

Blockchain Technology for Letters of Credit and Escrow Arrangements

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In this article, the author considers the implications of the blockchain technology for trade finance, in particular the letter of credit transaction and the escrow arrangement.

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1. Purposes of this article

The blockchain technology was invented to create the Bitcoin cryptocurrency around 2009. Since then, various types of blockchains have been developed. In common to all of them, the technology generates, via a chain of blocks, append-only ledgers which are distributed on an online network and maintains them in sync with each other without the involvement of any trusted intermediary.

This article will first highlight two particular aspects of the blockchain technology which are relevant to the subsequent analysis (Chapter 2). It will then examine the implementation of the technology for trade finance, looking in particular at letter of credit transactions (Chapter 3) and the escrow arrangements (Chapter 4). In the course of analysis, attention will be given to the question whether the blockchain technology with its ancillary functionality brings about any advantages over the current practice. Before wrapping up, this article will consider whether the escrow service fortified with the blockchain technology has the potential of making an inroad into the market of the letter of credit and other methods of payment (Chapter 5).

2. Two aspects of the blockchain technology

a. Blockchain technology as the distributed ledger technology (DLT)

The blockchain technology creates and synchronises distributed ledgers. It dispenses with a central registry. For that reason, the technology is often called “distributed ledger technology (DLT).” This feature will be referred to as “the DLT aspect of the blockchain”

throughout this article.

Prior to the emergence of distributed ledgers, the conventional model of keeping an online record of transactions has been the central registry model (or the hub-and-spoke model). Distributed ledgers have some advantages over the central registry model. Thus, whereas a central registry is under the surveillance and control of its administrator, there is no single operator who has control over distributed ledgers. The data in distributed ledgers is, therefore, censor resistant. And unlike the central registry model, there is no single point of attack or failure. The data in distributed ledgers is, therefore, tamper resistant. Resistance to censorship and tampering enhances the security and integrity of data. It also results in the saving of cost which would be incurred in the central registry model for establishing and maintaining back-up databases.

b. Blockchain technology for trustless P2P trading

The blockchain technology is not just about generating ledgers or a special way of doing it. Its greater potential for disrupting the society lies in the fact that it creates an online platform which enables the trustless P2P (peer-to-peer) trading of cryptocurrencies and other tokens. The core innovation of the Bitcoin's blockchain relates to this aspect of the technology.¹ Thus, while the online transfer of a fiat currency necessarily involves a trusted intermediary such as a bank, the transfer of a cryptocurrency can be carried out on a P2P basis.

Suppose that the parties to a sale contract have chosen a cryptocurrency as the currency of payment for their contract. If they opt for a method of payment such as the direct advance payment or the open account, they can send and receive payment on a P2P basis without the involvement of any intermediary. However, it is important to acknowledge that even the payment of a cryptocurrency necessarily involves an intermediary if the parties wish to avail themselves of services provided by a third party. Thus, if the parties to a sale contract opt to use a letter of credit, the payment process necessarily involves a bank as an intermediary. Again, if they opt to use an escrow service, an escrow agent necessarily gets involved as an intermediary. Accordingly, the payment of a cryptocurrency cannot be executed directly from the buyer to the seller as long as a letter of credit or an escrow service is used as the method of payment. All the same, it is worth considering whether any ancillary function of the blockchain technology can render such methods of payment trustless or reduce the required level of trust, an inquiry which this article will make at a few places in the course of analysis in the following two Chapters.

3. Blockchain for the letter of credit transaction

a. Advantages as a tool for supply chain management

Some recent pilot projects for the de-materialization of the letter of credit transaction envisage the use of blockchain. Their publicity materials describe how it works in the following terms.

