. Even though the use and possession of cannabis is illegal according to the federal law as told by Controlled Substances Act of 1970 (USgov., 1970), the recreational use of marijuana is allowed for adults in 11 states while in most other states it is allowed only with a doctor's recommendation.

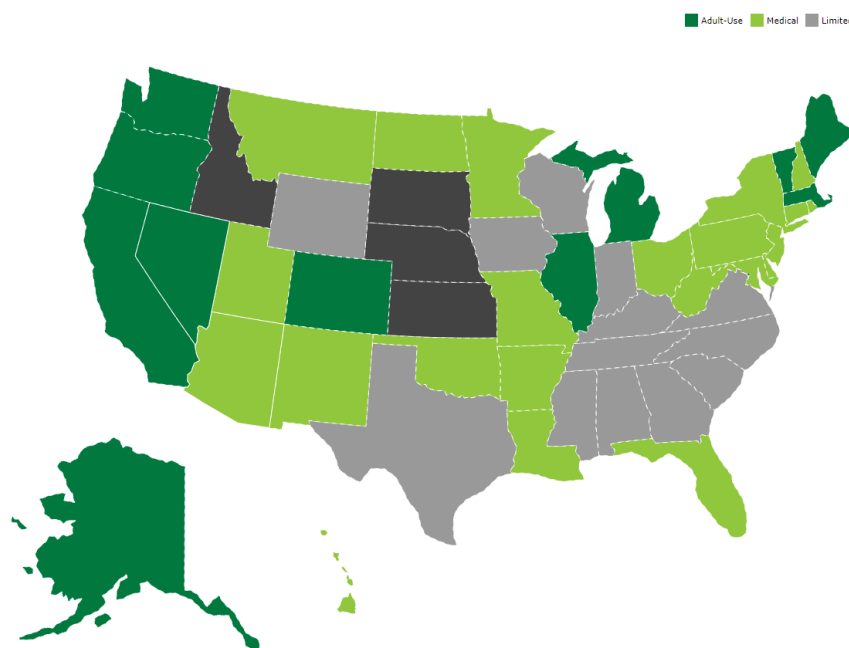


Figure 10 - stateby state cannabis policies, source: (National Cannabis Industry Association, 2020)

The following figure from FinCEN (FinCEN, 2019) shows the development of depositories providing their services to MRBs. Up until end of 2018 there was only a moderate increase since 2014. This can be explained just by the market increase that happened during those 4 years with new states becoming marijuana friendly after ever increasing support for legalization. (Gallup.com, 2019) After the beginning of 2019 the number started to ramp up. This is due to the SAFE banking Act. Before this Act passed, the only protection MRBs had from the federal level ban, were the so-called Riders, that had to be passed by the legal states every year. American Bankers Association, which is a key U.S. lobby representing the \$17 trillion of the banking industry, has openly pushed for the SAFE banking Act (American Bankers Association, 2019) that replaces these annual riders with permanent protection from being targeted by the federal government for providing services to MRBs.

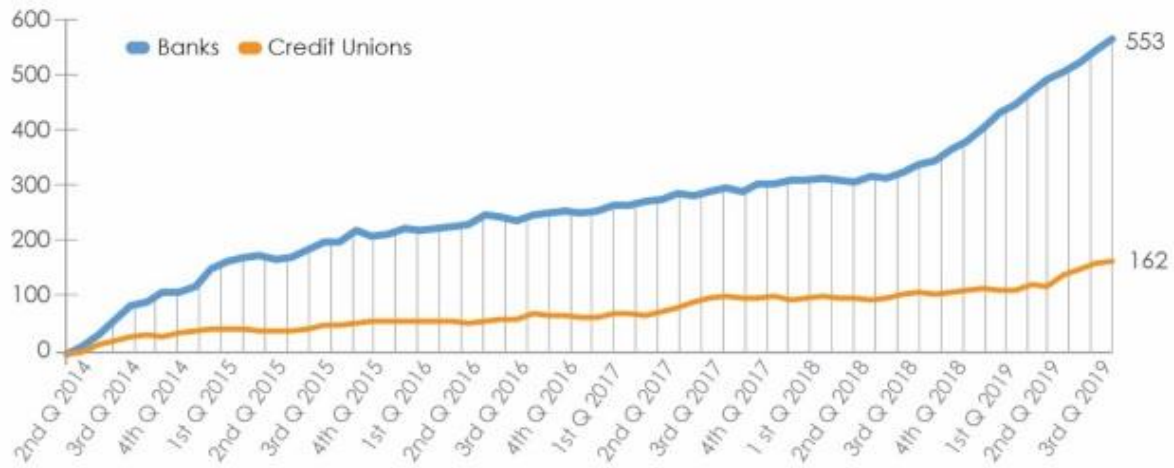


Figure 11- Depository Institutions (by type) Providing Banking to MRBs, source : (FinCEN, 2019)

What is also interesting is that as of 30 June 2019, FinCEN has received a total of 87,249 Suspicious Activity Reports (SARs) connected to MRBs. FinCEN separates these into three categories, which can overlap resulting in the total number being larger than the actual number of cases. 68,378 SARs of these cases were “Marijuana Limited.” This means that the MRBs were fully compliant and the banks kept on providing them their services. 22,132 (circa. 25%) cases were “Marijuana Termination.”, meaning the termination of the MRB’s membership with the bank. The rest of the cases are being investigated on, but the bank has not terminated the MRB’s membership yet. (FinCEN, 2019)

The Situation of banking MRBs is really telling of how the decision making in the banking world works and how the future of banking VCBs can look. During the last decade, when the market size of and the interest in the cannabis industry grew, the banks slowly stepped away from their conservative avoidance of MRBs, which they originally sought to be too risky, due to inconsistent legalization in the North America region as well as the extra work from reporting any SARs to FinCEN. Today the banking situation is getting better for the MRBs. After the bankers themselves showed interest in the cannabis industry in 2019 and came with the SAFE banking Act. FinCEN hasn’t released any such a form of statistics for VCBs, except for a note from Kenneth Blanco, the director of FinCEN, who said in December last year, that the number of received SARs for VCBs is in total 11,000 so far. (Nelson, 2019). The total rate of termination from the banking sector remains unknown. MRBs have demonstrated that the decisive factor for the banks is the market size, for which they are able to ignore the 25% of problematic cases.

3. Game theory

3.1 Overview of the model

“Game theory can be defined as the study of mathematical models of conflict and cooperation between intelligent, rational decision-makers.” (Myerson, 1997). The goal of this chapter is to create a game theory model, that is applicable to banks and VCBs. The model created by in this chapter could provide a simplified formula for banks on deciding if its worth it to bank VCBs.

Every game theory consideration consists of a set of players, a set of moves the players can do (or strategies) and a specification of different payoffs or losses for the selected move. (Myerson, 1997) In this investigation we were inspired by the Brander–Spencer model, which fits the definition of a normal (or strategic form) game (Myerson, 1997). Such a game is normally represented by a matrix which shows the players, their possible moves and outcomes of those moves. The case in this chapter won’t be any different.

