

**Cryptocurrencies:
New Opportunities for Postal Financial Services**

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1 Introduction

In today's world, it would be unthinkable to exchange goods without using a currency as a common value. Over the course of history, there have been two basic ways – commodity money and fiat money – to introduce a currency as a tool of exchange. While a rare commodity (e.g. gold) may be used as commodity money, fiat money is issued by a government or some other central authority. In recent years, a third form of currency has emerged with a completely different design: virtual currencies or cryptocurrencies (e.g. Bitcoin), which are issued by the network of their users.

Contrary to traditional currencies, cryptocurrencies neither have physical form nor are they guaranteed or backed by any central authority. They simply attain value by usage and the confidence of those participating in the respective system. A crypto-payment-system is a technology which allows for payments between individuals digitally without relying on central institutions, intermediaries or further infrastructure as required for conventional payment systems. Besides Bitcoin, there are over 200 further cryptocurrencies that are essentially copying the Bitcoin protocol with some minor changes or improvements. While their legitimacy as currencies has been questioned due to their high exchange rate volatility, the significant potential of the Bitcoin technology as a payment system is undeniable.

The emergence of the Bitcoin technology and its popularity have been driven by an increasing lack of trust in traditional financial institutions due to the global financial crisis of 2007–2008, the trend towards a cashless society, and the economic power of digital natives who are familiar with the virtual world. By providing payment solutions, which were specifically developed for use in the Internet, cryptocurrencies and crypto-payment-systems complement the boom in e-commerce and the increasing prevalence of mobile devices and mobile payments. Besides, they allow borderless global payments at low cost and thereby encourage global trade.

As postal operators typically have a role as financial intermediaries and act in an international and increasingly digital environment, crypto-payment-systems may be of particular interest to them. In fact, as the post has a wide network of access points and is highly trusted by the general public, it may be well-suited to offer services which counter some disadvantages of crypto-payment systems and cryptocurrencies, while retaining the benefits of their technology. By turning to crypto-payment-systems postal operators may extend their role as a financial intermediary with new domestic and international services. Furthermore, postal operators may even issue their own cryptocurrency to protect customers from the high exchange-rate volatility of cryptocurrencies.

We proceed as follows. Section 2 presents a brief characterization of crypto-payment-systems and cryptocurrencies. Also, an overview of government regulation is provided with focus on the United States. Furthermore, several opportunities and challenges for individuals and companies related to cryptocurrencies are presented. In Section 3 it is argued that postal operators could benefit from including crypto-payment-systems in their business model. In Section 4 the idea of *Postcoin*, a novel concept for a postal cryptocurrency, is presented. Finally, a conclusion is offered in Section 5.

2 Crypto-payment-systems and cryptocurrencies

Crypto-payment-systems derive their name from cryptography (the science of secret writing with the goal of hiding the meaning of a message), which is used as a means of securing transactions and accounts. The currencies that are momentarily used in such payment systems are called cryptocurrencies, the most prominent example of which is Bitcoin. Arguably the most innovative features of crypto-payment-systems is the so-called blockchain. It is a shared public ledger and combines two ideas. First, defining each coin of a corresponding currency as a chain of transactions makes it possible to solve the problem of double spending, because ownership is defined as having received a coin in the past. In contrast, simple possession of a code would not be suitable, because each code can be duplicated. Second, by using a democratic validation mechanism like proof of work (“mining”), there is only one accepted transaction history. Mining is the process of adding transaction records (e.g. transferred quantity of currency, public addresses involved, time of transaction) to the blockchain. Miners pick up these transaction records and generate a block by performing cryptographic functions. In the case of Bitcoin, miners get awarded with new bitcoins in return. As all users of the network agree on every legitimate transaction in the past, it is uncontroversial who owns a specific currency unit. Essentially, a decentralized register determines the number of currency units belonging to the person who is able to prove that he is entitled to spend them.

