

Cryptocurrencies and Business Ethics

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Abstract Cryptocurrencies such as Bitcoin, SETLcoin, Ether, Solar Coin, or Liberty Reserve exist since 2009. Because of their decentralized control, they are often considered a threat or alternative to the conventional centralized banking system. While the technological implication of some such currencies, especially of Bitcoin, has attracted much attention, so far there is little discussion about the entire field of cryptocurrencies and very little academic literature addressing its *ethical* significance. In this article, we thus address the impact of “blockchain technology” on the nature of financial transactions from a business ethics perspective. We begin with a survey on relevant literature from neighboring disciplines. Next, we work towards a 3 × 3 framework for current debates on the ethics of cryptocurrencies (see Table 1): we combine the *micro*, *meso*, and *macro* levels of business and society with assessments of the potential ethical impact of cryptocurrencies as morally *beneficial*, *detrimental*, and *ambiguous*. In addition, we highlight possible avenues for future research, such as the changing roles of the miners and regulators, the prosocial use of cryptocurrencies, the anti-social use for shadow banking and transactions in the ‘dark net’ and cryptocurrencies’ effect on inflation and deflation.

Keywords Cryptocurrencies · Blockchain · Business ethics · Financial system · Social business · Trust · Bitcoin · Darknet · Shadow banking

Purpose

Money makes the business world go round. Yet money is more than cash. Other forms of payment such as credit and debit cards differ, not always favorably, from conventional forms of money. The same is true for cryptocurrencies like Bitcoin (Trautman 2014; Vigna and Casey 2015), SETLcoin (Bajpai 2016), Liberty Reserve (Spiegel 2016), Ether (Extance 2015), Solar Coin, or further ‘social’ altcoins (Kleineberg and Helbing 2016).

While the merits and demerits of plastic money are widely and soberly debated, the discussion about digital money is much more mercurial; the subject attracts fewer combatants but flares more tempers. For both defenders and detractors, cryptocurrencies beckon the end of the world as we know it: the former condemn cryptocurrencies as downright evil (Krugman 2013) because they can facilitate nefarious commerce (e.g., weapons, drugs, and sex) and since they often escape public scrutiny or regulation. The latter hail cryptocurrencies as a solution to some of the most pressing societal ailments (e.g., poverty, debt crises, and hyperinflation) of the current economic system (Vigna and Casey 2015). Both sides concur, however, on the fact that due to their digital nature and global dissemination, cryptocurrencies have the *potential* to be much more pervasive than any previously established forms of money.

Obviously, for business ethics, it matters significantly whether the aforementioned moral claims about cryptocurrencies are (wholly or partially) true. In management

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circles, the relevance of the topic has not gone unnoticed (Dodgson et al. 2015). Leading universities, such as the Massachusetts Institute of Technology (MIT), have recently established research centers and started investigation projects on the topic. So far, however, this scholarship has not typically approached cryptocurrencies from a business ethics perspective (Angel and McCabe 2014).

Since the pioneering research on cryptocurrencies conducted in other academic disciplines often pertains to contemporary debates in business ethics, we begin this article by surveying this literature from a business ethics perspective. Second, we offer a systematic overview of the potential ethical impact of cryptocurrencies on the *micro*, *meso*, and *macro* levels (Dopfer et al. 2004) of business and society. Third, by clustering the *beneficial* as well as the *detrimental* and *ambivalent* characteristics of “altcoins” (alternative coins) in these rubrics, we hope to provide a framework for current debates and to highlight possible avenues for future research. In what follows, we first limit the scope of our investigation and explain in general terms the relevant features of cryptocurrencies for business ethics scholarship.

Limitations

Due to the survey character of this article, we cover only a limited section of the many ethically pertinent aspects of cryptocurrencies [for a wider introduction to the field of cryptocurrencies, see Jacobs (2011), Böhme et al. (2015), Raymaekers (2015) and Vigna and Casey (2015)]. The field of cryptocurrencies differs widely as to the specific features of the various altcoins. In this paper, we do not address individual cryptocurrencies, whether or not their specific features are factually beneficial, for example, through environmentally friendly currency generation (as in the case of “SolarCoin,”) or potentially harmful (as in the case of “Darkcoin”). Especially, we do not engage in the highly technical debates around Bitcoin. Instead, we focus on general and typical attributes for most, if not all, cryptocurrencies.

The technicalities of the value transfer process and its decentralized verification (so-called “blockchain technology”) are also beyond the scope of this article (for an introduction see the Oct 31, 2015 issue of *The Economist*). The same holds true for nonpecuniary uses of blockchain technology, which themselves are potentially of enormous societal impact and ethical interest, an issue that is slowly but surely recognized, as recent calls for papers to academic conferences indicate (HU 2015). Instead, we confine our investigation to the immediate impact of “blockchain technology” on the nature of *financial* transactions, as this financial aspect directly falls within the ambit of business ethics research. In what follows, we zero in on the impact

of cryptocurrencies on the institutionalization of “trust” in commercial relationships by examining characteristics that hold true for most cryptocurrencies with notable market valuations (such as Bitcoin, Dogecoin, Litecoin). Features specific to but one particular cryptocurrency, however, remain outside the scope of our investigation.

