This article describes two use cases where blockchain is a game changer for businesses: in international money transfers and in combating VAT fraud (missing trader fraud).

1. Introduction to Blockchain

Blockchain may be the most hyped topic of 2017. Reading this article 18 months ago, people would have probably wondered what bitcoin is and how it relates to this new emerging technology. Early bitcoin adopters were very enthusiastic about bitcoin’s price hitting USD 615 (October 2016). Nowadays, mainstream media are all about price surges and corrections – e.g. after the cryptocurrency broke through the USD 20,000 barrier before it retreated to less than USD 10,000 in early 2018. Bitcoin has come a long way since its inception on 3 January 2009. The metadata of the first transaction, initiated by bitcoin’s creator(s) who used the pseudonym Satoshi Nakamoto, contains the headline of the Times newspaper of that day, ”Chancellor on brink of second bailout for banks”.

As Marco Iansiti and Karim R. Lakhani mentioned in January 2017 in the Harvard Business Review, ”Bitcoin is the first application of blockchain technology […]. Blockchain is an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way.”[1] Marc Andreessen, founder of Netscape and the venture capital firm Andreessen Horowitz, wrote in 2014: “[this technology] offers a sweeping vista of opportunity to reimagine how the financial system can and should work in the Internet era, and a catalyst to reshape that system in ways that are more powerful for individuals and businesses alike.” In 2018, initiatives using blockchain to transform the way to make transactions are flourishing.

This article describes two use cases where blockchain is a game changer for businesses: in international money transfers and in combating VAT fraud (missing trader fraud).

2. Global Business Payments

2.1. How cross-border bank payments work currently

Blockchain provides companies with control, security and ease of use, and fundamentally changes the way they do business. However, what has been almost lost in the current debate, is that bitcoin itself is gaining more and more traction among users and, subsequently, also among businesses. Being a digital currency made for the Internet, bitcoin is a fantastic solution for cross-border commerce as a transaction medium, especially when it comes to international transfers.

The current process for cross-border payments is complex and relies on intermediaries (“correspondent banks”) before reaching the ultimate physical location. The banking system works similarly to the telephone system before IP-technology was used: for every call, a separate “line” connected individuals across countries and telephone companies. Similarly, for every international transfer, a specific channel via correspondent banks needs to be established. While the transfer information is sent via SWIFT, balances are settled in bank accounts that correspondent banks keep for each other, each with limits and risk management in place.
The number of banks required in the correspondent banking model, with each bank charging a fee, is one of the main reasons why cross-border payments are expensive. Assessing the total charges incurred throughout the correspondent payment cycle is difficult, especially when different currencies are involved.

For corporates, it is often estimated that all-in international transfer costs amount to approximately 1% to 3% of the volume of the payment, while SMEs and individuals may pay up to 10% in total. This cost is often not transparent for businesses, as quoted fees for business transfers outside of the Single Euro Payments Area (SEPA) are only approximately 0.20% of the transfer amount (0.10% for the sending bank and another 0.10% for the receiving bank; most banks also set a minimum fee of EUR 10-14 and a maximum fee of up to EUR 150). What the quoted fees do not include are steep foreign currency conversion spreads. Especially when payments take a few days, it is hard for senders or recipients of payments to understand what the fair foreign currency exchange rate (FX rate) would have been on a comparable value date.

An internal Santander memo leaked to Guardian Money states that Santander made EUR 585 million from money transfers – equal to nearly a tenth of its 2016 global profit of EUR 6.2 billion. The memo shows that the bulk of the profits comes from the FX margin, rather than the fees directly charged. The FX margin is the difference between the rate at which banks buy a currency and sell that currency to customers. The memo highlights that the bank's revenues in this area are at risk of collapsing from EUR 585 million to EUR 95 million (a fall of 84%) if it charged as little as new money transfer rivals.

As for the European Union, in 2009 the European Parliament decreed that bank fees for cross-border euro payments (up to EUR 50,000) to other Member States should equal the charges for similar national payments. However, given that the regulation does not cover charges for currency conversion, businesses can still be charged fees for non-euro transactions.

As McKinsey&Company states in its 2015 report “Global Payments 2015: A Healthy Industry Confronts Disruption”, the high cost does not in turn yield a fast processing time. Foreign currency cross-border payments typically take three to five working days to complete. The McKinsey&Company article summarizes research from Traxpay that around 60% of global B2B payments require time-consuming manual intervention taking at least 15 to 20 minutes.