2.1 Characteristics

The use of modern cryptography enables decentralization in payment, i.e. the transfer of currency units between individuals without intermediaries. In crypto-payment-systems there is no single institution or point of access which conducts transactions. Instead, transactions are validated democratically by group effort. Crypto-payment-systems are thus completely decentralized. This has two major implications:

1. Crypto-payment-systems enable peer-to-peer transactions, i.e. two individuals can exchange value without relying on a third party. This is a major difference to existing payment solutions, as no financial intermediary is required for a transaction. In comparison, for a bank transfer two banks need to exchange money on behalf of their customers. They charge a fee for each transaction, which can make payment expensive. Moreover, allowing an institution to transfer money the transacting parties do not only give away private information related to the transaction, but also give it access to their funds – and possibly ensuing theft – as well as to personal data. However, using a crypto-payment-system – without any intermediary – transaction costs are low, while no access to funds or personal information is given away to any third party.
2. Crypto-payment-systems do not exhibit any central point of access for governmental interference or law enforcement. For instance, it is difficult for authorities to seize money holdings in cryptocurrencies. While a government may freeze bank accounts, it cannot do so with crypto-payment-systems. Governments can only indirectly interfere with cryptocurrencies via currency exchanges and corresponding regulation.

An important implication, which follows from a decentralized ledger, is the irreversibility of transactions. Once a payment is issued, it cannot be reversed. The only way to

recover the claim is by asking the receiver to pay back the same amount in a new transaction. The irreversibility follows from the fact that each transaction is added to the blockchain, which in turn cannot be altered but only extended. Therefore, payment in cryptocurrencies is similar to a cash payment, but does not have to be conducted over-the-counter. However, in contrast to the existing non-cash payment systems such as credit card or bank transfer, the risk of transaction is shifted from receiver to sender via this irreversibility.¹

Another distinguishing property of crypto-payment-systems is the pseudonymity of the transacting parties. When transferring cryptocurrencies, there is no need to disclose any personal information to the public or any third party whatsoever. This substantially reduces the risk of identity theft and fraud common with other forms of payment such as credit cards. Users can act under one or several pseudonyms without any obvious links to their true person. The pseudonymity of cryptocurrencies has given rise to some discussion about illegal usage. This is a valid concern and thus an important topic for regulation.

Moreover, crypto-payment-systems are not bound by any geographical limit whatsoever. Due to the virtual nature of the payment system, it does not matter whether an individual sends cryptocurrencies to a neighbor or to someone on the other side of the world. In contrast, it is often difficult to use traditional payment systems to transact across borders, since the financial intermediaries are bound by country-specific regulation. Crypto-payment-systems transcend state borders: essentially, they form a global payment system instead of several national ones.

Table 1 shows a comparison of crypto-payment-systems with other payment systems.

	Crypto-payment-systems	Cash	Card	Paypal
Quick	✓	✓		
Direct	✓	✓		
Inexpensive	✓	✓		
Irreversible	✓	✓		
Mobile	✓		✓	✓
Confidential	✓	✓		
Location independent	✓		✓	✓

Table 1: Comparison of payment systems

By issuing units of a respective cryptocurrency, the technology of crypto-payment-systems incentivizes users to assist in securing the respective system. Consequently, it is not possible to use such systems for payments without using some currency as possible reward for securisation. Cryptocurrencies are freely exchangeable and may thus act as means of payment, if they are accepted by both parties participating in the respective trade. Exchangeability separates cryptocurrencies from other virtual concepts like frequent flyer miles or Facebook credits which are neither freely tradable between people, nor can they be exchanged against services outside the issuing company.

A key property of cryptocurrencies, which significantly distinguishes it from traditional currencies, is the lack of a central money issuer. Cryptocurrencies are created in a decentralized process without any authority controlling the distribution of new units. Hence,

¹ Cf. Jaag and Bach (2015) for a microeconomic analysis of the irreversibility characteristics of cryptocurrencies.

there also exists no institution, which could actively conduct monetary policy in the system. Consequently, cryptocurrencies are also not backed by any assets that central banks usually dispose of.

Table 2 compares different digital currencies and the U.S. Dollar as an example for a traditional currency.