Each of exporter, customs, importer, insurance, and importer bank has a representative node connected to a private blockchain which replicates transactional information as it occurs on the network. At any given point in time, the ledgers across all nodes are in sync.²

When a shipment of assets crosses borders, it requires approval from multiple legal entities, customs, port authorities and tracking and rail firms. The blockchain can be used to sign their approvals, notifying all parties that the assets have arrived.³

From these descriptions, it appears that those projects seek to tap into the DLT aspect of the blockchain. As a tool for supply chain management, distributed ledgers will offer some advantages. Thus, by allowing the relevant information to be shared among the stakeholders, distributed ledgers increase the visibility and traceability of goods. A caveat is that it is neither necessary nor appropriate for all the trade-related information to be shared by all stakeholders. Another advantage of distributed ledgers is that they are tamper-resistant. Another caveat is that the tamper-resistance of the ledgers neither guarantee that the information which is fed into the ledgers in the first place is true nor does it ensure that the goods to which the information relates are not to be tampered with. In spite of these significant caveats, the advantages might be big enough to warrant introducing distributed ledgers as a tool for supply chain management.⁴

The focus of the present article is, however, different. It is to consider the advantages of using the blockchain technology in the more specific context of a letter of credit transaction. To examine this question, we need to break down the stages involved in a letter of credit transaction. A letter of credit is issued by a bank at the request of the applicant-buyer and is transmitted to the beneficiary-seller (Stage 1). In its simplest form, the seller then presents to the issuing bank the documents called for by the credit (Stage 2). The bank examines the documents to see whether they are in conformity with the terms of the credit (Stage 3) and, if satisfied, makes the promised payment to the seller (Stage 4). The following sections will examine those four stages in turn to

consider whether the blockchain technology will offer any advantages over the current practice.

b. Issuance and transmission to the beneficiary (Stage 1)

i. Current practice

At the stage of issuance and transmission to the beneficiary, the de-materialization of a letter of credit is a well-established practice. Already by the end of the 19th century, a letter of credit was regularly transmitted by telegraph. Today, a vast majority of letters of credit are issued and transmitted by electronic means.⁵

A letter of credit is conducive to paperless issuance and transmission since it is not a document of title. The UCP 600⁶ is also supportive of de-materialized transmission. It provides in Article 11(a) that “[a]n authenticated teletransmission of a credit ... will be deemed to be the operative credit ..., and any subsequent mail confirmation shall be disregarded.”

ii. Advantages of using blockchain

Then, are there any advantages of using the blockchain technology in the context of issuance and transmission? One of the pilot projects for the de-materialization of a letter of credit gives an explanation in the following terms:

“It will take several days to arrive at the exporter ... even if you use electronic notification. However, by sharing the information across the blockchain network, you will be able to browse the information immediately.”⁷

It is to be wondered, however, whether the more expeditious notification through the blockchain network as asserted in this passage is real since communication by other electronic means can be equally instant.

c. Presentation of documents under a letter of credit (Stage 2)

i. The current practice

In the context of the presentation of documents, unlike in the context of issuance and transmission, de-materialization is not well established in the current practice.

Electronic presentations occasionally take place, using the platforms of the

central registry model.⁸ Overall, however, paper presentations are still prevalent. This is also reflected in the low rate of adoption⁹ of eUCP.¹⁰ The laggard de-materialization seems largely due to the uncertainty over whether electronic bills of lading are legally treated as equivalent to paper bills of lading. A bill of lading is a document of title embodying the right to claim the delivery of goods from the carrier. However, unless the applicable law treats electronic bills of lading as equivalent to paper bills of lading, the buyer and the banks cannot feel safe to rely on them. The past and present projects of electronic bills of lading have been plagued by the absence of supporting legal environment.¹¹ If the legislators of many States adopt the UNCITRAL Model Law on Electronic Transferable Records (2017), it would help create a favorable environment.¹²

ii. Advantages of using blockchain

In the context of the presentation of documents, the DLT aspect of the blockchain technology seems to offer some advantages over the central registry model. As noted above, the use of distributed ledgers enhances the security and integrity of data. Apart from the saving of cost which it entails, the tamper resistance of the ledgers will be helpful to fulfil the requirement that “[a]t least one original of each document stipulated in the credit must be presented” (Article 17(a) of the UCP 600). The eUCP provides that this requirement is satisfied simply by presenting one electronic record (Article e8), which seems to add nothing. On a better interpretation, this requirement is met where there exists a reliable assurance as to the integrity of the information it contains.¹³ Distributed ledgers, due to their tamper resistance, are more suitable to provide a reliable assurance than a central registry.