2.2. Disintermediation using bitcoin

The payments space, built on legacy systems and correspondent banks, is ripe for disruption. Prior to the invention of bitcoin however, no alternative global system was available to settle balances fast and cost effectively. While gold (as well as other precious metals) is broadly accepted as a store of value, it is highly inefficient to transfer and settle on a global scale. The world now has a digital asset class to use as a store of value like gold, but which is as simple as to transfer as other digital information.

Bitcoin start-ups are responding to this new opportunity by building solutions to meet the needs of today’s fast-growing global businesses. Some start-ups have managed to avoid the banking system altogether. The peer-to-peer lending platform Bitbond, for example, allows borrowers to take out USD-denominated loans in bitcoin. By using bitcoin as a settlement network, the Bitbond team has managed to serve users from more than 120 countries. This would have been impossible if the traditional banking system had been used.

Other start-ups use bitcoin (or other cryptocurrencies) as a transfer tool to make global payments more efficient. Money is converted to bitcoin in one market, then sent within minutes, and converted back on the other end to local currency, with the added benefits of:

speed: getting three confirmations on the blockchain will take little more than half an hour;

- cost-effectiveness: transaction costs are much lower (compared to traditional banking costs) with no hidden conversion fees; and

- security: full transparency and the history of the money transfer is available in the blockchain.

Naturally, bitcoin thrives in more “difficult” payment corridors. For example, companies use bitcoin to transfer funds in euro or US dollars to global suppliers located in Asia, Latin America, or Africa. These businesses typically do not buy or handle the digital currency themselves. Instead, payment platforms provide end-to-end solutions whereby payments can be made directly in euro. As such, business users are not required to have an in-depth understanding of the steps involved, given they are performed in the background by a bitcoin company.

The entire process described above (after receipt of the fiat currency by the money transfer company) typically takes less than 1 hour to complete. Often, only due to the time involved in the wiring of a currency, completion of end-to-end transactions takes a total time of approximately 4 hours.

Any exchange rate volatility risk is minimized, given that positions in bitcoin are only maintained for less than one minute before they are converted to and from local currency.

Alternatively, some companies may prefer to generate even greater savings by setting up in-house platforms and opening bitcoin wallets in each of the countries in which they operate. Over time, cryptocurrency expertise may be incorporated into companies’ Treasury Management Systems.

2.3. Intra-group transfers

Interestingly, more than 60% of world trade takes place not between different companies, but within multinational corporations. So, rather than, for example, a US importer buying from a Chinese manufacturer, the majority of the global transfer volume consists of transactions between legal entities of the same corporate group. These payment flows relate to goods, services or financial transactions such as loans, royalties or dividends.

Due to technological improvements in IT and communications, the speed of global trade has increased dramatically. As a result, internationally operating companies feel the pressure to move value within their group the same way they already move information. Bitcoin provides companies global access to their liquidity and the ability to transfer money cross-border faster and easier.

By using cryptocurrencies, payments can be processed securely and transparently. Global companies can track the whereabouts of funds in real time. The need for external funding is reduced by settling intercompany positions using bitcoin. Simultaneously, additional insight into intercompany lending and cash positions is obtained. This is especially valuable for multinational companies that do not have access to professional cash pooling services.

By utilizing cryptocurrencies, intra-group payments are automatically executed allowing for payments to arrive at the recipient (sometimes within ten minutes) and converted into local currency in less than four hours (depending on banking speed).

3. Solving VAT Missing Trader Fraud

A completely different use case of blockchain is combating VAT fraud by making money smart.

3.1. VAT gap

Looking at the current VAT reverse charge system inside the European Union, one might say that it is broken: the extensive compliance mechanisms designed over the years have not been able to prevent massive fraud. The European Union issued a report in 2017,
estimating “the VAT Gap”[5] at EUR 150 billion per year. This “VAT gap” is not entirely VAT fraud, as the VAT gap can also be influenced by bankruptcies and tax arrears, as well as reporting problems in national accounts. Nevertheless, it is still a good indicator how much tax revenues the EU Member States are missing out on. On a per capita basis, the VAT gap amounts to over 300 euro for each European citizen.

To combat this fraud, in 2016 the European Commission launched an “action plan to tackle the VAT gap and adapt the VAT system to the digital economy and needs of SMEs”.[6] What if a blockchain-based system could help to increase transparency and accountability and in turn reduce VAT fraud, while lessening the burden of compliance at the same time?

IBM has recently defined blockchain as “[...] a shared ledger that is decentralized and resistant to tampering. It allows verified contributors to store, view and share digital information in a security-rich environment, which helps to foster trust, accountability and transparency in business relationships”.[7]

Based on this assumption, a team of blockchain experts from PwC’s Experience Center experimented with designing a proof of concept that envisages an automated end-to-end system which labels transactions and makes money smart. The system distinguishes between payments to suppliers and to tax authorities. This results in fraud prevention, reduced compliance costs and real-time insights for tax authorities – and will help to reach the European Commission’s Action Plan on VAT’s objectives.