Moreover, it is our intent to open up a discussion on the ethical *pros* and *cons* of cryptocurrencies, yet not to decide any and all related moral questions on the spot. Oftentimes, the issues at hand are far too intricate to allow for swift assessments. Instead of parsing our own moral opinions on such ambiguous issues, we aim to present the array of existing opinions in order to stimulate and legitimate further research in this direction.

Relevance to Business Ethics

Business ethicists have reason to take cryptocurrency research seriously, not least because of the innovative and possibly disruptive nature of the modes of payment and business practice they offer. In contrast to more traditional forms of money, most cryptocurrencies are global and frictionless by design, facilitating a swift transfer across space and, crucially, without the backing of political authorities or private banks. Cryptocurrencies are transferred from and to electronic “wallets” secured by encryption. In principle, this allows for full anonymity of ownership and use. Not all existing altcoins, however, go quite so far. Bitcoin is an example of a “pseudonymous” currency, where encrypted accounts can theoretically be traced back to their owners while remaining anonymous for standard practical purposes. Value can thus be held and exchanged in cryptocurrencies without public disclosure of personal identity. As a consequence, transactions in cryptocurrencies are much less open to social pressure than exchanges in physical currencies; such opacity may have negative as well as positive ethical implications (see “[Moral Evils: Facilitation of Nefarious Consumption](#)” and “[Moral Ambiguities: Privacy Issues](#)” sections).

Moreover, since cryptocurrencies do not require banks and clearing houses, they may prove to be disruptive innovators to the entire industry of finance. Traditionally, when payer and payee are unfamiliar to one another, there is need for trust in mediating individuals or institutions as facilitators and guarantors of the respective transaction. Yet, by offering an impersonal verification technology, cryptocurrencies hold out the promise of transparency and credibility without a strict necessity to involve or pay mediators. Moreover, in theory at least, transaction costs in digital peer-to-peer transfer systems are close to zero (Wong 2014)—much to the possible benefit of the transacting parties and much to the potential disadvantage of all formerly advantaged mediating institutions. In practice,

though, for maintaining security standards many exchange platforms charge fees (Kaskaloglu 2014). These fees, however, are considerably lower than what conventional banks and financial service providers demand for exchanges of comparable value.

Cryptocurrencies replace the rather *centralized* generation and dissemination of units of payment through public institutions or private issuers with a considerably more *decentralized* process. Governments or banks cannot influence the overall available quantity of digital coins other than through becoming part of the process of “mining,” alongside other actors. As a result, the power of financial and political institutions over the available quantity of a respective currency is significantly reduced. The liquidity levels of cryptocurrencies cannot, therefore, be manipulated as easily as those of traditional currencies, for better (e.g., smaller risk of hyperinflation) or worse (e.g., diminished democratic malleability of monetary developments).

Introduction and Literature Review

The first truly functional cryptocurrency, Bitcoin, was created in 2009 and has been gaining momentum ever since, although lately the bitcoin community is divided into two fractions. One promoting the original idea of a limited cryptocurrency and a second fraction arguing for growth by making Bitcoin more of a traditional currency (Economist 2016). Although Bitcoin was soon widely discussed in business media, scholarly literature emerged only gradually thereafter; the first contribution to appear was not until 2011 in the *Journal of Internet Banking and Commerce* (Jacobs 2011). In the following, we present the current state of cryptocurrencies literature,¹ summarizing trends and issues. Most scholarly publications discuss the novelty of the underlying technology, legal, and regulatory issues, and last but not least the risks associated with cryptocurrencies on different levels.

General Features of Cryptocurrencies

Nearly all cryptocurrencies can be bought in exchange for traditional currencies (or for other cryptocurrencies), both online at various trading platforms and offline at certain ATMs. Initially, however, cryptocurrencies come into being through various processes of “mining.” Akin to the physical process of extracting the raw materials for bullion, the ‘mining’ of digital currencies demands the input of effort and/or equity. Typically, this means that a given user

is forced to spend time and computing power in order to participate in generating a “ledger” of transactions documenting all transactions with a certain ‘altcoin’ (alternative digital coin). Currency generation and payment verification are thus linked together. All cryptocurrencies require credible attestation that a given amount of value has indeed been transferred from one party to another in order to avoid fraud, e.g., through the “double-spending” of one and the same digital coin (Tendermint 2014). Clearinghouses and banks are solving this problem for traditional currencies—for a fee. In the world of cryptocurrencies, however, the global community of users tackles the verification task. As a reward or incentive, participants in this review process receive small amounts of newly “minted” digital coins. In the realm of Bitcoin, moreover, there is a discussion whether miners could or should impose costs for expediting certain transactions. In that case, miners would act much like conventional intermediaries charging transaction costs. Such a scenario, however, where miners are decentralized, still differs a lot from traditional currencies with a central intermediary.² There are, furthermore, new entrants to the scene of digital coins tying the ‘mining’ of a coin to certain social or ecological accomplishments (as, for instance, to the supply of solar energy in the case of “Solar Coin”). Thus, in many cases, ‘mining’ shifts from a *negative* to a *positive externality* of the acquisition process—bestowing additional benefits on society.

In all, altcoins can be generated (“mined”) and accessed by all with access to the requisite technology. This process of coin generation grants an uncommon degree of financial autonomy to civil society.