In this simple model there are only two players. Both of these players are banks, however they will differ significantly. The first player is called a Smart Bank and the other is Blind Bank. The difference between them will be explained later in this chapter. These two banks are opponents and they will be executing their moves simultaneously. Both banks decide for one of the two moves. The first move is to choose to bank VCBs, while the other is to ignore VCBs altogether. The model is designed to show the outcomes for 1 year.

Before going into how the outcomes are calculated and what factors affect them, there needs to be a few disclaimers. The factors, affecting the math behind the following matrix are all draw upon from the previous chapters. This means there is some empirical evidence to support their use in creating this simplified reality. The factors are as follows:

- **The state factor [S]** (value from 0 to 1) The state factor represents the friendliness of the country towards the VCB industry.
- **Market analysis investment [I]** (Value from 0 to ∞) The market analysis investment is done only by the Smart Bank. It’s some sum that is spend for the bank to gain access to “results of the matrix”, allowing the smart bank to decide if it wants to enter the market. The blind bank saves money on this investment but will be making stochastic choice based on the state factor alone.
- **VCB maintenance fee [F]** (Value from 0 to ∞) Represents the increased fee the banks tend to demand from some VCBs in order to keep their accounts opened per some unit

of time. You can imagine an extra employee hired or some payment for technical upgrade.

- **Average VCB gain [G]** (Value from 0 to ∞) Represents how much will bank gain from serving one VCB customer per some unit of time
- **Risk factor [R]** (value from 0 to 1) Represents the risk that each VCB poses for the bank. You can imagine anti-AML state organizations causing problems for the bank etc.
- **Amount of VCBs on the market [N]** (Value from 0 to ∞) All the VCBs have the same value and the same risk in this model. They are also split 50% 50% between the two banks should both banks choose to bank VCBs as their strategy.
- **Investment into filtering of fraudulent VCBs [i_f]** (Value from 0 to ∞) the risk factor may be reduced by smart investment into procedures, know-how and technologies which can help distinguish between genuine and fraudulent VCBs, which is done by the Smart Bank. The relationship between this investment and the obtained modified risk factor can be described as a function $r_m = f(R, i_f)$, where r_m is the reduced (modified) risk factor, R is the original risk factor and i_f is the investment into VCB filtering. Intuitively, the function f is probably non-linear with regards to the investment, with higher investment having diminishing returns. The following properties should apply:
 - $f(R, i_f) = R$, meaning the risk factor is not modified if there is no investment into VCB filtering
 - $\lim_{i_f \rightarrow \infty} f(R, i_f) = 0$, meaning the risk factor can be at most reduced to 0.
 - One obvious and simple candidate for such a function is $f(R, i_f) = R e^{(-i_f/A)}$ where A is some constant – larger values of A lead to a smaller impact of the investment.
 - Let's assume that the Smart Bank will have to hire an employee who will be reducing the risk. The cost of i_f will thereby be that of their monthly salary. Lets also assume that if this employee receives an average salary, he could reduce the risk by half. A higher salary would mean a larger factor of reduction of the risk.

There are two functions that define the payoff for the two banks for the given parameters.

The functions are defined as follows:

- For the Smart Bank, the payoff is the product of the State Factor S , the Average VCB Gain G and $(1 - Re^{-i_f/A})$, the share of banks which are not problematic, where we use the modified risk factor, which is dependent on the Investment into Filtering of Fraudulent VCBs. The VCB Maintenance Fee F is deducted from this product, which is multiplied by number of VCBs the Smart Bank is going to bank. The Market Analysis Investment must also be deducted from the whole to calculate the payoff. Thus, the payoff for the Smart Bank can be described by the function h , which takes i_f and n , the number of VCBs the Smart Bank is going to bank, as parameters.

$$h(i_f, n) = \begin{cases} n[SG(1 - Re^{-i_f/A}) - F] - I - i_f, & \text{if the Smart Bank banks VCBs} \\ -I, & \text{otherwise} \end{cases}$$

- If the Smart Bank chooses not to bank VCBs the payoff is the negative of the Market Analysis Investment, which cannot be recovered.
- Similarly, for the Blind Bank, the payoff is also the product of the State Factor S , the Average VCB Gain G , and the share of banks which are not problematic. However, the Blind Bank does not invest into filtering as the Smart Bank does, so the risk factor is R , and the share can be expressed as $(1 - R)$. Again, the VCB Maintenance Fee F is deducted from this product, which is multiplied by number of VCBs the Blind Bank is going to bank. Because the Blind Bank did not perform an analysis of the feasibility of VCBs in the market, the Market Analysis Investment need not be deducted from the payoff. Thus, the payoff for the Blind Bank can be described by the function g , with n , the number of VCBs the Blind Bank is going to bank, as its parameter.

$$g(n) = \begin{cases} n[SG(1 - R) - F], & \text{if the Blind Bank banks VCBs} \\ 0, & \text{otherwise} \end{cases}$$

If the Blind Bank chooses not to bank, its payoff is 0 – as the bank loses nothing.

The payoffs can be arranged in a payoff matrix:

Actions:	Bank VCBs		Do not bank VCBs	
Bank VCBs	$g\left(i_f, \frac{N}{2}\right)$	$h\left(\frac{N}{2}\right)$	$g(i_f, N)$	0
Do not bank VCBs	$-I$	$h(N)$	$-I$	0

Table 1- The payoff matrix

It remains to determine the final payoff for both the Smart Bank and the Blind Bank. Here the difference between the two players are manifest: the effect of the Market Analysis Investment, which the Smart Bank conducts, can be thought of as revealing the contents of the payoff matrix. In other words, the Smart Bank knows which action has a higher payoff, depending on the values of payoff and the Blind Bank's behaviour, which will be described next.

The Blind Bank, on the other hand, does not invest any resources into determining if it is indeed profitable to bank VCBs, and as such, the payoff matrix is hidden to it. Therefore, we model the decision of the Blind Bank as a random bernoulli-distributed variable random variable X , with $p = S$ (S being the state factor):

$$P[X = \text{"Blind Bank banks VCBs"}] = S$$

$$P[X = \text{"Blind Bank does not bank VCBs"}] = 1 - S$$

Since the action of the Blind Bank is stochastic in nature, we can only speak of expected payoffs (expected values). For the Smart Bank, there are two expected values to consider:

- the expected payoff if it chooses to bank:

$$\mathbb{E}_{Bank}[P_{Smart}] = Sg\left(i_f, \frac{N}{2}\right) + (1 - S)g(i_f, N)$$

- the expected payoff if it does not choose to bank:

$$\mathbb{E}_{Notbank}[P_{Smart}] = S(-I) + (1 - S)(-I) = -I$$

where P_{Smart} is the payoff of the Smart Bank.