3.2. The problem of VAT fraud

In order to solve VAT fraud, the core of this problem needs to be addressed. Also called “missing trader fraud”, VAT fraud arises if a supplier charges an amount including VAT on an invoice to a customer, but the supplier then goes “missing” before on-paying the legally required VAT to the local tax authorities. Of course, this kind of fraud happens mostly in cross-border situations, with complex “carrousels” in which fraudulent and non-fraudulent parties participate (willingly or not), usually involving high-end consumer goods (such as mobile phones) or specific credits (for example, carbon emission credits). So a solution should be designed to address the core of the problem which might be explained as simply as in the illustration below.


After receiving the VAT charged to its customer, the fraudster does not pay that VAT to the local tax authorities, but just goes “missing” with the money. In fact, the issue at hand with VAT missing trader fraud is as simple as people crossing a red light. When arriving at a red light, people have the opportunity to cross – even though they are aware of the consequences they face of breaking the rules. So, although they are legally prohibited to cross, there is no physical barrier stopping them from doing so. This is the same for the fraudulent party in the case of missing trader fraud. Every fraudster has the opportunity to walk away with the VAT it receives, as there is no physical barrier preventing them. If only it would be possible to track and trace this money – making sure it ends up in the right hands.

3.3. Blockchain: Make money smart

So how to improve the situation? In the past, EU Member States have imposed several anti-fraud measures, of which the reverse charge VAT mechanism is the most familiar one. Under a reverse charge, the VAT is not levied from the supplier of the good(s), but actually needs to be paid directly to the tax authorities by the receiver of the good(s). However, given that this is not implemented across the European Union simultaneously, or only on specific products, fraudulent parties can still make use of their current fraud schemes.

Given that it is difficult to implement a broader change in legislation across the European Union (due to the fact that all Member States have to agree on such a change), a solution should focus on the current problem at hand – which is the uncertainty whether the money will actually be paid to the tax authorities. But what if that uncertainty could be taken away? Member States have already been following the flow of invoices and the flow of goods to track down fraudulent parties, and in some cases – when possible – the flow of money. However, if it could be ensured that money always ends up in the right hands, there would be no need to follow all these flows. By making money smart, its destination will no longer be unknown but predefined as soon as any amount of VAT would be due.
Blockchain offers the possibility to label transactions and thereby make money smart. Imagine that with every transaction that takes place between two parties, the amount of money paid in that transaction were divided in two parts just before it arrived at the bank account of the supplier. One part would be freely available to the supplier, being the fee paid for the good supplied. The other part would be labelled as VAT, being the percentage of VAT that the supplier has charged on its product. This second part would be transferred to the supplier's bank account. However, having a different label ("VAT due"), the second party would only "hit" the bank account before it would be transferred automatically from the supplier’s bank account to the bank account of the tax authorities. Hence, there is no opportunity to commit fraud.

From a blockchain perspective, the development team chooses to build a proof of concept of the solution on Ethereum to enforce the labelling of the currencies on the blockchain. Comparable to Bitcoin’s blockchain, the nodes in the Ethereum blockchain each store a full historical shared record of all transactions. However, the major difference in the technology is the application of smart contracts, which in fact are – according to the Ethereum white paper – nothing more than a piece of code implementing arbitrary rules. Every node in the network keeps track of the state of these smart contracts, and stores this most recent state of the smart contracts. Further, where Bitcoin’s blockchain does not actually keep accounts (but rather uses unspent transaction outputs to determine the amount of Bitcoin a user has), Ethereum actually makes use of tokens that are stored in wallets, which can be transferred to other users’ accounts.

The envisaged solution that has been developed involves several parties. In this network, local tax authorities within the European Union would each be a node in the network, having a strong link with their counterpart at the local chamber of commerce. Upon registering at the chamber of commerce (and at the tax authorities), an entrepreneur would receive the required login details to sign in on the platform. The entrepreneur ("Party A") can now create an invoice for a good to be sold to any of its customers that have access to the platform as well (in this case "Party B"). When creating an invoice, all company data can be pre-populated with data from the chamber of commerce and the tax authorities.