Novelty of Cryptocurrencies’ Technology

A key feature of cryptocurrencies is the “blockchain technology” which distinguishes today’s altcoins from all previous currencies (for a detailed comparison see Angel and McCabe 2014, pp. 2–3). Cryptocurrencies are generated and encrypted by a software code (Yahanpath and Wilton 2014) and transferred between users via electronic wallets. Like other *fiat* monies, cryptocurrencies are created *ex nihilo*. But neither are altcoins backed by an issuing authority (like a government, a central bank, or a commercial bank), nor is trust in such institutions any longer needed [on the replacement of trust by technology, see Jacobs (2011), Maurer et al. (2013), or Angel and McCabe (2014)]. Important implications for business and business ethics follow from this development, as we explore below.

Despite their novelty, cryptocurrencies can nevertheless be said to have predecessors in the form of other digital

¹ The review of the literature was concluded in July 2015 and contains only references published up to that date. .

² This latest turn nevertheless also caused a crisis for Bitcoin, as the open letter of Mike Hearn indicates (Popper 2016).

payment systems. According to Kim (2015), decentralized virtual currencies can be compared to virtual currencies present in online games since the 1990s. Kim finds that both virtual online game currencies and Bitcoin lower transaction cost leading to a “low cost alternative to real currencies” (Kim 2015, p. 17). Stokes (2012) argues in a similar vein when comparing Bitcoin with the *Linden Dollar*, an “in-world currency of the interactive online environment Second Life.” Although both Kim and Stokes see cryptocurrencies as direct descendants of such virtual money systems, there remains an important distinction to be made between cryptocurrencies and online game currencies, namely between the ‘first life’ ontology and the ‘second life’ virtuality of the latter.

Money theorists have long discussed the issuing of notes and the (apparent or real) creation of value. Debates have been particularly heated in regard to forms of payment such as ‘credit money’ or ‘fiat money’ in the sense of state-issued currencies, that are based on trust or promises (in stark contrast to the decentralized, software-based genesis of cryptocurrencies). Blockchain technology transparently creates a publicly visible “ledger” of the currency “mining” process, thereby ‘democratizing,’ at least in theory, sovereignty over the issuance of money. Barkatullah and Hanke (2015) show, however, that, in practice, things may not be quite so egalitarian. There is already a “technological arms race” underway to build ever more powerful processors, as it is only by solving increasingly complex mathematical puzzles that Bitcoins can in fact be earned (Barkatullah and Hanke 2015, p. 68). An entire industry has therefore emerged to produce specialized integrated circuits for Bitcoin mining processors (ibid., 69).

The trade and exchange of cryptocurrencies is essentially accessible to those in possession of an “electronic wallet.” As Kim (2015) points out, these peer-to-peer transfer systems are theoretically free, because “sending data from one user to the other [is] comparable to sending and receiving emails” (Kim 2015, p.12). For the majority of users, however, access to cryptocurrencies is mediated by trade and exchange platforms (Brandvold et al. 2015) such as Coinbase, Bitstamp, Mt. Gox, or BTCE, to name just a few (Dwyer 2015, p. 87). While these platforms do impose fees for their services, this does not alter the overall picture that the transaction costs of commerce in and with cryptocurrencies are radically lower than with any of the existing alternatives.

Exchange platforms carry their own risks, as all transactions in peer-to-peer networks run digitally, with “no person or institution [...] in charge of certifying exchanges” (Dwyer 2015, p. 82). This exposes assets held in cryptocurrencies to hazards such as technical malfunctions or the bankruptcy which forced the Mt. Gox platform to close down in 2014 (Evans-Pughe et al. 2014; Brandvold

et al. 2015). Also, unlike the open mining process of the blockchain, exchange platforms operate anonymously so that money can move secretly from one framework to another, which allows for shadow banking or even a shadow economy for illegal products and services. Not coincidentally, therefore, these exchange platforms are under the close scrutiny of such institutions as the U.S. Treasury Department’s *Financial Crimes Enforcement Network* (Dwyer 2015, p. 86).

While literature abounds on the *technical* aspects of the mining process, including the hardware and software issues associated with the cryptographic “mining” of electronic coins, the same cannot be said regarding the *ethical* consequences of the use of cryptocurrencies. Moral arguments, to the extent that they exist at all, mostly focus on the legal issues surrounding the new technology, such as money laundering and other ethically dubious behavior. We explore some of these issues briefly below, before attempting an ethical survey of the topic.

Legal, Regulatory, and Governance Issues

The legal assessment and regulation of cryptocurrencies is unsurprisingly intricate. Other than conventional central bank currencies, their operations have exerted a transformative influence upon the “global economic order” (Vigna and Casey 2015). Due to their global reach, cryptocurrencies pose a threat to conventional payment systems and currencies (Raymaekers 2015; Böhme et al. 2015) as well as to the existing legal frameworks and monetary policies which buttress them. Numerous publications investigate this threat; most articles focus on the US legal system (Boehm and Pesch 2014; Elwell et al. 2015; Kaplanov 2012; Trautman 2014), while several others concentrate on the legal systems of Germany (Beck and König 2015; Boehm and Pesch 2014; Eberwein and Steiner 2014) and Austria (Benndorf 2015). Of particular interest from a legal perspective are questions of just taxation (van Gils 2014) and the extension of existing (national) fiscal law to cover cryptocurrencies (Akins et al. 2014; Marian 2013) in a bid to prevent new forms of tax evasion (Marian 2014) and money laundering (Möser et al. 2013).