The advantages of the blockchain technology seem, however, limited. As noted above, the technology does not prevent false information from being fed into the ledger. In this connection, it should be remembered that the most serious form of fraud in letters of credit relates to the issuance of false documents¹⁴ rather than to tampering with documents after they have been issued.

Most significantly, it should be pointed out that the legal hurdle to using electronic bills of lading cannot be sidestepped by using blockchain.¹⁵ Until and unless favorable legal environment emerges, this problem will continue to plague both the central registry model and the blockchain model.

d. Payment under a letter of credit (Stage 4)

Before turning to the examination of documents (Stage 3), it is analytically convenient to consider payment under a letter of credit (Stage 4).

If, as is usually the case today, the parties to a sale contract choose a fiat currency as the currency of payment for their contract, payment under a letter of credit is commonly effected by an electronic transfer. The use of the blockchain technology will add nothing in this context.

Where, on the other hand, the parties to a sale contract choose a cryptocurrency as the currency of payment for their contract, the blockchain network must be used to effect payment. If they opt to use a letter of credit, the payment cannot be effected directly from the buyer to the seller since it necessarily involves the issuing bank as an intermediary. All the same, it is worth considering whether it is possible to render the letter of credit transaction a trustless method of payment by means of any ancillary function of the blockchain technology. The answer would be yes if, and this is a big if, it were possible to automate the examination of documents since a computer code on a blockchain, which may be called “smart contract,”¹⁶ could then be set to work to trigger payment without any manual authorization by the bank. In the next section, we will go back to Stage 3 and consider whether it is possible to automate the examination of documents.

e. Examination of documents (Stage 3)

The purpose of examining documents presented under a letter of credit is to see whether they are in conformity with the terms of the credit. To consider whether the examination can be automated, it is necessary to have regard to the provisions of the UCP 600 which articulate the standard and tests for examination. Some of the provisions lay down concrete tests for ambiguous terms in a credit. Thus, Article 3 provides in the relevant part:

For the purpose of these rules:

...

Terms such as "first class", "well known", "qualified", "independent", "official", "competent" or "local" used to describe the issuer of a document allow any issuer except the beneficiary to issue that document.

Unless required to be used in a document, words such as "prompt", "immediately" or "as soon as possible" will be disregarded.

The expression "on or about" or similar will be interpreted as a stipulation that an event is to occur during a period of five calendar days before until five calendar days after the specified date, both start and end dates included.

These provisions would facilitate the automation of document examination. There are,

however, provisions which would necessitate human interventions. Thus, in another part of Article 3 provides:

For the purpose of these rules:

...

A requirement for a document to be legalized, visaed, certified or similar will be satisfied by any signature, mark, stamp or label on the document which appears to satisfy that requirement.

The examination under this test could require the exercise of value judgment and, therefore, cannot be automated. In addition, the provision in Article 14(e) is in the following terms:

In documents other than the commercial invoice, the description of the goods, services or performance, if stated, may be in general terms not conflicting with their description in the credit.

In contrast with the test for commercial invoice (Article 18(c)) which uses the words “must correspond with,” this test calls for greater flexibility. To automate examination under Article 14(e), unless and until there are considerable advances in artificial intelligence, one would need to anticipate every possible description of all possible goods. It must, therefore, be concluded that the examination of documents under a letter of credit cannot realistically be automated.

f. Summary of this chapter

Some pilot projects for the de-materialization of the letter of credit transactions seek to tap into the DLT aspect of blockchain. However, advantages over the central registry model seem limited. Most importantly, the biggest obstacle to de-materialization, namely the legal hurdle to electronic bills of lading, cannot be sidestepped by the mere use of blockchain.