The Smart Bank chooses whether to bank VCBs based on these two values -it will bank VCBs if $\mathbb{E}_{Bank}[P_{Smart}] > \mathbb{E}_{Notbank}[P_{Smart}]$ and vice versa. The expected value of the Blind Bank is then determined by this decision:

- the expected payoff of the Blind Bank if the Smart Bank chooses to bank:

$$\mathbb{E}_{Bank}[P_{Blind}] = Sh\left(\frac{N}{2}\right) + (1 - S) \cdot 0 = Sh\left(\frac{N}{2}\right)$$

- the expected payoff if it does not choose to bank:

$$\mathbb{E}_{Notbank}[P_{Blind}] = Sh(N) + (1 - S) \cdot 0 = Sh(N)$$

Using the game theory explained above I have created 2 model situations on which demonstrate how each of these factors can affect the outcomes for both the banks.

3.2 Model situation 1

The following parameter set should represent an overall bad situation for banking VCBs. A very unfriendly state with medium risk chance. This combined with only 50 VCBs on the market, with each of them offering a decent gain should result in red numbers. In the following table you can see exactly the parameter set used. I am assuming that the Smart Bank will need to pay an extra average monthly salary (2000) for a new employee to reduce the risk for the duration of the year. The initial cost for the market analysis equals to that of one month salary.

The state factor	0,2
Market analysis investment	2000
VCB maintenance fee	500
Average VCB gain	1500
Risk factor	0,2
Amount of VCBs on the market	50
Investment into filtering of fraudulent VCBs	24000

Table 2- parameter set for model situation 1

* 2000 is the imagined average monthly salary used for calculations of i_j and for estimating the cost of I

The following figure shows the resulting payoff matrix. Blue represents the Smart Bank and orange represents the Blind Bank. The results are obvious. The best outcome in this case is 0, which only a Blind Bank could achieve without spending on the initial market analysis investment.

	Bank VCBs		Do not bank VCBs	
Bank VCBs	-31750	-6500	-37500	0
Do not bank VCBs	-2000	-13000	-2000	0

Table 3 - payoff matrix for model situation 1, source: excel calculations

However, this is not the expected value. The 4 possible expected values are as follows:

- Expected value for Smart Bank if it does not bank: -2000
- Expected value for Smart bank if it banks: -36350
- Expected value for Blind Bank if Smart Bank does not bank: -2600
- Expected value for Blind Bank if Smart Bank banks: -1300

The Smart Bank has the option to decide as it has invested into the market analysis. So, it will logically choose not to bank VCBs and will end its VCB endeavor with an expected loss of 2000. The Blind Bank however has not invested into the market analysis and its decision on banking VCBs correlates with the state factor, which even though is low, will still result in some banking of VCBs. Leading to an expected loss of 2600 for the Blind Bank.

The following Graph shows how the model situation would change together with the risk in a situation where both banks bank. Should the risk increase, the investment of Smart Bank into reducing it would reduce the loss. However, in such an overall bad situation for banking VCBs it does not really matter as all the extra investments done by the Smart Bank heavily outweigh the benefits of reducing the risks.

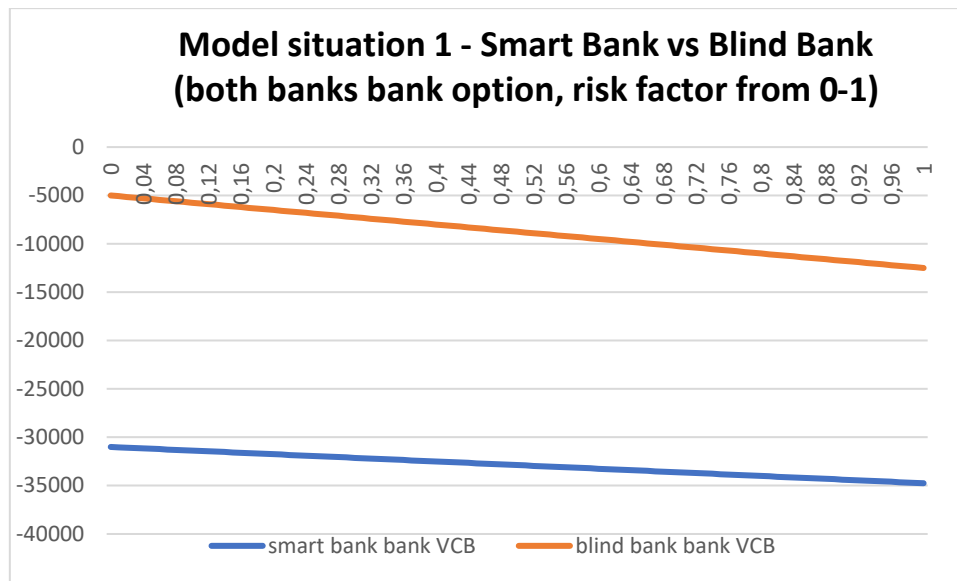


Figure 12- Smart Bank vs Blind Bank for model situation 1, source: excel calculation

3.3 Model situation 2

The second parameter set represents an overall positive situation of banking VCBs. A very friendly state together but with a higher risk chance, which spells more trouble for the Blind Bank then for the Smart Bank. There are 300 VCBs in this model environment and each represents a significant potential income for the banks.

The state factor	0,9
Market analysis investment	3000
VCB maintenance fee	500
Average VCB gain	1500
Risk factor	0,5
Amount of VCBs on the market	300
Investment into filtering of fraudulent VCBs	36000

Table 4 - parameter set for model situation 2

* 3000 is the imagined average monthly salary used for calculations of i_j and estimating the cost of I

The best overall outcome in the following payoff matrix (+114750) is when the Smart Bank has the entire VCB market for itself. There are also no negative outcomes for the banks.

	Bank VCBs		Do not bank VCBs	
Bank VCBs	37875	26250	114750	0
Do not bank VCBs	-3000	52500	-3000	0

Table 5 - payoff matrix for model situation 2, source: excel calculations

- Expected value for Smart Bank if it does not bank: -3000
- Expected value for Smart bank if it banks: 45 562
- Expected value for Blind Bank if Smart Bank does not bank: 47 250
- Expected value for Blind Bank if Smart Bank banks: 23 625

As can be seen from the expected values the Smart Bank is yet again in a much better situation than the Blind Bank. The following figure then shows how drastically would the situation differ should the risk value change. The extra spending on filtering VCBs by the Smart Bank would

keep it in mostly positive numbers even after the risk increases, as it is affectively decreasing the risk for itself.