Many publications highlight the difficulty of tackling what is, in essence, a global phenomenon by means of national regulation alone (Brito and Castillo 2013; Trautman 2014; Elwell et al. 2015; De Filippi 2014). While some authors are optimistic that national governments can eventually come to terms with cryptocurrencies (Kaplanov 2012), others take a much more pessimistic stance. Fearing the insecurities they introduce, Erber (2014), for instance, recommends prohibiting cryptocurrencies altogether. Others, meanwhile, contend that only institutions which are themselves global, such as the IMF, could really regulate

cryptocurrencies (Plassaras 2013). Most authors, however, seek solutions through both national legislation and global governance initiatives. Many also advocate caution lest regulatory zeal hinder the healthy development of cryptocurrencies' liberating potential (Blundell-Wignall 2014).

Risks and Chances on *macro*, *meso*, and *micro* Levels

Cryptocurrencies pose risks to business and society on many societal levels. In the following, we build on the analytical framework as established in the social sciences and here more specifically in evolutionary economics differentiating between *micro*, *meso*, and *macro* levels (Dopfer et al. 2004). Where the *micro* level is understood to focus on the individual, and the *macro* level focuses on the aggregated system level, the *meso* level (for a definition see Dopfer et al. 2004, p. 267) points to the trajectories between the *micro* and *macro* level through organizations and structures.

Micro Level: Brito and Castillo (2013) emphasize that cryptocurrencies are not a safe-haven for personal savings due to the "risk of accidental deletion or misplacement;" an altcoin's 'loss' is almost impossible to retrieve. For example, individual users lost 650,000 Bitcoins due to turbulence created by the shutdown of the Bitcoin exchange platform Mt. Gox (Evans-Pughe et al. 2014; Brandvold et al. 2015). The major risk for individuals, however, comes from hackers who 'steal' altcoins by unauthorized access to individuals' electronic wallets or to digital exchange platforms (Lee 2011; McMillan 2014). Several hacker attacks on various altcoins have already been documented (Evans-Pughe et al. 2014, p. 84); this reality must be factored into any ethical assessment of cryptocurrencies. Not infrequently, injured parties are not wealthy investors with diversified asset portfolios but individuals short on financial alternatives, as the increasing popularity of cryptocurrencies among migrants sending remittances back to developing countries for example suggests (Angel and McCabe 2014, p. 4).

Meso Level: The use of cryptocurrencies by, among others, millions of migrant workers represents an existential risk to service providers like Western Union, who previously charged up to 17 % in fees for money transfers. This example highlights the disruptive potential of cryptocurrencies for the financial sector. Blockchain technology seemingly holds the "key to banking's future" (Zander 2014) by offering near-instantaneous exchanges for transactions worldwide at minimal costs.

Due to their enormous volatility in moments of perceived or real crisis, however, cryptocurrencies cannot yet adequately fulfill several of the important functions of standard currencies, including, most notably, value storage. Such volatility affects firms accepting cryptocurrency

payments such as *Overstock.com* or companies working on the hardware side of cryptocurrencies, as evidenced by the demise of CoinTerra, a Bitcoin-mining hardware producer in bankruptcy due to a price crash of Bitcoin (Edwards 2015). Bitmine, another producer of mining hardware from Ticino, Switzerland also went bankrupt in 2015 (Mik 2015).

Macro Level: Ever greater numbers of individuals, institutions, and communities are opting out of conventional currencies so as to escape the grip of governments or banks deemed corrupt or illegitimate (Vigna and Casey 2015), some with the expectation of cryptocurrencies to revolutionize the economic system (Van Hout and Bingham 2014). Due to a lack of governance mechanisms and regulatory frameworks, altcoins users are, however, susceptible to the enormous volatility of altcoins' exchange values (Baek and Elbeck 2015). Up to date, most research publications focused on exchange rate volatility (Cheah and Fry 2015; Gronwald 2014; Sapuric and Kokkinaki 2014; Vejačka 2014) emphasize its positive feedback loops: volatility fuels speculation (Glaser et al. 2014) which in turn leads to speculative bubbles in Bitcoin markets and further volatility (Badev and Chen 2014) with the potential to disturb the entire global financial system (Moore 2013).

Some empirical studies, however, offer a more measured assessment. Consider, for instance, the finding that the "average monthly volatility of returns on Bitcoin is higher than for gold or a set of foreign currencies in dollars, but the lowest monthly volatilities for Bitcoin are less than the highest monthly volatilities for gold and the foreign currencies" (Dwyer 2015, p. 81). Such research suggests that, if regulated wisely, cryptocurrencies could contribute to an overall decline in financial asset volatility by offering countercyclical investment opportunities (similarly to gold and other 'naturally scarce' assets).

Mapping the *Micro*, *Meso*, and *Macro* Levels

The relevance of the ongoing development of cryptocurrencies from the perspective of business ethics hinges on the ethical assessment of the nature and effects of each of these alternative forms of payments. Such assessments do *not always* vary according to the respective moral standpoint taken. Often enough, all or most standard approaches to business ethics, such as deontological, teleological, utilitarian, contractarian, and care ethics, to name a few, agree in their moral evaluation of certain aspects of cryptocurrency-based transactions: Some transactions are surely to be *commended* (e.g., mitigating poverty by reducing transactions costs), and others clearly to be *condemned* (e.g., facilitating illegal online purchases). Hence,

we classify such clear-cut issues without further ado as “moral goods” and “moral bads,” leaving as a third category “moral ambiguities” in order to highlight areas of uncertainty. These reflect instances where the moral evaluation is contingent either on disputed descriptions, or on contested normative concepts, or both.