Even where the parties to a sale contract choose a cryptocurrency as the currency of payment for their contract, as long as they opt to use a letter of credit, the payment process necessarily involves a bank as an intermediary. An ancillary function of blockchain, which may be called “smart contract,” cannot be set to work to render the letter of credit transaction a trustless method of payment since the examination of documents cannot be automated.

4. Blockchain for the escrow arrangement

Having examined the implications of the blockchain technology for the letter of credit transaction in the preceding Chapter, our analysis will now turn to the escrow arrangement.

a. Escrow arrangement

In general, the escrow is an arrangement whereby, instead of sending money directly to the payee, the payer temporarily deposits funds in the hands of a third party called “escrow agent.” After confirming that the payee has performed its side of the deal, the payer lets the escrow agent release the escrowed funds to the payee. It is a method of payment used in a variety of dealings such as real estate transactions and M&A (mergers and acquisitions).

In the context of a sale of goods, the arrangement usually works as follows. The seller and the buyer first appoint an escrow agent whom they can trust. The buyer deposits the purchase price in the account of an escrow agent. After receiving the goods from the seller and inspecting them, the buyer lets the escrow agent release the escrowed funds to the seller. If the buyer rejects goods for non-compliance with the sale contract, the escrow agent will act in accordance with the terms of appointment. Thus, depending on the terms, he or she may return the escrowed funds to the buyer, or may hold the funds until the dispute is resolved by arbitration or litigation and then follow the resolution, or may himself or herself act as an arbitrator to resolve the dispute.

The escrow service, namely the service provided by an escrow agent, has been available to make payment in fiat currencies. Recently, some providers started the service for the payment of cryptocurrencies. In fact, there is a reference to the escrow in the Bitcoin’s foundation paper which states, “routine escrow mechanisms could easily be implemented to protect buyers.”¹⁷ For the payment of a cryptocurrency, an address on the blockchain serves as an escrow account.

b. Risks of the escrow arrangement

The escrow arrangement requires the buyer to deposit funds with an escrow agent in advance of the seller’s performance. This leads to some risks. Thus, the escrow agent may misappropriate the escrowed funds or a third party may steal them. Where the escrow agent becomes bankrupt, the escrowed funds may constitute property of the bankruptcy estate unless they are deemed under the applicable law to be held in trust.¹⁸ Furthermore, the seller may collude with an escrow agent to defraud the buyer, and *vice*

versa.¹⁹

Those risks are real and may be the reason why the escrow arrangement is not as prominent a method of payment as the letter of credit in trade involving a large sum of money. To guard against those risks, licensing and other regulatory requirements are imposed on the providers of escrow services by some legal systems,²⁰ which entails compliance costs. The analysis in the following section will consider whether those risks can be removed or reduced with the use of the blockchain technology.

c. The 2-of-3 multisig

In 2011, a new addition was made to the scripting capabilities of the Bitcoin's blockchain, which enabled an ancillary function called "multisig (or multi-signature)." The function is a species of "smart contract" and is now also implemented on the blockchains of other cryptocurrencies. While there are various permutations to multisig addresses, where a 2-of-3 multisig address is created, two digital signatures of the three associated public keys are needed to send units of the cryptocurrency from that address to another address. This makes it possible for three persons to have a joint control over the same address instead of one person having a total control. Then, units of the cryptocurrency in that address can only be sent if the transaction is signed by two of them. Thus, where the parties to a sale contract choose a cryptocurrency as the currency of payment for their contract and opt for the escrow arrangement as the method of payment, they may appoint an escrow agent and create a 2-of-3 multisig address which they control jointly with the escrow agent.²¹

In a majority of cases where no dispute arise between the seller and the buyer, they can both sign a transaction to send the escrowed funds either to the seller or to the buyer without any help from the escrow agent. Thus, they can both sign a transaction to release the funds to the seller when the goods have arrived to the satisfaction of the buyer. On the other hand, where the sale contract is cancelled or terminated amicably, they can both sign a transaction to return the funds to the buyer.