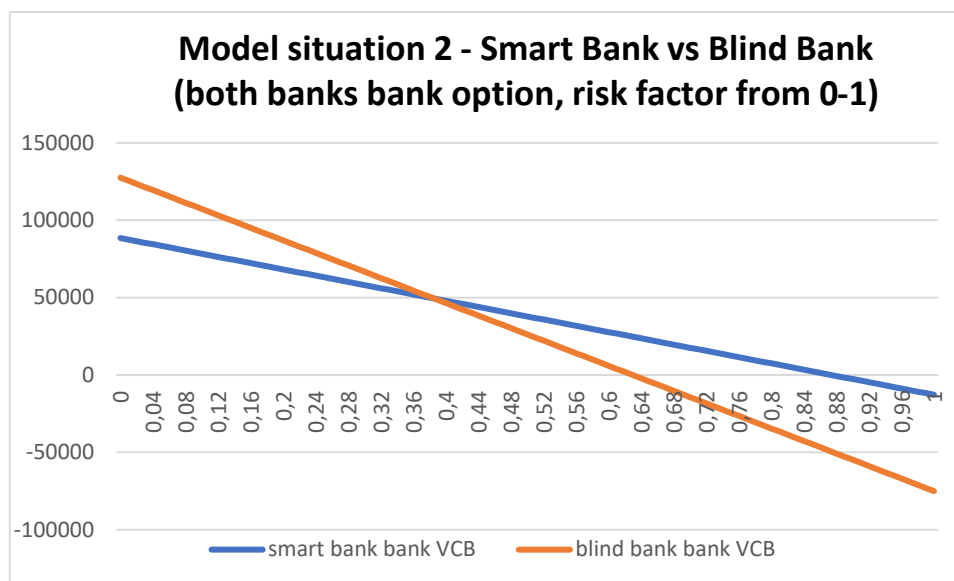


Figure 13 - Smart Bank vs Blind Bank for model situation 2, source: excel calculation

4. Competitive advantage for a bank in Czech Republic

4.1 The legal situation in the Czech Republic

The first two theoretical parts described the current situation of banking VCBs and compared it with a totally different industry in the form of the cannabis industry to help indicate what issues are connected to VCBs only when it comes to a bank's decision to bank them. The third chapter took the findings of the first two chapters to create a simplified game theory model to demonstrate how the factors affecting real banks and VCBs today could project in gain or loss for the banks as well as show that some extra interest and spending on learning about VCBs can prove a good return on investment.

This chapter will focus on the VCB market in the Czech Republic in order to find out if there can be a competitive advantage for a bank, that would open itself to VCBs on this market.

Cryptocurrencies are legalized and almost unregulated in the Czech Republic. After initial discussion over the legal tender the Financial Administration of the Czech Republic has defined cryptocurrencies as intangible movable assets. This decision was made based on Czech National Bank's recommendations. There was a specific reason for cryptocurrencies that prevented the Czech institutions to define them as cashless funds or electronic money. According to Czech law *n. 284/2009* buying or selling cryptocurrencies on one's own account does not constitute any of the payment services or non-cash foreign currency transactions defined by the law. (Mareš, 2018)

This definition plays a major role when it comes to taxation of crypto activities in the Czech Republic. The third article of the Czech law *n. 586/1992* defines that any conversion from fiat to cryptocurrency must be taxed. The act of exchanging cryptocurrency for another cryptocurrency remains unclear when it comes to taxation requirements. Further tax calculation depends on whether the gain from the exchange or conversion was a single occasion or not. Should it be a single occasion done by a natural person and not by a legal entity an exemption from taxes up to 30 thousand CZK per year can be applied for. Most VCBs are however executing transactions with cryptocurrencies regularly and as a legal entity, making use of such tax reliefs impossible. (Mareš, 2018)

Buying any goods using cryptocurrencies is also taxable. This is legally defined as a non - monetary income and so the tax must be calculated from the price of the bought goods. The calculation of expenditure on achieving, securing and maintaining revenue made from

cryptocurrencies for the end year taxation is a problem as every cryptocurrency was bought for a different price and this must somehow be accounted for. Currently there are two specific accounting methods that can be used to deal with this changeability. Either the FIFO method (First in First out) or calculating the weighted average. (Mareš, 2018)

One advantage the cryptocurrencies have in the taxation system is the exemption from value added tax (VAT), due the standardized legislation in the European Union. Already in 2015 the Court of Justice of the European Union has decided that the exchanges of traditional currency for cryptocurrency should be exempt from VAT. (Court of Justice of the European Union, 2016). For VCB exchanges, however, VAT must be applied since they are providing services for remuneration. Any mining VCB is also set free from any VAT as it usually not clear, who the end customer will be. The situation with pool mining could be different but Czech law as of today does not differentiate between the two forms. Both the mining VCBs and exchanges are also not eligible for deduction of VAT. What is also crucial with VAT in the Czech Republic is that from the second half of the year 2017, based on the amendment to the VAT act, every VAT payer, becomes the guarantor for ensuring that the recipient of the state's cryptocurrency payment taxes VAT correctly, which is certainly a good thing to keep in mind and keep an eye on for any Czech VCBs. (Běhounek, 2017) (jaknakrypto.cz, 2019)

To find out about the current banking situation of the VCBs in the Czech Republic, I have created a form similar to the one Pratin, David, & Andrew have done in 2016 for the U.S. based VCBs. (Bok, 2020) I have spoken with two VCBs in the Czech Republic in more detail, that also filled in the form and the rest of the answers were collected anonymously mostly from the Bitcoin CZ/SK group on Facebook (Facebook, 2020) with nearly 20 000 people. Altogether I have managed to collect 11 filled forms from managers or owners of VCBs in the Czech Republic.

Even though the amount of answers might seem small, one must bear in mind the size of the market, which is described later in this chapter. Out of the 11 questioned VCBs, 9 were of small size, employing between 1 to 9 employees and two were of slightly larger size, employing between 10 to 19 employees. From this we can tell that most of the VCBs tend to be smaller sized businesses. 6 out of 11 VCBs have encountered major issues with banks in the Czech Republic. These issues were either straight up being denied an account by the banks or having the bank account closed shortly after establishing it. The banks either gave no specific reason for their decision or have claimed the VCBs carry to much of risk with them. The other 5 VCBs

haven't encountered any major issues with their banks so far. Most of the VCBs who answered the form have their accounts split among three banks, that seem to be more crypto friendly than the rest.

When trying to figure out the connection between the VCB type and the bank's final decision, I came across some interesting findings. Both blockchain VCBs faced no issues when opening a bank account with two different banks, out of which one bank, the Raiffeisen bank, was called out by other two differently focused VCBs as unwilling to open an account for them. The same blockchain VCB has also stated how important it was to explain to the bank that their company was an IT company. I found this interesting as it proves that some Czech banks do not orient themselves correctly among the different VCBs and what they do. The most denied VCBs were the Specialized Service Providers with 4 out of 5 getting denied by banks. Specialized Service Providers have the most varied activities and it would be interesting to find out which of their potential activities made the banks dislike them. Out of the two mining VCBs who answered the form, one has faced issues with opening a bank account and the other has not. Both the single successful Special Service Provider and the successful mining VCB have their accounts with one of the three previously mentioned "crypto friendly" banks. Those three banks are Equabank, Moneta bank and Fio banka, a Czech bank. Although Fio banka has received more positive reviews than negative ones, some VCBs have reported in the form that Fio banka has closed their account. However Moonbanking also has Fio banka rated overwhelmingly crypto friendly, so overall I think it is safe to claim that Fio banka belongs to the three crypto friendly banks in Czech Republic with Moneta bank and Equabank, that have also received positive reviews. (Moonbanking, 2020) (Bok, 2020)