	Crypto-currencies	Facebook credits	Game-based currencies	U.S. Dollar
Exchangeable	✓		(✓)	✓
Own Denomination	✓	✓	✓	✓
Non-physical	✓	✓	✓	
Central money issuer		✓	✓	✓

Table 2: Comparison of currencies

A major disadvantage of cryptocurrencies is their high volatility, mainly due to their design excluding any centralized money control but admitting free exchangeability. The fact that cryptocurrencies are a new phenomenon accompanied by much uncertainty and speculation also plays a role. It is likely that they will stabilize with higher adoption and greater liquidity. For instance, the Bitcoin exchange rate against the USD plunged about 35 percent in December 2012 after rumors had come up that Chinese regulators were to ban cryptocurrencies in their country (see Bloomberg, 2014a). However, users do not necessarily need to bear the exchange rate fluctuation of cryptocurrencies. They can protect themselves from such risk by using service providers that convert cryptocurrencies into traditional currencies instantly. For instance, merchants who accept cryptocurrencies from their customers can immediately exchange them to a traditional currency. Thereby, these merchants benefit from crypto-payment-systems without being exposed to the volatility of corresponding cryptocurrencies.

2.2 Regulation

Crypto-payment-systems and cryptocurrencies are hard to regulate for governments. First, due to their decentralized nature there is no central point of access. Second, crypto-payment-systems allow for international money transmission without any concern for national borders. Therefore, regulation would need to be coordinated across countries.

Nevertheless, transactions in crypto-payment-systems can be regulated to some extent. On the one hand, rules may be imposed on individuals dealing with cryptocurrencies. Such measures include taxation of cryptocurrency transactions up to prohibition of usage. On the other hand, institutions and companies offering services related to crypto-payment-systems can be subjected to regulation, as they provide central access points. For instance, currency exchanges, which present a gateway between traditional currencies and cryptocurrencies, can be forced to abide by government regulation such as anti-money-laundering law.

For instance, in the United States, the Financial Crimes Enforcement Network (FinCEN) has issued a first guidance relating to the regulation of money service businesses in March 2013 (see FinCEN, 2013). Different rules apply to users and exchanges. Users, i.e. individuals who use cryptocurrencies to purchase or sell goods, do not fall under Fin-

CEN's regulation. In contrast, cryptocurrency exchanges are considered to be money service businesses and therefore need to comply with FinCEN regulation. This regulation entails anti-money-laundering law. Subsequent to this first guidance, FinCEN (2014a, 2014b) has provided additional clarification for services related to cryptocurrencies: miners and software providers do not fall under its regulation.

2.3 Opportunities

Cryptocurrencies, such as Bitcoin, dispose of innovative features either as a currency, payment system or, more generally, as a technology. With their unique characteristics, they bear the potential to substantially influence the existing financial system. Several opportunities could unfold for individuals, businesses and the economy as a whole.

A main advantage of crypto-payment-systems for companies is the resulting independence of traditional financial intermediaries such as credit card companies or traditional money transmitters. By substituting traditional payment methods by cryptocurrencies, it is in fact possible to decrease transaction fees and therefore reduce the costs from non-cash payments. This especially applies to online businesses. Furthermore, crypto-payment-systems provide a quick low-cost way for sending money directly from person to person around the world. For example, with traditional remittance services, emigrant workers pay an average of 12 percent in fees to transfer money back to relatives in Sub-Saharan Africa. A worker sending USD 200 home to provide for a relative's education would incur an additional cost of USD 24 (see Watkins and Quattri, 2014).

The combination of low transaction costs with fast, easy usage can provide new methods of revenue schemes based on microtransactions. For instance, with cryptocurrencies it becomes possible to add a tipping system to online services such as blogs or to crowd-funded projects. More generally, there is a wide field of microtransaction systems which could enable new innovations and which could be financed by the community of users. Previously, small transactions have not been worthwhile, whenever the transaction costs outweighed the benefits or even the value of the transactions itself.

For individuals and companies it can be advantageous, that transactions with cryptocurrencies are irreversible. For instance, payments by credit cards can be reversed after the purchase. Online merchants are thus exposed to the risk that customers reverse their payments after the respective order has already been shipped. In fact, payment irreversibility may strengthen e-commerce by reducing its overall risk, if merchants have more reputation to lose than customers (see Jaag and Bach, 2015).

Another advantage of cryptocurrencies is the protocol's open source. Every individual can thus work on its structure and it is easy to add improvements as well as extensions to the system. Therefore, the innovation potential is basically unlimited. Indeed, a rich system of services related to cryptocurrencies has emerged in the past few years.