We then apply these three categories (good, bad, ambivalent) each to the *micro*, *meso*, and *macro* levels of business ethics in order to structure our survey and in order to offer a useful 3×3 heuristic for identifying research gaps (see Table 1). By no means, however, could our study be considered comprehensive. In order to indicate at least *some* of the issues we have been forced to omit from our survey, we offer the following table:

The Micro Level

Moral Goods: Poverty Reduction

Due to their digital nature and the corresponding absence of mediating financial institutions, commercial transactions in cryptocurrencies can globally be executed in near real-time and almost cost-free (Wong 2014). Traditional transactions incur costs ranging from a small percentage of the total (e.g., through credit card fees) up to as much of a fifth of the sum transferred (in the case of small remittances). Cryptocurrency transaction costs, meanwhile, remain in the 0–1 % range (Kaskaloglu 2014). The difference is particularly significant with smaller exchanges, such as donations to the victims of natural catastrophes, expatriate workers’ remittances, or microloans for farmers in the developing world; for such transactions, cryptocurrencies appear to have many advantages over conventional forms of payment. Where the latter imposes transaction costs high enough either to diminish the beneficial effects

of exchange or to disincentivize the transaction altogether, the former offers a welcome alternative.

Internet access, along with the payment of a nominal fee for access to the services of a web-based trading platform, is in most cases sufficient for a cryptocurrency transaction (Dwyer 2015). This ease of exchange enables the receipt of micropayments or loans by those who would not otherwise have access to liquidity, offering the world’s millions of ‘unbanked’ an unprecedented degree of convenience and security (Vigna and Casey 2015). Lacking access to a physical bank or the requisite documentation of assets to use one, such individuals have, until the advent of cryptocurrencies, involuntarily foregone the options of saving and securing assets or of being able to engage in financial planning and investing. Through their reliance on cash, they are often put in danger and always confined to transact with people within their physical reach. Now, as long as (even temporary) access to a mobile phone with SMS capability can be gained, an entire world of transaction and investment opportunities suddenly becomes available (Raymaekers 2015). The success of digitized money transfers via mobile phones has already changed the banking sector for the better in many developing countries, but the addition of cryptocurrencies into the mix—for example in Kenya, where Bitcoin is hitched onto the popular M-Pesa system (Vigna and Casey 2015)—may accomplish even more through a further steep fall in transaction costs.

Moral Evils: Facilitation of Nefarious Consumption

The aspect of the altcoin world that has arguably received most attention in the popular media is commerce in the “dark web” (Dostov and Shust 2014). On websites specifically designed to escape public scrutiny,

Table 1 Overview of ethical assessment on *micro*, *meso*, and *macro* levels, where discussed topics are highlighted in bold, omitted topics in italics

	Good	Bad	Ambivalent
<i>micro</i>	Poverty reduction through reduced transaction costs <i>Frictionless, globalized payments</i>	Facilitation of nefarious consumption Lack of deposit insurance <i>Volatility</i>	Privacy
<i>meso</i>	Empowers BoP-business models and Social Business <i>Reduces Costs of global B2B and B2C operations</i>	<i>Nefarious businesses</i> <i>Shadowbanking</i> Volatility	Competition between Cryptocurrencies
<i>macro</i>	Reduces hyperinflation of monetary supply <i>Gives citizens of states with corrupt governments a financial opt-out option</i>	Tax evasion <i>Volatility</i>	Establishes Civil Society as 3rd emitter of currency <i>Reduces governmental monetary autonomy</i>

cryptocurrencies are being used to buy and sell illegal drugs, weapons, and sex. Unquestionably, the anonymity afforded by some altcoins affords criminals advantages compared to either trading in physical spaces or to using privately or publically owned exchange media within the virtual space of the Internet, opening the door to many forms of fraud and theft as in the case of the imprisoned founder Arthur Budovsky of the cryptocurrency “Liberty Reserve” (Spiegel 2016). Although law enforcement agencies have recently succeeded in closing down several cyber-commerce sites, it seems undeniable that the advent of cryptocurrencies has changed the playing field in favor of merchants and consumers with criminal intent.

Vendors can combine the economies of scale afforded by the Internet with the anonymity of cash-transactions hitherto confined to hand-to-hand exchanges. Already there is evidence (Böhme et al. 2015) that the increased opportunities for revenue and the decreased likelihood of detection are attracting an ever larger supply of illicit wares, driving down costs and, by extension, entry barriers for consumers, thereby effectively increasing demand. In short, by drastically *altering the quantity* and scope of such exchanges, cryptocurrencies can be said to have *transformed the quality* and ubiquity of nefarious commerce. One must, however, add that recently there is increasing news on successful digital tracing and thus policing of illegal commerce in the blockchain world by law enforcement agencies on the national level (Greebel et al. 2015) or international level (Plassaras 2013).