4.2 The status of banking VCBs

I have contacted a middle-sized bank in the Czech Republic and conducted an interview with the staff to get insight on the bank's decision process from the inside. The main issues they had with banking VCBs was the risk of getting in conflict with state run third parties as well as the technical investment needed in order to comply with the Czech legislation. (Skalicky & Demko, 2020) The specific paragraph causing the technical difficulties is the § 41f from the banking law (Ministry of Finance of the Czech Republic, 2020). The main technical issue is that most accounts of VCBs own funds of multiple people or even companies, becoming so called "*vklad se zvláštním režimem*" or special scheme depositary in English. This obliges banks to identify the real owners of the assets in the VCB account. Thus, not only do the banks always have to identify the beneficiary but also should the banks fail to fulfill these obligations, they become

liable for any damages that would incur, should the National Bank notify the Financial Market Guarantee System about the banks' inability to meet their obligations to the beneficiaries under legal and contractual terms and conditions, at which point the actual owners of funds in the escrow accounts cannot be properly identified. This puts pressure on VCBs in Czech Republic to manage their customers carefully as well as on banks. (Skalicky & Demko, 2020) From the bank's perspective it is possible to overcome this technical difficulty, although it is not cheap for the bank to adapt to working with companies serving cryptocurrencies. Some larger banks in the Czech Republic have already managed this to some extent. Unicredit bank for example is using a special form in BusinessNet Professional - an internet banking module as a solution. Unicredit also gives only 3 days to its clients from receipt of any funds to identify the actual owners. (Šupík, 2018)

In order to find out about the risk of intervention from third parties in the Czech republic, I have contacted the Financial Analytical Unit (FAU) of the Czech Republic and was provided with internal statistics on the money laundering (ML) or financing of terrorism (FT) crime rate connected with the use of virtual currencies in the Czech Republic. In the year 2017 the FAU has encountered 120 cases of ML/FT illicit use of virtual currencies. In the year 2018 the amount of reported cases increased by 8 to 128. In the year 2018 the total amount of ML/FT cases the FAU dealt with was 3455. The Virtual currencies cases made "only" 3,7% of the total number. Out of those 128 cases in the year 2018, 59 were proven to be illicit giving the examined cases illicit rate of 46%. What is interesting is that 25 of these confirmed cases were traced to scamming e-shops and fraudulent bazaars, while initial coin offerings, something very specific to the crypto world, made up only 5 of the cases. CEO scams and unspecified scams made 5 times as much with 25 cases. In 2017, there were 60 cases of criminal charges being brought upon the sources of the criminal activity. In 2018 the amount of criminal charges increased more than 5 times to 395 cases. The assumption of the FAU is that the increase happened due to the process of legalization of virtual currencies in the Czech Republic. The most important number, however, is how many of the suspected illicit cases were reported by VCBs or other obliged entities which deal with cryptocurrencies themselves. This happened only in 7 cases so far. This does not reflect the optimal situation at all with regards to another Czech legislation of *law n. 253/2008* (Parlament of Czech republic, 2008). that makes it illegal to not report on this. This situation has two possible explanations. Either the VCBs and obliged entities are not capable of detecting and reporting the illicit cases themselves or they are letting them slip by. (Plecitý, 2020) Both of these options do not paint a pretty picture for VCBs in the

Czech Republic. It gives Czech banks a legitimate reason to be worried. If they were relying on VCBs to filter out their customers correctly and to report any suspicious activity they would be exposing themselves to a considerable amount of risk.

Another important issue is the fear of regulators. Once a bank would openly declares itself for VCBs and starts to attract them, the regulators become interested in the bank, which combined with the risk VCBs pose, could have negative consequences for the bank. (Skalicky & Demko, 2020)

(Skalický & Demko) denied the notion that the avoidance their bank has towards most of the VCBs has something to do with the potential rivalry crypto currencies could pose to the bank they are representing or to the banking sector. Although ever increasing, the volume of transactions is just not big enough to pose any real danger. The volume of Bitcoin transactions around the world is roughly the same as the one of PayPal, a worldwide online payment system. Even together with other cryptocurrencies the volume is far too small to suggest any nearing revolution and replacement of fiat. (Thomas, 2020)

The most important part when it comes to bank's decision making is the market size. There are no studies conducted that deal with the size of the VCB market in the Czech Republic and the government of the Czech Republic has no special classification for VCBs under CZ-NACE (codes for classification of economic activities) and so most of VCBs use the CZ-NACE code 00, that is unspecified activities. (Ministry of Finance of the Czech Republic, 2020). This makes any calculation of the VCB's market size in the Czech Republic hard and one can only assume its real size until some proper study will be conducted on the topic. There are however clues that suggest the VCB market could be a larger one in the Czech Republic when compared with other countries. Prague has been rated by Forbes as the most crypto friendly city in the year 2018 (Talty, 2018). Prague and the Czech Republic are also home to many businesses, which accept virtual currencies as payment. (Coinmap.org, 2020) This proves not only the large amount of virtual currency users and the existence of good infrastructure, but the general interest of the local population in cryptocurrencies too. From this point of view the Czech Republic seems like an almost perfect environment for VCBs to thrive in.

There was a recent study made by IPlytics in April of 2019, focusing on some countries and the amount of blockchain-related companies there. This can be used to estimate the amount of blockchain based companies in the Czech Republic compared to other countries.