Cryptocurrencies also offer an alternative store of value for countries with unstable currencies. For instance, in high-inflation countries, it may be beneficial to hold cryptocurrencies as assets in addition to national currency. Moreover, cryptocurrencies do not fall under the authority of government, and can thus not be devaluated or held back for fiscal or other purposes. A recent example is Argentina where the government devaluated the domestic currency to counter the country's trade deficit (see Coindesk, 2014).

2.4 Challenges

In spite of several opportunities and a substantial innovation potential, quite some challenges associated with the nature and the use of crypto-payment-systems remain.

One major challenge is the desire of potential users to understand crypto-payment-systems. Even though most of them do not understand the traditional financial system either, individuals and merchants who do not comprehend the mechanics of the underlying technology may hesitate to enter the crypto-currency system due to a lack of trust in the system. Ignorance about crypto-payment-systems is still rather widespread. For instance, according to a survey by The Street (2014), three fourth of the questioned persons in the United States indicated that they are not familiar with Bitcoin at all.

Regulatory uncertainty severely restricts widespread adoption of cryptocurrencies, too. Indeed, lack of clear governmental guidance represents one of the main challenges for cryptocurrencies at the moment. Generally, regulation in the financial sector usually demands high compliance and risk management efforts from financial intermediaries. Regulatory uncertainty is thus especially problematic, because handling cryptocurrencies may result in the involuntary provision of financial services, which are subject to government regulation of financial intermediaries. New businesses acting in the uncharted territory of cryptocurrencies are hence exposed to the risk of being prosecuted. As a recent example, the CEO of BitInstant, a Bitcoin payment processor, was arrested and charged with money laundering related to the online exchange Silk Road (see Forbes, 2014).

Security concerns about handling and storing cryptocurrencies are another major challenge. Adversaries may gain access to a user's wallet and steal his cryptocurrency units. This can be particularly dangerous for inexperienced computer users. Currency exchanges and companies that store cryptocurrency for their customers are vulnerable, too. If such companies are attacked, users may lose all money on their account. The most prominent example of crypto-currency theft happened to the exchange platform Mt. Gox, which lost the equivalent of approximately USD 365 billion in Bitcoin (see Bloomberg, 2014b). Following this incident, Mt. Gox declared bankruptcy and it is likely that users will not be able to reclaim their assets.

Limited availability of cryptocurrency as well as the lack of trusted exchanges pose further problems for adoption. Currently, access to cryptocurrencies is only provided by online exchanges or personal trade. Exchange platforms are mostly new start-up firms with little reputation and no representation in the real world. However, people not familiar with online services would prefer to exchange currencies over the counter. The introduction of cryptocurrency teller machines provides a partial solution, but it will take some time for their reach to be at a satisfactory level.

Finally, high exchange rate volatility also poses an issue for cryptocurrencies. Merchants may not be willing to bear price fluctuation risks, which could adversely affect the value of sales. A current solution involves the instant exchange of the received units of cryptocurrency to USD. But some administrative burden and additional fees do then occur. Note that high volatility may only be a temporary property for cryptocurrencies. As more companies and customers adopt them, cryptocurrencies are likely to gain in stability as a currency. Besides, a substantial part of the current fluctuations are due to regula-

tory and market uncertainties – both of which will decrease as regulatory guidance becomes clearer.

The challenges of cryptocurrencies can be summarized as follows. A lack of trusted and established institutions in the realm of crypto-payment-systems unleashes a feeling of risk and necessitates a high degree of personal responsibility, which users are not used to in conventional payment systems. These key challenges could be tackled by trusted firms, which offer cryptocurrency related assistance and services.

Table 3 provides a short overview of the discussed opportunities and challenges of cryptocurrencies and crypto-payment-systems.

Opportunities	Challenges
<ul style="list-style-type: none"> • Easy-to-use • Privacy • Low transaction fees • Microtransactions • Irreversibility • Alternative store of value 	<ul style="list-style-type: none"> • Limited Availability • Security in usage • Reliable institutions • Regulatory uncertainty • Limited prevalence • Exchange rate volatility

Table 3: Opportunities and challenges of cryptocurrencies and crypto-payment-systems

3 Potential roles for postal operators

Many postal operators face legal universal service obligations, requiring them – among other things – to provide access to postal offices within reasonable distance. Actually, in 2013, with 663'210 post offices globally, the network of postal outlets was the densest network of branches in the world (see Universal Postal Union, 2014). There currently exist two major challenges for traditional postal operators: Indirect competition from electronic substitutes in the letter segment and direct competition in the parcel segment.