Another problem is the present lack of deposit insurance such that users of altcoin platforms are without remedy in the case of a system crash or currency theft. This problem could be tackled, however, by the emergence of both a private insurance industry (e.g., with bond against hacking) and public deposit insurance as well as regulatory efforts—akin to similar provisions in the world of traditional currencies.

Moral Ambiguities: Privacy Issues

The misuse of cryptocurrencies for illegal or illicit activities is enabled by enhanced privacy for users compared to credit cards and other forms of electronic payment (Maurer et al. 2013). Of course, privacy itself is not morally defective and is even viewed by many as a net moral *good*. Indeed, the potential to keep intrusive governments at bay was one of the initial attractions of cryptocurrencies among libertarians, who hailed the privacy of altcoins as nothing short of a cosmopolitan safe-haven for all freedom-lovers worldwide (Marian 2013).

The moral assessment of the privacy proffered by cryptocurrencies, however, is rather complex, with complications arising on both the descriptive and prescriptive

levels. Technological considerations weigh heavily on the assessment of the exact degree of anonymity certain cryptocurrencies grant to their users. Clearly, however, the outcome of this assessment affects the corresponding moral evaluation of such anonymity; certain nefarious schemes which require full anonymity to succeed may be thwarted where the veil of anonymity can be lifted (e.g., upon a valid judicial warrant), pierced (e.g., by criminal intelligence agencies), removed (e.g., by a community of programmers or web-administrators), or relinquished (e.g., by one or all of the transacting parties). We may be forced to nuance our ethical judgments about the respective type of anonymity or pseudonymity of given altcoins on the basis of these considerations (Koshy et al. 2014).

On the prescriptive level, we face the difficulty that privacy is prized in different ways and for different reasons. For libertarians, there could scarcely be a higher good; utilitarians, meanwhile, might prefer to highlight the widespread *misuse* of privacy in the “dark web” as a morally salient feature; teleological-minded ethicists in general would likely stress potential contributions to the common good, and thus come to different assessments for each altcoins in light of the consequences its adoption brings about; deontologists in turn would consider the question whether certain forms of anonymity could be universally granted according to reciprocally acceptable rules, and so on.

All of these differences come to bear on the question as to how to assess nefarious commerce. Should we see it as a merely accidental misuse of the intrinsically unqualified and *unconditional* good of privacy? Or are we to take such uses as an indicator for a reassessment of privacy as a merely *conditional* good, whose *legitimation* (through the ulterior purposes it does or does not serve) becomes at the same time also its *limitation*? These questions cannot be decided *ad hoc* and deserve deeper consideration than that provided by our survey.

The Meso Level

Moral Goods: ‘Base of Pyramid’ and Social Business

As cryptocurrencies impose miniscule transaction costs for value transfers (Kim 2015), they extend the realm of marginally productive business endeavors. Moreover, the value units of most cryptocurrencies can be subdivided almost *ad libitum*, thereby facilitating micropayments, and the development of more innovative business models. But why? Social value creation through corporations relies on some form of value capture; businesses servicing the “base of the pyramid” often face the problem that consumers reaping the benefits of their services are unable to pay for them. This inability to pay, however, comes in many

different forms. At times, the modes of available payment are a decisive factor.

For example, a pharmaceutical firm may provide medicine for sick individuals (primary beneficiaries). Thus, by reducing the risk of contagion, they also confer a collateral benefit on neighbors (secondary beneficiaries) as well as the wider community (tertiary beneficiary) by protecting and restoring the productive faculties of its otherwise incapacitated members. While the utility the pharmaceutical firm bestows on all three beneficiaries taken together would, if monetized, be more than sufficient to cover its investment with interest, the concomitant value capture often fails in practice. One recurring reason is the so-called ‘friction,’: with a large number of transfers of very small sums, the relatively high cost of each individual value transfer can render the entire scheme uneconomical. If secondary and tertiary beneficiaries are to supplement or supplant the payments of indigent primary beneficiaries, then the additional costs imposed by cumbersome and expensive micropayment transactions can become quite significant. By lowering or even abolishing such costs altogether, the use of cryptocurrencies is of potential advantage to all businesses, in particular for those whose servicing of the “base of the pyramid” is hampered by the ‘friction’ created by the proportionally high transaction costs of micropayments.

For many budding social entrepreneurs, a reduction in transaction costs for small payments may be so important as to decide the success or failure of their business models. Cryptocurrencies, moreover, can lower the transaction costs for all hybrid models of social business whose financial sustainability relies in part on donations or public support. In short, wherever the sums needed for a social business model cannot be generated by a few potent payers but rely on a large number of small payments (Greebel et al. 2015), cryptocurrencies can make a substantial difference and thus widen the ambit of feasibility of social business models.

Moral Evils: Volatility

Cryptocurrencies are known for their enormous volatility (Lemieux 2013; Yahanpath and Wilton 2014). The price of Bitcoin, for example, first skyrocketed, then crashed, and ever since has been a roller coaster of ups and downs. Hence, as is the case for most current altcoins, Bitcoin does not yet satisfactorily fulfill one standard function of money: value storage. If a new currency is to be accepted and used as money, business and civil society must be able to rely on some constancy in its value for mid-term and long-range planning.