Should a dispute arise between the seller and the buyer, there will be a stalemate between them. But the escrow agent can break it by adding his or her signature to a transaction to help release the escrowed funds. Thus, depending on the terms of appointment, the escrow agent may add his or her signature to return the escrowed funds to the buyer or may wait until the dispute is resolved by arbitration or litigation and then follow the resolution or may himself or herself act as an arbitrator to resolve the dispute.

The fortification of an escrow account with the 2-of-3 multisig would reduce or remove the risks of the escrow arrangement outlined above. Thus, since signatures of

multiple persons are needed to release the escrowed funds, the risk of theft by a third party will be reduced. The risk of misappropriation by the escrow agent is removed since he or she cannot single-handedly release the funds. In the event of the escrow agent's bankruptcy, the likelihood of the escrowed funds constituting property of the bankruptcy estate will be no higher than would be the case where the escrow account is unfortified with the multisig. The multisig fortification does not, however, remove the risk of collusion by the escrow agent with the seller or the buyer. Accordingly, the need for a trusted intermediary is not eliminated. However, the reduction and removal of the other risks associated with the escrow arrangement should justify easing the regulatory requirements for the provision of an escrow service.²²

d. Summary of this chapter

Where the parties to a sale contract choose a cryptocurrency as the currency of payment for their contract and opt for the escrow arrangement as the method of payment, they may create an escrow account fortified with the 2-of-3 multisig. The multisig does not dispense with an intermediary because an escrow agent needs to get involved to break a stalemate between the seller and the buyer in the event of a dispute between them. They need to find a person whom both of them can trust to act as an escrow agent because the risk of collusion is not removed by the multisig fortification.

The required level of trust in an escrow agent is, however, lower than would be the case where an escrow arrangement is unfortified with the multisig since other risks associated with the escrow arrangement are reduced or removed by the multisig fortification. The reduction and removal of such risks should justify easing the regulatory requirements for the provision of an escrow service.

5. The potential of the multisig-fortified escrow service for making an inroad into the market of the letter of credit

The fortification of an escrow account with the multisig will, through the reduction and removal of risks, enhance the attractiveness of the escrow service. Moreover, if the regulatory requirements for providing escrow services are eased commensurately with the reduced risks, the cost of compliance will be lowered, which will further enhance the attractiveness of the escrow service. This begs the question whether the multisig-fortified escrow service has the potential of making an inroad into the market of letters of credit and other methods of payment, though this question will only surface if and when it becomes a widespread practice to choose a cryptocurrency as the currency of payment for sale of goods.²³ The following analysis will seek to answer

this question by comparing the escrow arrangement (with or without the multisig fortification) with other methods of payment.

a. Comparison with the direct advance payment and the open account transaction

The escrow arrangement purports to reconcile the conflicting needs of the parties to a sale: the seller wants to receive payment as early as possible whereas the buyer wants to make payment as late as possible. As a method of payment, it sits somewhere in the middle between the two ends of the spectrum, namely the direct advance payment and the open account transaction.

Compared to the direct advance payment, the escrow arrangement is a method of payment more favorable to the buyer since the deposited purchase price is not released until the buyer approves the goods.

Compared to the open account transaction, the escrow arrangement is a method of payment more favourable to the seller since the buyer has to deposit the purchase price, which will not constitute property of the bankruptcy estate in the event of the buyer's bankruptcy.²⁴ In addition, the funds deposited are in the (usually safe) custody of a trusted third party, namely an escrow agent.

b. Comparison with the letter of credit transaction

Like the escrow arrangement, the letter of credit transaction sits somewhere in the middle in the spectrum between the direct advance payment and the open account transaction. Its rationale is the same as that of the escrow arrangement: it purports to reconcile the conflicting needs of the parties to a sale. But it strikes a balance between the conflicting needs differently from the escrow arrangement, as detailed below.

A letter of credit is subject to the well-established principle of independence. It is reflected in Article 4(a) of the UCP 600 which stipulates, "A credit by its nature is a separate transaction from the sale or other contract on which it may be based." The opposite is true with the escrow arrangement. Only after inspecting and approving the goods, does the buyer let the escrow agent release the escrowed funds.