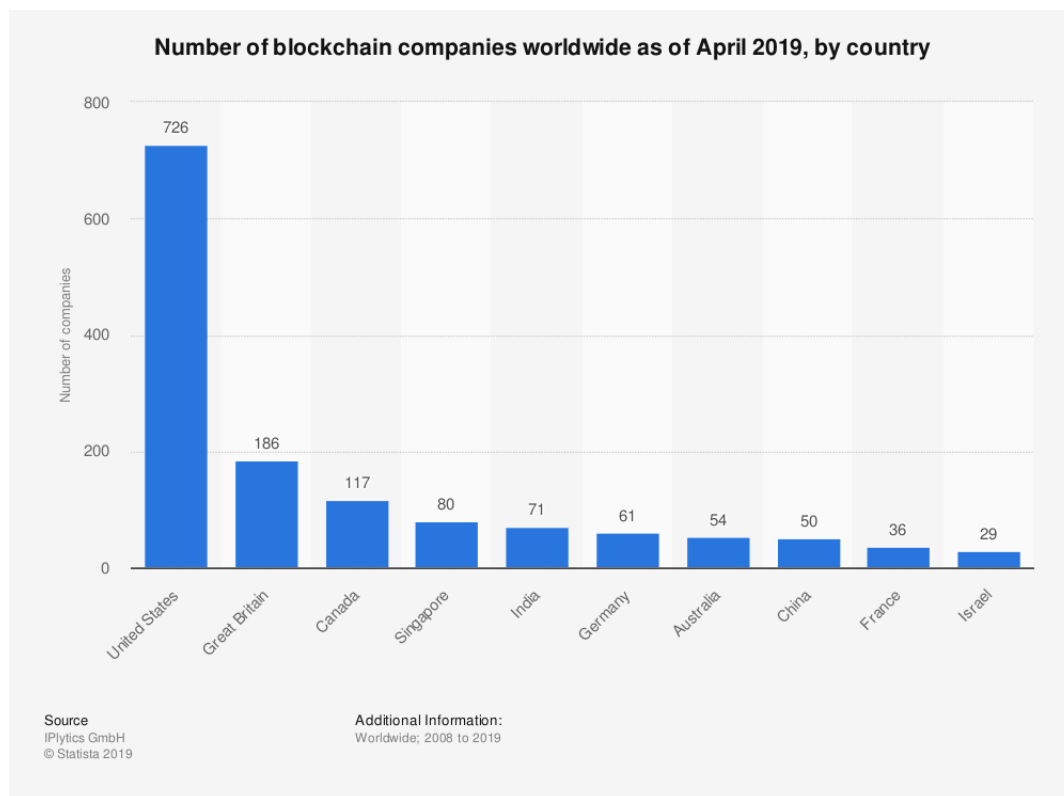


Figure 14 - Blockchain-related companies as to the country founded, source: IPlytics

Although directly searching in the database of businesses (Ministry of Justice of Czech Republic, 2020) for VCBs is impossible due to no CZ-NACE code being assigned to them, I have tried to bypass this by using the most common tags in the industry in both Czech and English (Bitcoin, BTC, XBT, Altcoin, kryptoměny, cryptocurrency, krypto, crypto, blockchain etc.) in order to filter out potential VCBs by their names, and after that I have gone through the findings manually. With this approach I have found around 100 companies. Of course, this method is highly unreliable as the name of the company does not have to suggest its operations so many could have been missed. The amount of companies I was able to find like this surprised me and suggests a higher amount of VCBs in the Czech Republic. Combining these small clues about the state of crypto and VCBs in Europe and in the Czech Republic, I think it's safe to say that there are at least 100 VCBs operating in the Czech Republic but probably even more. Yet the real amount of active VCBs cannot be determined unless a proper research is conducted in the Czech Republic or an update of the NACE codes happens.

On the next figure the rapid growth of market capitalization of cryptocurrencies from 2013 to 2019 can be seen. Even if we were to ignore the boom of 2017, the increase during this seven-

year period has been rapid and signals that cryptocurrencies were not a year-long fluke and that VCBs will accompany this interest in virtual currencies.

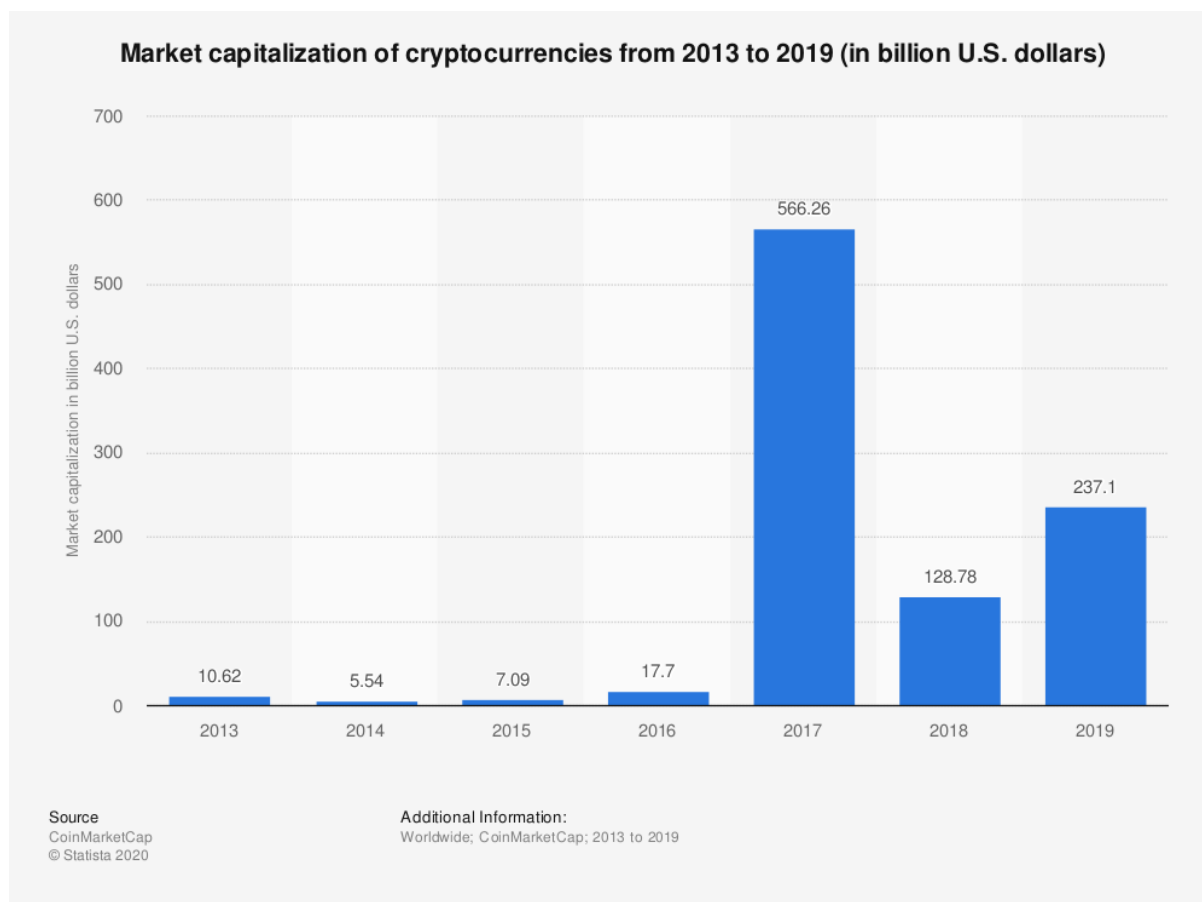


Figure 15- Market capitalization of cryptocurrencies from 2013 to 2019, source: CoinMarketCap

The same goes for the worldwide spending on blockchain solutions. The following figure shows the predicted growth for the industry. This expected growth is also likely to create space on the market for more VCBs. Some of this growth will affect the Czech Republic as well, and so it can be safely assumed that the amount of VCBs in the Czech Republic will increase in the following years.