On the *micro and macro* levels of society, the volatility of altcoins can both be beneficial as well as detrimental: As

for the *micro* level, individuals may be hurt when using cryptocurrencies, for example, for their retirement savings planning. On the flipside, they might also rejoice in the opportunity of treating the very selfsame volatility of altcoin values as an opportunity for high-yielding speculation. Whether, however, on the macro level, governments are positively or negatively affected by the volatility of altcoin exchange rates, meanwhile, depends much on their prior stance on the question whether they are in favor or in opposition to their very existence (Van Alstyne 2014); supporters of cryptocurrencies deplore what their opponents welcome. As a consequence, while price volatility also affects the *micro* and *macro* level of business and can hamper individual as well as institutional planning, one may well argue that such volatility is most destructive on the meso level of economic activities. For, as long as the price volatility of altcoins compares unfavorably to that of conventional currencies, the many potential benefits cryptocurrencies offer for both bottom-line and socially oriented businesses are in jeopardy.

Businesses—with the exception of professional altcoin investors—are hence averse to the volatility of cryptocurrency exchange values. Merchandise platforms such as Overstock.com (with a mission to integrate producers from developing countries who would otherwise have no access to global markets and economies of scale) have a business model which depends on a modicum of financial stability. The same is true for NGOs employing cryptocurrencies to safeguard the financial autonomy of minorities or to enhance gender equality in the allocation and spending of money. Such vulnerable clients cannot tolerate erratic fluctuations in value, inasmuch as their livelihood depends on income paid in digital currencies.

In short, drastic price differentials are useful only for the arbitrage games of professional speculators. The volatility of cryptocurrencies therefore tends to work to the advantage of those who have above-average financial assets, are time-rich and well-informed. But at the same time such volatility works to the disadvantage of the less privileged. The only possible redeeming feature of cryptocurrency volatility is that, over time, it tends to invite its own demise. The more speculators try to line their pockets, the faster liquidity levels will rise and thus, *ceteris paribus*, reduce volatility in the altcoin market.

Moral Ambiguities: Competition Between Cryptocurrencies

One common argument against the spread of cryptocurrencies runs as follows: even if it were advantageous to have one particular altcoin to compete with conventional forms of payment, this hypothetical advantage is surely obviated by the confusing array of cryptocurrencies currently vying

for attention. Some authors hold this excessive supply combined with the overhyped features of many and the downright fraudulent nature of some (for example, altcoins used for the so-called “pump & dump” schemes (Graydon 2014)) which makes the entire scene look shady, doing much to discredit the overall idea of cryptocurrencies as an ethical alternative to the monetary *status quo* (Seitim Aiganym 2014).

While accurate in their accusation of past misconduct, these arguments do not suffice to discredit the current use or potential future merits of cryptocurrencies. In fact, one might turn the argument against its proponents and define these vicissitudes as a painful but necessary process of social evolution: Altcoins amenable to, or even explicitly conceived for, morally deplorable purposes may, over time, be found out as unstable and unsafe storage mediums of value and eventually lose favor with investors. One might even optimistically contend that, over the long term, the public will come to prefer precisely such currencies whose design and administration guarantees transparency and accountability. Insofar, our thesis runs parallel to anterior arguments in favor of a free competition and denationalization of private currencies (Hayek 1978). The open market might tomorrow deliver what many hope for today: the identification of altcoins which credibly employ the potential virtues inherent in the conception of cryptocurrencies while eschewing their past and present vices (Fernández-Villaverde and Sanches 2016).

The Macro Level

Moral Goods: Reduction of (Hyper) Inflation

Proponents tout cryptocurrencies as a panacea for many ailments of the current economic system. Nowhere, arguably, are these aspirations more accentuated than when it comes to the macroeconomic effects of a supposed widespread adoption of altcoins. Cryptocurrency advocates defend altcoins as a path to a less crisis-prone financial system (Seitim Aiganym 2014; Maurer et al. 2013), and, by extension, to a more sustainable and equitable world economy (Angel and McCabe 2014). The backdrop for these claims is the connection between the frequency and intensity of world economic crises and overall financial liquidity levels.

The central argument runs, roughly, as follows: In an ideal economic universe, goods and services on the one hand and money on the other are in a moderately dynamic balance without drastic changes in their proportion that might lead to excessive inflation or deflation. A crass amplification of currency, for instance, can bring about inflation beyond the economically beneficial degree (historically referred to as hyperinflation) or speculation

bubbles and so unsettle established socioeconomic relations. States create such upheaval when printing too much money or assuming excessive debt. Yet also banks, individually and collectively, can destabilize the entire system. Due to the fact that private banks need to hold in reserve only a fraction of the assets they lend out, the amount of credit offered to borrowers can also inflate overall liquidity. In fact, several authors argue that in sheer quantitative terms, the augmentation of the global money supply through the fractional banking system is several times larger than the one driven by governments engaging in deficit spending (Van Alstyne 2014).

In the past, whenever excessive inflated liquidity levels induced primary asset speculation, thereby precipitating crashes with wider repercussions for the economy at large, money theorists would argue for a return to substance-based currencies such as gold and silver. These arguments frequently matched the sentiments of the general public, which in times of financial crisis tend to hedge through investments in bullion. Cryptocurrencies now present themselves as a welcome alternative. Some hold that, for a global and digitalized economy, the most rational escape from liquidity inflation is recourse to a digitalized global currency whose supply cannot be altered either by public or private institutions (Lemieux 2013). With algorithms as stewards of scarcity, cryptocurrencies could (if the algorithm and mining process remains unchanged and the overall amount of altcoins is strictly limited and transaction costs remain close to zero) become the gold of the future: a safe-haven for all who distrust the wheeling and dealing of ‘the establishment.’