When Party B agrees to pay for the amount due on the invoice received from Party A, the payment in local currency from the bank account of Party B will automatically be transferred into crypto tokens on the blockchain. By agreeing to the payment, the tokens are transferred to the bank account of the supplier, Party A. At the same time, a smart contract on the blockchain is executed, which matches the amount of the fee charged for the product, as well as the VAT mentioned on the invoice, to the actual payment in tokens. This payment is then split in a payment (e.g. green tokens) for the product and the VAT amount (e.g. red tokens). The red tokens hit Party A’s bank account, but are automatically and immediately forwarded to the tax authorities by that same smart contract. In case Party B has a right to reclaim the VAT that was mentioned on the invoice, this amount will be directly transferred from the bank account of the local tax authorities to the bank account of Party B as well. At that time, the tokens on the platform can be transferred back into local currencies at the relevant parties’ bank accounts.
This solution not only prevents fraud, but also lowers the burden of compliance costs that companies are now facing with respect to VAT reporting and proving that they are not part of any fraud scheme in case a potential scheme would be inspected by the tax authorities. By using the blockchain platform, all (necessary) real-time information is available to the tax authorities at any given moment in time. Further, only dealing with companies participating on the platform will provide certainty on your counterparties’ VAT compliance.

3.4. Roadblocks still to overcome

Blockchain is trust by design. It enables labelling (elements of) transactions to make money smart. With that, one could potentially solve important problems such as fraud and lower the compliance burden for taxpayers at the same time. The solution designed by PwC's Experience Center’s blockchain team shows that using blockchain technology can be a game changer by building a tax-fraud free society and help the European Union achieve its objective of countering VAT fraud.

There are however still some roadblocks ahead that need to be overcome before such a solution could actually be implemented. Currently, VAT is due at the moment it is mentioned on the invoice of a supplier. This VAT needs to be included in the VAT return considering the period of the invoice date, whether the payment has been received or not. On the platform, VAT is due as soon as the payment has been made – not taking into account the date of the invoice or the period of the VAT return. In fact, as the VAT would be paid directly, there might not even be a need to submit a VAT return at all.

Another issue to be considered is the direct payment of VAT. Certain entrepreneurs and SMEs may use the VAT paid by their customers as a cash flow advantage, given that this VAT usually only needs to be paid at a later point in time, or that it can be offset against the VAT that they have been paying to their own suppliers. Indeed, on the platform, this cash flow advantage would disappear as the VAT would no longer be in the hands of the supplier. However, on the other side of this supply, the customer receives the VAT paid to the supplier instantly from the tax authorities if that customer is able to reclaim the VAT, leading to a cash flow advantage on the other end of the supply. This advantage might equal the loss of the cash flow advantage on the supplier’s end of the supply.

A third consideration might be the implementation of such a platform, although this will be mostly of technical nature. With APIs linking the platform to the current systems of local tax authorities, chambers of commerce and banking platforms, the solution may be implemented
relatively easily. By connecting the platform to existing ERP systems, the blockchain transactions would only take place through an interface with existing systems, thereby not greatly affecting current processes.

Going forward, the use of the platform might lead to a shift of missing trader fraud from the electronic payment system to the world of cash. However, if it is possible to exclude all electronic payments from the research area of the investigation teams of local tax authorities looking for fraudulent parties, it would be a great step forward in solving the issue of VAT missing trader fraud.

4. Conclusion

Having an enormous potential, blockchain is currently at the top of its hype. Many individuals, as well as institutions are investing in cryptocurrencies, seeing the investable asset as a means of diversification. For businesses, there is perhaps greater potential in the technology behind cryptocurrencies and in utilizing cryptocoins to label transactions and make money smart.

During the past years, many use cases of blockchain were theoretical at best. Currently, the technology is evolving dramatically and generates many more opportunities for businesses within different industries. This article illustrated two use cases for businesses where blockchain delivers on this potential. First, with respect to international business transfers, it was described how payments can be executed faster, cheaper and more securely by settling cross-border transfers using bitcoin’s blockchain. Secondly, the potential of ethereum’s smart contracts in combating VAT missing trader fraud was discussed. In both cases, blockchain technology provides unique elements which solves the (business) issue at hand.

The practical applications of blockchain are especially interesting for internationally operating SMEs who need to save money on currency conversion, global businesses that want to avoid using cash in emerging markets and fast-growing companies that want to increase the speed of collecting payment on their invoices. Furthermore, business opportunities can be found by identifying situations where the traceability of money and determining its destination upfront are desirable before executing the transaction itself. It would be interesting for businesses to assess how such elements can improve budgeting, intercompany transactions and treasury management, when several parties are involved (either within the company’s group or external parties) and where there is a lack of trust. In these cases, blockchain technology may provide a path forward to greatly improve inefficient systems in global finance and tax.