The first challenge results from the increasing use of email and other Internet based services for communication purposes. Since the end of the 1990s, physical mail volumes have declined in most industrialized countries. There seems to be no foreseeable end to this trend and the decrease will strongly affect the development of postal markets in the future. Indeed, between 2006 and 2010 domestic and international letter-post traffics have decreased by 3.5% and 13%, respectively, while the average number of letters posted per capita in the year 2012 reached a record low of 49.3 world average. In contrast, the number of Internet users more than doubled during the last 5 years. In 2012, over 35% of the world population used the Internet and approximately 65 e-mails were daily sent per email user. Consequently, posts face the challenge of operating dense networks of branches, being able to serve the population in proximity, while suffering from a decreasing letter demand.

The second challenge concerns the continuously growing sector of e-commerce. In fact, over the last decade, e-commerce has fundamentally changed the retail sector, helping companies to expand into new markets and to engage more efficiently with customers. From the perspective of postal operators, e-commerce constitutes a unique opportunity and a rare growth area. Indeed, the global domestic postal parcel traffic has doubled during the last 20 years. Undoubtedly the sustained increase in e-commerce activity constitutes a positive development for postal operators. However, liberalization of the

parcel segment has attracted considerable competition. Posts need to carefully evaluate, how to position and differentiate themselves in the parcel market for e-commerce. In particular, cross-border delivery has to be addressed, which still poses a major obstacle to international e-commerce.

There seems to be a well-suited match between cryptocurrencies resp. crypto-payment-systems and posts in view of the above mentioned challenges (see Jaag and Bach, 2013). On the one hand, cryptocurrencies and crypto-payment-systems are still lacking a physical interface that is easily as well as generally accessible to the public, while on the other hand postal operators dispose of nation-wide networks of branches with declining usage in their traditional core business. A natural opportunity thus seems to have evolved: Posts could employ their network as a bridge between traditional currencies and the virtual world of cryptocurrencies by offering local exchange and transaction services. Also, the technology of crypto-payment-systems could be used to innovate and advance existing financial services. Some domestic and international opportunities for postal operators that might ensue from an implementation of cryptocurrencies into their business model are now presented.

3.1 Domestic opportunities

Cryptocurrencies and crypto-payment-systems could extend the financial role of postal operators by enabling the provision of new services in their respective home markets.

Retail solutions and e-commerce

Cryptocurrencies appear to fit well the global rise of e-commerce. In 2012, sales in e-commerce already topped USD 1 trillion and are expected to rise annually by approximately 15 percent in the next few years (see eMarketer, 2013). On the one hand, this means that electronic payment methods will further gain in importance, as there is a physical separation between merchant and customer. On the other hand, this separation also increases the demand for postal logistic services, as the purchased goods need to be delivered to customers. Since cryptocurrencies, especially Bitcoin, are increasingly used in e-commerce, service provision with regards to cryptocurrencies could attract new customers to the post offices for parcels. In particular, persons owning neither a credit card nor a bank account would thus be enabled to access e-commerce via exchanging traditional currencies for cryptocurrencies. As a single intermediary between merchants and customers providing parcel delivery but also facilitating the financial transaction in e-commerce, postal operators would be able to reduce coordination needs and to offer more efficient e-commerce solutions. Hence, by combining their traditional strength in physical delivery with easy and low-cost payment services, postal operators may facilitate e-commerce and actually contribute to its further growth.

Services for individuals

The Post could also aim towards becoming a leading service point for remittances in cryptocurrencies and corresponding monetary transfers through crypto-payment-systems. Although it is possible for individuals to send, for example, Bitcoin without intermediary, there is still a role for the post as money transmitter. Combined with a postal account, postal operators could provide an interface for their clients to easily send money without having to understand crypto-payment-systems in detail.

The adoption of additional financial services also seems to correlate with the growth strategies of the financial branch in the postal sector. Indeed, postal operators already have considerable financial knowledge, which could be transferred to offer new financial services. Together with their extensive physical network, they are in strong position to not only serve domestic but also international markets.

3.2 International opportunities

As crypto-payment-systems are not limited by national borders, they could provide the infrastructure for commercial and financial transactions on a global scale and serve as a tool for financial inclusion of the poor.