By virtue of the principle of independence, a letter of credit is almost equivalent to "cash in hand" for the seller and may be pledged as a security for loan. It has earned the reputation as "the life blood of international commerce."²⁵ A side effect of the principle of independence is that it creates an opportunity for perpetrating fraud on the underlying sale contract.²⁶ On the other hand, the escrow arrangement allows the buyer to release the purchase price after inspecting the goods and, therefore, leaves no room for this type of fraud, though it is vulnerable to a different kind of fraud noted

above.²⁷

In terms of the nature of tasks undertaken, the issuing bank of a letter of credit acts as a reliable paymaster who skillfully performs the difficult task of checking the conformity of documents with the terms of the credit. An escrow agent, on the other hand, acts as a custodian of the purchase price who is trusted to release the escrowed funds in accordance with the terms of appointment. Where an escrow account is fortified with the 2-of-3 multisig, the term “custodian” is no longer apt to describe the role of the escrow agent. This is because the escrow agent can only release the escrowed funds with the help of another person and because the other two persons can act together to release the funds without the help of the escrow agent. An escrow agent’s role may, therefore, be better described as “moderator.” Unless he or she is asked to perform the role of an arbitrator, an escrow agent’s task is much simpler than the task of the issuing bank of a letter of credit. Since the complexity of tasks is usually factored into the costs of services, an escrow service can be significantly cheaper than the letter of credit transaction.

The letter of credit transaction does not necessarily require the buyer to put the issuing bank in funds in advance. The necessity depends on the creditworthiness of the buyer and other circumstances. The escrow arrangement, on the other hand, invariably requires an outlay of deposit, which entails various risks. As seen above, some of the risks are reduced or removed by the fortification of an escrow account with the 2-of-3 multisig.

c. Summary of this chapter

The foregoing analysis reveals that as between the conflicting needs of the parties to a sale contract, the escrow arrangement strikes a balance in a way different from other methods of payment such as the letter of credit, the open account transaction and the direct advance payment. Accordingly, it appeals to the needs of traders different from those catered for by other methods of payment. Although the multisig fortification would enhance the attractiveness of the escrow service, this basic picture remains the same. It follows that should it ever become a widespread practice for the parties to a sale contract to choose a cryptocurrency as the currency of payment for their contract, the escrow service might gain some prominence with the multisig fortification but is unlikely to make a significant inroad into the market of the letter of credit and other methods of payment.

6. Recapitulation

Aside from the conclusions stated in the summary section of Chapters 3 to 5 above, the following observations may be offered in terms of the two aspects of the blockchain technology highlighted in Chapter 2.

a. The DLT aspect of blockchain

Some pilot projects for the de-materialization of the letter of credit transaction envisage the use of the blockchain technology. They seek to tap into the DLT aspect of blockchain. The advantages of distributed ledgers, though they come with significant caveats, might be big enough to warrant introducing blockchain as a tool for supply chain management. In the more specific context of the letter of credit transaction, however, the advantages of distributed ledgers over the central registry model seem limited. Most significantly, the biggest obstacle to de-materialization, namely the legal hurdle to electronic bills of lading, cannot be sidestepped by the mere use of blockchain.

b. Blockchain for trustless P2P trading

The blockchain technology creates an online platform which enables the trustless P2P trading of cryptocurrencies and other tokens. Thus, if the parties to a sale contract choose a cryptocurrency as the currency of payment for their contract, they can send and receive payment on a P2P basis without the involvement of any intermediary. However, even the payment of a cryptocurrency necessarily involves an intermediary if the parties wish to avail themselves of services provided by a third party (such as the issuing bank of a letter of credit and an escrow agent). Furthermore, even an ancillary function of the blockchain technology, which may be called “smart contract,” cannot render the letter of credit a trustless method of payment since the examination of documents cannot be automated. Neither is the escrow arrangement rendered trustless by the multisig fortification, a species of “smart contract,” since there remains the risk of an escrow agent acting in collusion with either the seller or the buyer. However, the multisig fortification lowers the required level of trust in an escrow agent since it reduces or removes the risks associated with the escrow arrangement.