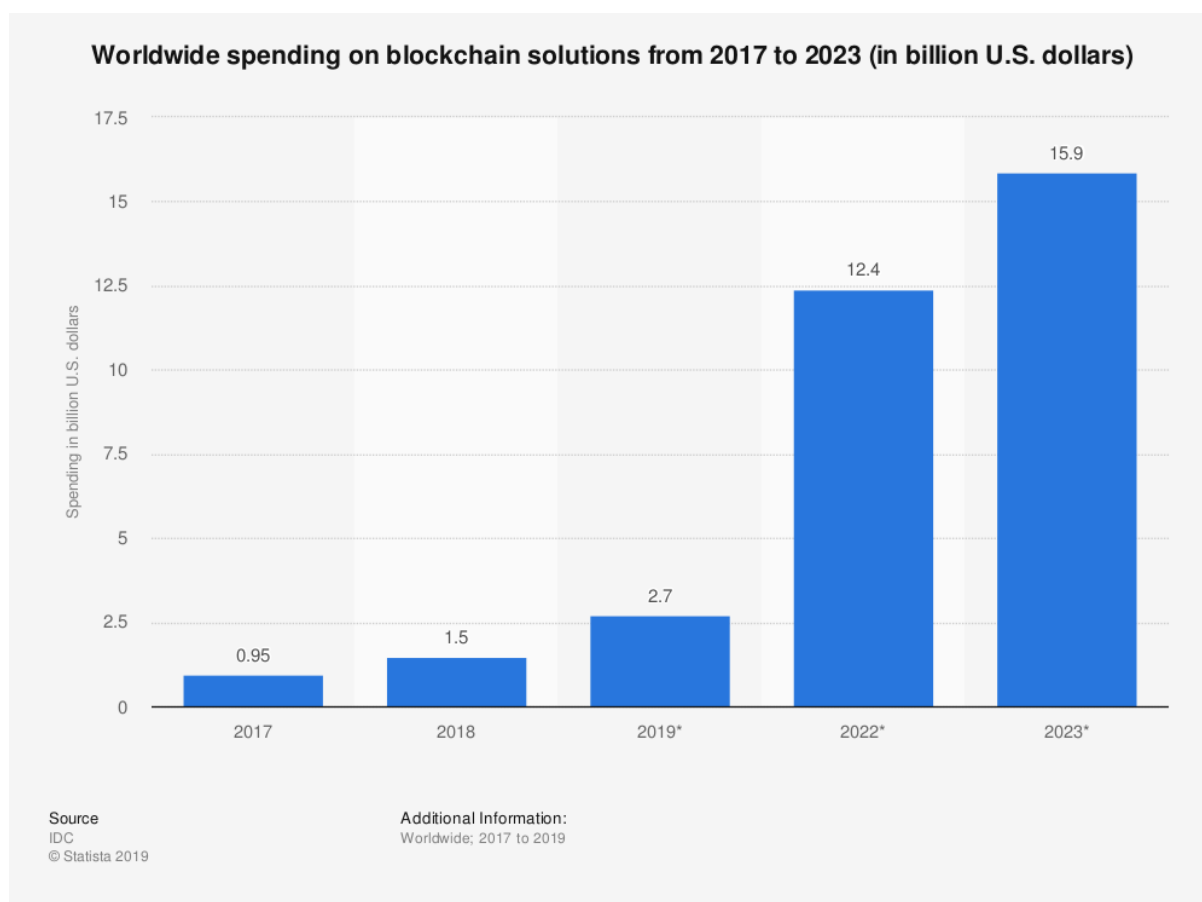


Figure 16 - Worldwide spending on blockchain solutions from 2017 to 2023, source: IDC

Given the above information we have about the situation in the Czech Republic, is it possible for a bank to develop a competitive advantage over the other banks by opening themselves to the VCB sector? The empirical answer is yes, as three major banks in the Czech Republic seemed to have already separated themselves from the rest and are willing to accept VCBs more than other banks.

4.3 Model situation of the Czech Republic

To support conclusion of the empirical evidences we can attempt to apply the model from the previous chapter to the Czech market. In order to apply the model from chapter three to the market of the Czech Republic and correctly use the findings from this chapter, the model had to be altered slightly. To account for market of 24 banks the payoff matrix calculations needed to change. Let's assume that in the Czech market there are three Smart Banks and 21 Blind Banks. Let's also assume that should all the banks bank VCBs then the three Smart Banks will

be able to attract 60% of all the VCBs in the market and the rest (40%) is divided equally between the Blind Banks. The payoffs can be arranged in a payoff matrix:

Actions:	Bank VCBs		Do not bank VCBs	
Bank VCBs	$g\left(i_f, \frac{0,6}{3}N\right)$	$h\left(\frac{0,4N}{21}\right)$	$g\left(i_f, \frac{N}{3}\right)$	0
Do not bank VCBs	$-I$	$h\left(\frac{N}{21}\right)$	$-I$	0

Table 6 - payoff matrix for model situation of Czech Republic, source: excel calculations

From the data presented in this chapter I have created the following parameters for the model situation. I am assuming that each of the Smart Banks will need to pay an extra average monthly salary (36000 CZK) for a new employee to reduce the risk for the duration of the year. (Česká Televize (CT24), 2020) The initial cost for the market analysis equals to that of one month salary. The VCB maintenance fee is the biggest “guess” out of all the following parameters. I have assumed that the maintenance cost of internet banking module like the Unicredit uses isn’t high. The initial buying cost of such module is however not accounted for in any way in this model but can play a major role as suggested in this chapter. Most of the bank’s income comes from investing the money (borrowing it) from the accounts opened with them. Let us assume each of the VCBs, which are mostly smaller companies, can earn the bank 3000 CZK monthly (36000 CZK yearly) (Czech National Bank, 2001). The biggest issues the banks have with VCBs is the risk of getting involved in an FAU investigation. During the last years, the amount of cases of money laundering connected to VCBs in the Czech Republic made only 3,7% of all the investigations done by the FAU, suggesting there are much more common and popular ways of money laundering than through cryptocurrencies. However, the FAU also concluded that 46% of the relevant cases it investigated were confirmed to be illicit and thus 46% will be used in this model. Nevertheless it is important to mention that many of these were caused by businesses that would probably not fit our VCBs definition.

The state factor	0,9
Market analysis investment	36000 CZK
VCB maintenance fee	6000 CZK
Average VCB gain	36000 CZK
Risk factor	0,46
Amount of VCBs on the market	125
Investment into filtering of fraudulent VCBs	432000 CZK

Table 7- parameter set for model situation of the Czech Republic

	Bank VCBs		Do not bank VCBs	
Bank VCBs	5700	27371,42857	321500	0
Do not bank VCBs	-36000	68428,57143	-36000	0

Table 8 - payoff matrix for model situation of Czech Republic, source: excel calculations

Under such parameters, the results are positive. The results, however, quickly become worse should any of the “positive” parameters like the gain from each VCB or the number of VCBs change. So these need to be taken with a grain of salt. The expected value is calculated the same way as in the previous chapter.