Financial Inclusion

Exclusion from the financial system is an important issue and a major obstacle for participation in global commerce. According to the World Bank (see Lammer, 2014), over 2.5 billion adults in the world do not have a formal bank account. The percentage of so-called *unbanked* people is particularly high in developing countries, where also approximately 200 million smaller enterprises lack access to financial services and credits. Even developed countries, like the United States, are not immune from this issue. For those excluded from the financial system this means that they lack a secure way to save their money or to transfer it to other individuals. On a macro level, this also hinders economic participation and development, as a well-functioning financial system is one of the key enablers for growth.

Figure 1 gives an overview of the financial account penetration by country. Especially developing countries have a low rate of people with access to the financial system.

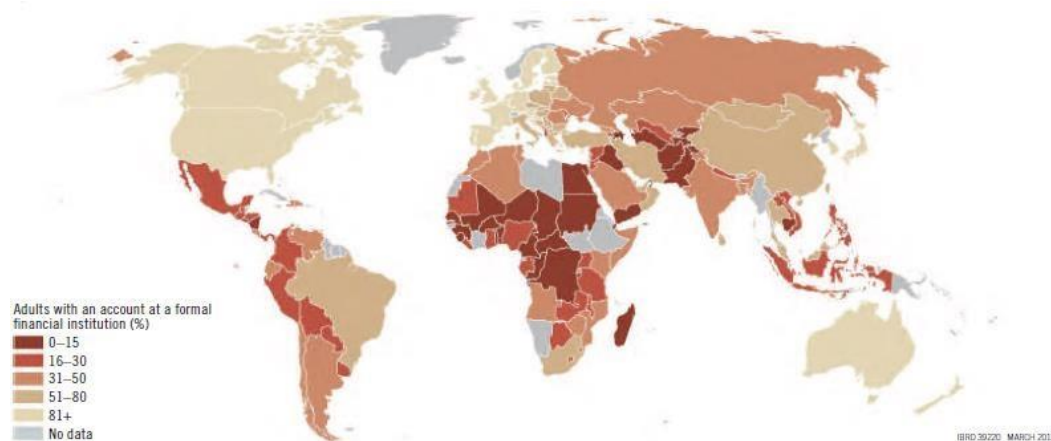


Figure 1: Account penetration around the world (see Deminguc-Kunt and Klapper, 2012)

Postal operators could offer a partial solution to this problem. With their widespread physical presence, which also extends to rural and poor areas, they are well suited to provide a financial gateway for unbanked people incl. financial services. This especially applies to all areas with no bank in near proximity. In fact, about 20 percent of the people without an account state as a reason that banks are too far away to use (see Deminguc-Kunt and Klapper, 2012).

In this regard, the Universal Postal Union (2012) has set financial inclusion as an important objective for postal operators in the coming years. For postal operators there are different business models ranging from a pure cash merchant to a licensed financial ser-

vice provider (see Universal Postal Union, 2013). There is some evidence that postal operators already contribute to financial inclusion to a certain extent: vulnerable groups, such as the poor, less educated, and those out of the labour force, are relatively more likely to use an account from postal operators than from other financial institutions (see Anson et al., 2013).

Cryptocurrencies and crypto-payment-systems could become an important tool for postal operators to further advance financial inclusion. They enable access to the financial system with almost no infrastructure requirements. A single post office would be able to provide various financial services with an internet connection being the only requirement. With this technology posts could provide a savings account, where money could be stored in cryptocurrencies. Individuals without a bank account but a postal outlet in near proximity might particularly benefit from this opportunity. In addition, it would be possible to include a service to use cryptocurrency for payments to other individuals or companies. The fact that the general demand for additional payment methods is high in developing countries, is also reflected by the success of mobile phone payments. In a number of African countries such services have been introduced and are already used by more than 20 percent of all adults (see Lammer, 2014).

International money transfers

Besides offering a secure way to store wealth, cryptocurrencies also allow for efficient international money transaction. This is especially relevant for financial inclusion as remittances are important in developing countries. According to the World Bank (2014), migrants from developing countries have sent back USD 414 billion in earnings to their relatives in 2013. However, sending remittances through traditional channels is very costly, as such a service demands 9 percent of the transaction in fees on average.