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¹ For any trading platform to work, it is essential to avoid the double spending of the same token. That is possible in the central registry model since the administrator of the registry, being a trusted intermediary, can keep track of all the transactions. The blockchain technology solves the double spending problem without the involvement of any trusted intermediary by means of

an algorithm which guarantees a single true version of distributed ledgers. For the Bitcoin's solution, see its foundation paper, Satoshi Nakamoto, "Bitcoin: a peer-to-peer electronic cash system" (2008) (<https://bitcoin.org/bitcoin.pdf>) 3, where it explains the concept "proof of work."

² ING and Societe Generale Corporate & Investment Banking, "Easy Trading Connect" <https://www.youtube.com/watch?v=RLyiIXLEqg4> (July 14, 2016) (Last accessed on October 25, 2017).

³ IBMBBlockchain, "Streamlining Trade Finance with IBM Blockchain" https://www.youtube.com/watch?time_continue=20&v=JEYO8RuS4fM (January 12, 2017) (Last accessed on October 25, 2017).

⁴ In fact, some enterprises which offer distributed ledgers as a supply chain solution are already up and running. These include Everledger and Provenance.

⁵ James Barnes & James Byrne, "E-Commerce and Letter of Credit Law and Practice" (2001) International Lawyer 23, 24.

⁶ International Chamber of Commerce, *Uniform Customs and Practice for Documentary Credits: 2007 Revision* (2006).

⁷ IBM Blockchain, "How Mizuho Bank Leverages IBM Blockchain for Supply finance" <https://www.youtube.com/watch?v=FmhB83dCYzg> (August 2, 2017) (Last accessed on October 25, 2017). NTT Data, too, makes a similar statement: "We have confirmed the usefulness of blockchain in trade finance by a demonstration which was the first ever in Japan" (A translation by the present author from the original in Japanese.) <http://www.nttdata.com/jp/ja/services/sp/blockchain/initiatives/> (Last accessed on October 25, 2017)

⁸ One of the organizations which provides such a platform is Bolero (Bill of Lading Electronic Registry Organization). It states on its website, "Bolero solutions offer a safer, smarter and faster way to centrally manage letters of credit and electronic presentations. Buyers, sellers, banks and carriers can electronically exchange letters of credit, electronic bills of lading, insurance certificates and other trade documentation over a common digital network." (<http://www.bolero.net/home/letters-credit-management/>. Last accessed on November 11, 2017). For the actual use of the Bolero platform, see e.g. "Bank of China and RBS move forward with Bolero" Trade Finance (September 5, 2013).

⁹ See James Byrne, "The Four Stages in the Electrification of Letters of Credit" 3 (2012) Geo. Mason J. Int'l Com. L. 253, 270; William Patrick Cronican, "Buyer Beware: Electronic Letters of Credit and the Need for Default Rules" 45 (2013) McGeorge L. Rev. 383, 391. See also "KEB issues first paperless LC under eUCP" Trade Finance (December 1, 2010).

¹⁰ International Chamber of Commerce, *Supplement to the Uniform Customs and Practice for Documentary Credits for Electronic Presentation* (version 1.1 (2007)). It applies where a credit indicates that it is subject to eUCP (Article e1(b)) and seeks to accommodate the presentation of electronic records alone or in combination with paper documents (Article e1(a)).

¹¹ For details, see Koji Takahashi, "Blockchain Technology and Electronic Bills of Lading" (2016) 22 Journal of International Maritime Law pp. 202, 206. Its focus is on public blockchain platforms (p. 204). After its publication, efforts to develop private blockchain platforms have intensified on the part of financial industry. In fact, the points made in that article, including those on legal issues but excluding those made in section 6 of that article, are also relevant to private blockchain platforms.

¹² For details, see Koji Takahashi, "Implications of the Blockchain Technology for the

UNCITRAL Works” due out from the UNCITRAL Secretariat, *Modernizing International Trade Law to Support Innovation and Sustainable Development*.