- Expected value for Smart Bank if it does not bank: -36 000 CZK
- Expected value for Smart bank if it banks: 37 280 CZK
- Expected value for Blind Bank if Smart Bank does not bank: 61 585 CZK
- Expected value for Blind Bank if Smart Bank banks: 24 635 CZK

After one year, the Smart Bank is expected to gain 37 280 CZK and the Blind Bank is expected to end up with a gain of 24 634 CZK. The following figure shows how the situation would differ with increasing risk. The figure might seem surprising at first, however due to higher competitiveness with three Smart Banks and 21 Blind Banks the cost for reducing the risk won't show its value here. One cannot forget that the model does not reflect in any way on the indirect risks and costs that may rise from assisting FAU investigation etc.

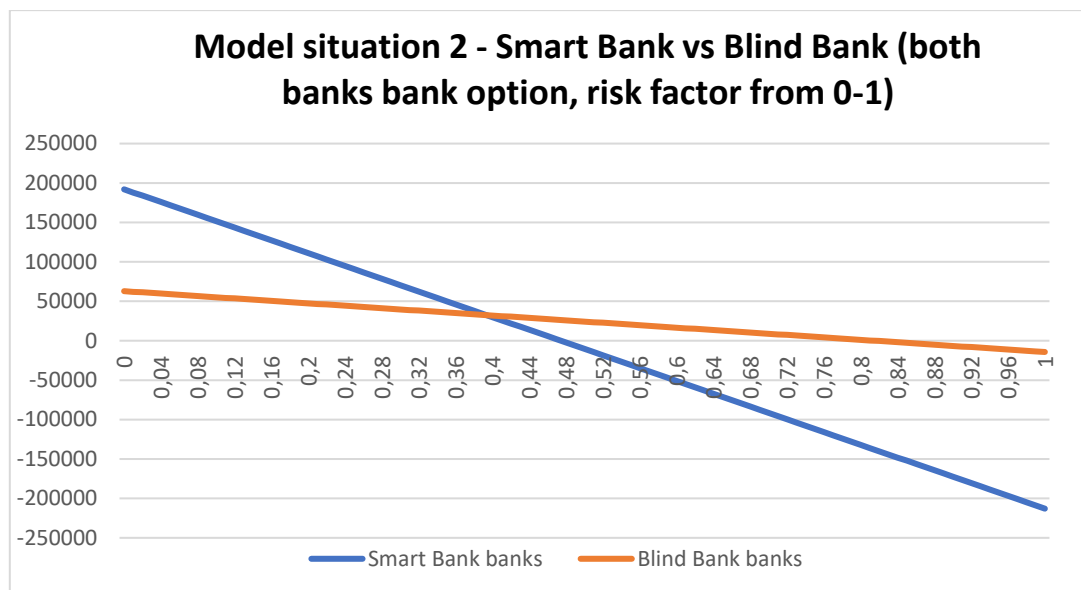


Figure 17-Smart Bank vs Blind Bank for model situation of the Czech Republic, source: excel calculation

The model suggests it is better for most of Czech banks to avoid VCBs altogether as accepting them blindly and unselectively is the riskiest option offering small gain only, as is the option of paying extra expenses for a small portion of an already small market. Most of the VCBs in the Czech Republic have already found their banking partner and without investing into some marketing campaign it's unlikely they would leave for a new bank. For the three banks, that offer their services to VCBs right today and can be consider crypto friendly, I do believe there is a small competitive advantage.

Conclusion

The goal of this thesis was to identify the issues the banks around the world have with providing their services to VCBs and to find out if any bank could potentially gain a competitive advantage by focusing on these customers.

After examining the situation in the world's three major crypto regions that are Europe, USA and southeast Asia the findings suggest that the banking sector is mostly avoidant of any VCB clients. This is mostly due to risk of VCBs being investigated by state controlled third parties for money laundering and other illicit activities, which may endanger the bank during the process of investigation. The other reappearing issue for all the banks around the world is following the different but similar know-your-customer rules, which require banks to have detailed information about their customers and where they get their money from, which is often a point of conflict with companies using virtual currencies with anonymous clients all around the world. Although there were signs of antipathy, especially from the U.S. banks, nothing suggests it is playing any major role in the avoidance. The comparison between the cannabis industry and VCBs has suggested that with time and more stable legislation and steady growth in the specific market, the banks are willing to change their views and push for a change as they have done in the U.S with cannabis industry recently.

Recent research on the amount of illicit activities done through cryptocurrencies has shown the percentage to be extremely low with only 1,1% of all total cryptocurrency activity around the world being illicit for the year 2019, proving older methods of money laundering or terrorist financing more popular. This is a fact most likely unknown to most of the banks who consider all the VCBs high-risk customers.

The issue pointed out in 2016 by (Pratin, David, & Andrew, 2016) of banks being unaware of major differences between the different VCBs continues to harm the both the VCB industry as well as the banks, who miss out on potential clients who pose no risk whatsoever like some blockchain solution companies. On the other hand the most risky VCBs are the exchanges, due to the nature of what they do and can easily and unknowingly allow for illicit transactions to occur.

If and how much a bank would prosper from the VCB sector has been answered in both the theoretical and practical part. The game theory model attempted to answer the question using all the factors we know affect the situation in the real world and in a simplified way showcases

the possible outcomes between two different banks with different priorities and tactics sharing one VCB market. Results of this method rely entirely on the entered parameters, however in most of the cases the Smart Bank that invested in the VCB market research ended up with better outcome than the Blind Bank that made its decision based on the state's general attitude towards VCBs.

In the Czech Republic, which was the focus of the practical part, most of the smaller VCB market seems to have distributed itself among three medium sized banks, who unlike other 21 banks in the Czech Republic did not deny them. As these three banks continue to provide the VCB customers with their services suggests that there is incentive to keep them in a form of some small competitive advantage.

What seems to be the worst option for any bank around the world is to ignore the VCB situation altogether and accept VCBs blindly, because they will most likely open account for the most risky VCBs, that were denied by other banks, who did their research on the subject.

Overall, the situation for the VCBs around the world is far from perfect and being denied banking services is one of the major issues holding the industry back. The idea most of the crypto community has of banks deciding for this scrutiny out of some fear of being overthrown in the future is also incorrect. Most of the decisions just comes down to the risk assessment team in the bank following the common misconception about cryptocurrencies being a new major tool for money laundering and risky business altogether. I do believe that should the VCB sector grow, the banks will open themselves up to it.

The one singular recommendation I would have for the entire banking sector is to conduct at least some minimal amount of research on the topic to debunk the biggest misconceptions about the VCBs, like the risk they pose and that they are all the same in concept.

For the VCBs which deal with cryptocurrencies, I would recommend stricter customer checks as they are the first who should report any suspicious activities, not the banks. Unfortunately, as the statistic from the Czech Republic pointed out, this is not happening. I would also recommend not working with controversial cryptocurrencies like Tether, that seem to be favored by the criminal entities.

I have faced many limitations in this thesis in the form of finding primary sources, as the topic is not well explored and there are many holes to be filled in by future research. To counter this lack of literature and data points I have done multiple interviews and was lucky enough to meet

people willing to assist with my research in the public sphere, the banking sector and among the VCBs.

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