With cryptocurrencies, it becomes possible to make international money transfers with only a minor fraction of the transaction fees of existing services. This would particularly help poor people to afford money transfers.

Integration of financial and physical transactions

Besides transmitting value, crypto-payment-systems are potentially capable of adding information and other functionalities to transactions. For instance, payment transaction data has a timestamp through inclusion in the blockchain. This timestamp could be used for reference in a parcel's track-and-trace information. Payment data may also contain shipping information, such that the postal operator and customs are automatically pre-notified of goods to be expedited as soon as a payment hits the blockchain. In essence, crypto-payment-systems allow for a close link between the financial and the non-financial part of commercial transactions, which could unify payment and delivery in a single process.

Hence, the introduction of cryptocurrencies and crypto-payment-systems into postal business does not only enable new financial services by the posts, but it could also influence the logistic process and has the potential of innovating international parcels and mail delivery. Consequently, the Universal Postal Union considers crypto-payment-systems as a potential way to simplify the complex system of international transactions, as they offer the possibility to synchronize financial and physical (logistics) transactions (see Anson, 2014).

4 Postcoin – A postal cryptocurrency

A considerable drawback for cryptocurrencies is their high volatility. Remedy could be provided by fully backing cryptocurrencies with other assets as well as by invoking a trusted party as issuer. Such improvements of cryptocurrencies give rise to the idea of a Postcoin. Postcoins could be issued by a postal operator and they would receive their value from some reserve held by the issuing post. The post would sell each unit of Postcoin for a certain amount of local currency, while holding the equivalent value of a defined unit of another asset or currency (e.g. USD, gold or SDR) as reserve. At the same time it would also guarantee to buy back every Postcoin for local currency at an amount at least equivalent to its value in terms of reserves. Thereby, Postcoins could be injected into the economy via an exchange between the respective post and its customers. Essentially, users could enjoy the benefits of a crypto-payment-system, while the issuing post would guarantee currency stability by backing the Postcoin with a full reserve. The reputation of postal operators constitutes a key factor in this regard.

4.1 Transaction types

The various transaction types in a Postcoin system are shown in Figure 2. The green bar represents transactions in Postcoin, which can be interpreted as a layer on top of another crypto-payment-system illustrated as the grey bar. Three possible transaction types are now discussed in turn.

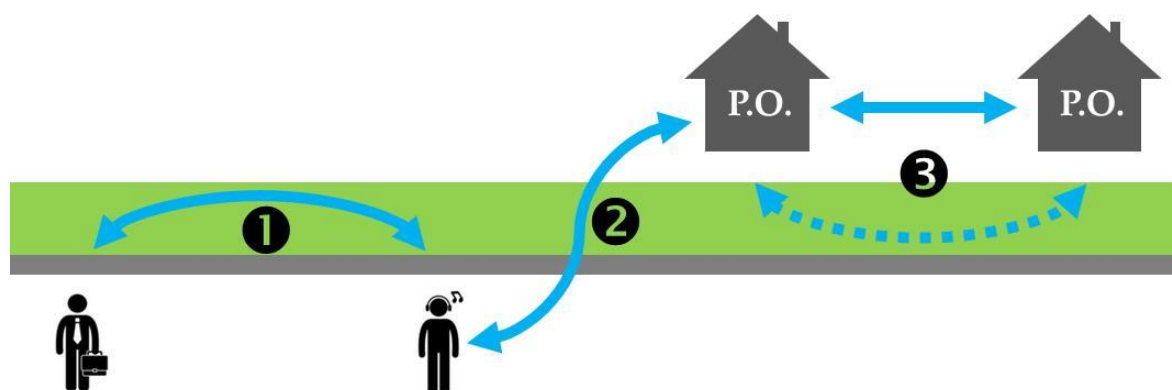


Figure 2: Postcoin transaction types

First, Postcoins could be used to exchange value between two parties without any direct involvement of the post (❶). Transactions in Postcoin would be beneficial to the respective parties by virtue of being digital, peer-to-peer, fast and low-cost. Note that the transacted value would be fixed and hence not vary as in other cryptocurrencies. Therefore, users could be sure that their money does not change in value and any potential need to immediately exchange Postcoin back into another currency ceases.