¹³ See Article 9(4)(a) of the United Nations Convention on the Use of Electronic Communications in International Contracts (2005).

¹⁴ See e.g. *Sztejn v. J. Henry Schroder Banking Corp.*, 177 Misc. 719, 31 N.Y.S.2d 631 (Sup. Ct. 1941). In this case, the seller tendered a bill of lading and invoices describing the bristles as called for by the letter of credit when in fact it had shipped cow hair and other rubbish.

¹⁵ The same point is made by John Sze “Blockchain: the next wave in trade finance” (<http://www.jtjb.com/all/2017/blockchain/>) (Last accessed on October 26, 2017).

¹⁶ The expression “smart contract” is a misnomer. It is in fact a computer code stored on a blockchain, triggered by transactions on it and reads and writes data in it: Gideon Greenspan, “Beware the impossible smart contract” (2016) (<http://www.multichain.com/blog/2016/04/beware-impossible-smart-contract/>) (Last accessed on November 14, 2017). Its relevance to a “contract” (in the legal sense) only lies in the fact that it can automate the online execution of the part of a contract which says “if A happens, then do B.” The automation is possible only to the extent the contract can be executed online.

¹⁷ Satoshi Nakamoto, “Bitcoin: a peer-to-peer electronic cash system,” *supra* note 1 at p. 1.

¹⁸ In the United States, the bankruptcy estate is comprised of “all legal or equitable interests of the debtor in property as of the commencement of the case” (11 U.S. Code §541(a)(1)). The existence of property interests is a matter for the applicable state property law. Under New York law, an escrow agent has neither legal title nor an equitable interest in the escrowed funds since the latter are deemed to be held in trust: See *In re Dreier LLP*, 527 B.R. 126, 133 (S.D.N.Y. 2014). The upshot is that in the event of an escrow agent’s bankruptcy, the escrowed funds do not constitute property of the bankruptcy estate. The same outcome cannot, however, be guaranteed under all legal systems.

¹⁹ Thus, in collusion with the seller, an escrow agent may release the escrowed funds to the seller without waiting for the buyer’s authorization. If, on the other hand, an escrow agent colludes with the buyer, he or she may never release the escrowed funds to the seller.

²⁰ See e.g. Division 6 of the California Financial Code; Ch. 7 of Title 6 of the Arizona Revised Statutes. Such regulations may be interpreted as applicable also where the escrow account accepts a cryptocurrency. For example, s. 17003(a) of the California Financial Code mentions the delivery of “money ... or other thing of value” in defining the term “escrow.” See also paragraphs (4) and (7) of s. 6-801 of the Arizona Revised Statutes which likewise mention the delivery of “money ... or any other thing of value.”

²¹ An escrow account fortified with the 2-of-3 multisig is actually used in some online market places such as OpenBazaar.

²² For more about such regulatory requirements, see *supra* note 20.

²³ It is beyond the scope of the present article to consider whether and when such a practice will be established. But the stabilization of the value of cryptocurrencies will surely be a prerequisite.

²⁴ In the United States, it has generally been held under state laws that the debtor who has placed funds in an escrow account does not retain an unqualified interest in the funds, with the result that in the event of the bankruptcy of the debtor, the funds do not constitute property of the bankruptcy estate under the federal law (11 U.S. Code §541(a)(1). See *supra* note 18). For a recent case, see *LTF Real Estate Co. Inc. v. Expert S. Tulsa LLC*, 619 Fed. App’x. 779 (10th Cir. 2015) (under Oklahoma law). For other cases, see Alan Resnick & Henry Sommer (eds) 5

Collier on Bankruptcy ¶ 541.09 [2] (16th ed.)).

²⁵ As described in a number of cases, including *United City Merchants v. Royal Bank of Canada* [1982] Q.B. 208, 250 per Griffiths L.J. (English Court of Appeal).

²⁶ See *supra* note 14 for the facts of a seminal case which established a parameter of the principle of independence.

²⁷ See *supra* note 19.