Second, customers might exchange Postcoin for local currency at the post office (❷). Thus, people would gain access to Postcoin by paying the postal operator the equivalent of a fixed amount of the PostCoin's reserve. The acquired Postcoin could either be kept in a postal account or be withdrawn and stored in a private wallet. Moreover, the postal operator as a trusted intermediary for exchange could serve as a source of support for the technologically inexperienced user.

Third, there are post-to-post transactions which could take two different forms (❸). Postal operators might directly transact in Postcoin on the Postcoin blockchain. Such

transactions would be efficient as they do not involve an exchange into another currency. However, the receiving party might want to obtain money in a different currency. Thus, postal operators could use off-blockchain transactions between offices (or companies if several postal operators are involved). In this case, involved parties would keep a separate ledger of mutual asset balances in Postcoin and could clear them with transactions on the blockchain in regular intervals.

4.2 Advancing cryptocurrencies

Compared to other cryptocurrencies, Postcoin would exhibit the advantage that it does not suffer from volatility: it would offer a stable store of value by virtue of not only being issued by a reliable source but also being pegged to another asset or currency. In essence, Postcoin would enable customers to benefit from all the advantages of cryptocurrencies, while adding a trusted institution to interact with.

Providing a postal currency could solve another issue related to cryptocurrencies: it may be somewhat difficult to handle the plethora of unsystematic information on cryptocurrencies as well as to fully understand their concept. Backed by a trusted authority, Postcoin could become an alternative cryptocurrency which is both easy to understand and to use. All necessary information can be provided by the post as a reliable institution. The post could offer Postcoin account services at postal franchises and integrate Postcoin accounts into postal websites. Consequently, customers would need no advanced technical knowledge on cryptocurrencies, but would still be able to use the corresponding services such as payments and money transfers.

4.3 Further potentials of Postcoin

The concept of Postcoin could also serve as a successful business model for countries with unstable national currencies. If people trust the postal system more than the central money issuer of their country, Postcoin might emerge as an important store of wealth relative to the national currencies. This could also assist in stabilizing the economy of the respective country. Moreover, it is conceivable that each national postal operator would create its own Postcoin with international payments being settled between operators. The Universal Postal Union might then act as an exchange between different postal currencies. However, it would be even more efficient if the international postal community issued one single postal currency with the Universal Postal Union coordinating the efforts of national postal operators. Such coordination measures might entail regulations, standards and multilateral agreements (see Anson, 2014). In particular, the Universal Postal Union would need to ensure that all postal operators issuing Postcoin adhere to the same exchange rates and reserve standards in an auditable way. If all postal operators were to coordinate on a single Postcoin currency, the reputation effects would amplify due to the participation of many trusted parties.

Besides, Postcoin services could be implemented at a smaller scale and act as a bonus feature rather than a core part in the business model. Comparable to frequent flyer miles, Postcoin could reward loyal customers and give rights to additional benefits (e.g. exchange for postal services). A bonus system might also be a safe way to test Postcoin as a payment system before launching it as a full-fledged cryptocurrency.

5 Conclusion

In the past few years, publicity for cryptocurrencies has increased. However, cryptocurrencies are not only a new kind of currency but also a revolutionary technology due to the novel payment systems they operate on. Essentially, they enable transfer of value across the Internet just as emails transfer information. In particular, this means that people can make peer-to-peer transactions without any financial intermediary in between. Furthermore, crypto-payment-systems provide a completely decentralized system lacking any central institution. Instead, the system is controlled by its community of users. With its unique characteristics such as low transaction costs and secure transactions, crypto-payment-systems can offer various benefits for individuals, companies and the society as a whole. Nevertheless, there are still some challenges. Most importantly, the exchange rate of cryptocurrencies is highly volatile and crypto-payment-systems lack any established institution for people to rely on.

Postal operators are well-suited to counter some of the main weaknesses. They combine a widespread physical network with a strong reputation as well as with substantial experience in financial service provision. Financial services such as savings accounts or money transfers could rather easily be extended internationally and thus assist in advancing financial inclusion. Posts could also issue their own postal cryptocurrency, the Postcoin, which could be capable of protecting customers from the high exchange-rate volatility that cryptocurrencies currently bear.

Looking into the future, possibly many cryptocurrencies will not survive. However, the innovative technology of crypto-payment-systems is likely to persist and to transform the existing financial system. Companies and regulators should therefore keep up with any future developments.

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