This argument may be less far-fetched than it sounds. At present, we have a globalized economy but little global governance worthy of the name. Businesses compete with one another—and so do governments in a quest for tax revenues—without being adequately regulated by a cosmopolitan framework of financial regulation. This provides systemic incentives and leaves ample room for what economists call the ‘externalization of negative effects:’ both firms and states may serve their own interests, narrowly defined, by acting against the common interest of all. For instance, in order to satisfy certain desires today, businesses and governments may inflate the global money supply without appropriate regard for the needs of tomorrow (Andelman 2014). Through cryptocurrencies, people wary of such intergenerational wrongdoing would have an exit option. By moving their private assets out of state-issued currencies and into altcoins in order to safeguard their present assets against inflation, they would also produce a systemic incentive for governments and banks not to overplay their hands.

In this regard, it is worth mentioning that both excessive inflation as well as deflation are considered threats to the

overall stability of the financial system. As firms reduce output in order to adjust to declining prices, layoffs result, which in turn can lead into a recessionary spiral. The ones hardest hit are then those with the least flexibility of the prices, i.e., workers rather than firms. Lastly, as prices fall consumers who can afford to do so will delay their purchases since they anticipate that their money will buy them more (or better versions) of the respective goods the longer they wait and, eventually, aggregate demand dwindles with detrimental effects for the economy overall. It is in these circumstances that economists tend to advocate for monetary policy to loosen up in order to stop the decline of average prices, i.e., relying on a flexibility which certain cryptocurrencies do not allow for. Thus, there may be clear ethical downsides to currencies with deflationary tendencies.

Cryptocurrencies will eventually display deflationary tendencies when demand rises and algorithms limit their supply. As a rule, the quantity and quality of altcoins is no longer malleable once the code for them is written (Barkatullah and Hanke 2015). Exceptions to that rule are possible (if a majority of the miners worldwide agrees on such changes) but, on that very condition, also rather unlikely and rare. Yet a deflationary threat from altcoin usage does not seem very probable. Cryptocurrencies, even if—counterfactually—all of them were on an inbuilt path to deflation (and many of them are not so programmed), do not at present constitute a default means of payment. For the time being, they are but an opt-in currency as opposed to standard currencies, which, under certain governments, do not even allow for an opt-out. What cryptocurrencies thus do is create not annihilate alternatives so that people can ‘vote with their wallets,’ based on a personal assessment which price/value-dynamics they prefer.

Moral Evils: Tax Evasion

Due to their global nature, assets in cryptocurrencies can be used for tax evasion and shadow banking (Van Alstyne 2014). At present, some national governments and their internal revenue services are in the process of formulating legislation on assets held in cryptocurrencies. However, in many countries this is not (yet) the case (Akins et al. 2014; Marian 2013). Moreover, such actions only reach altcoins that are held pseudonymously so that, in principle, their holders can be identified, which creates an incentive for self-reporting one’s digital assets—an incentive which anonymously held cryptocurrencies clearly lack. While some libertarians may celebrate such a state of affairs as a welcome reprieve from illiberal overreaching of state bureaucracies, most other people would claim ethical grounds for stronger regulation. Here suggestions include a more prominent role of the IMF to regulate cryptocurrencies (Plassaras 2013). The ethical issues, however, remain

unsolved as the technology-based governance of altcoins still allows for the use of illegal and immoral transactions in the ‘dark net’ or for money laundering. Cryptocurrencies, however, create a new loophole (Irwin et al. 2014) which, if persistently exploited by some, may increase the tax burden on all, resulting in effective punishment for the honest and an incentive for frauds. The same can be said for the associated risk of money laundering, which altcoins also make easier (Möser et al. 2013; Evans-Pughe et al. 2014). In either case, there exists a perverse incentive structure, which, for ethical as well as fiscal reasons, ought surely to be dismantled.

Moral Ambiguities: Civil Society as Issuer of Currencies

For better or worse, the onset of the age of cryptocurrencies establishes civil society as a third emitter of currency alongside governments and banks (Segendorf 2014), to the dismay of adherents of the ‘currency school’ in monetary theory, who hold that money ought to be issued solely by public authorities (as ‘fiat money’). This outcome also irks proponents of the ‘banking school,’ according to whom money acquires value in proportion to the trust people bestow on the issuing institutions, namely banks with commercial incentives to maintain a certain quality and quantity of money.

Altcoins are much more removed from the influence of politicians and bankers. If anyone could be said to be the sovereign backer of such currencies, it would be global civil society as a whole. This very fact, however, leads to a range of potentially conflicting evaluations. While some deplore the fact that cryptocurrencies cannot be ‘managed’ in any traditional sense, others celebrate the idea that altcoins cannot be manipulated by ‘vested interests’ (Yahanpath and Wilton 2014). Where the former decry ‘chaos,’ the latter instead envision the formation of a new financial ‘cosmos’ in which civil society forces the public and private sectors into healthy competition for the most trustworthy currency. Only time will tell which side is closer to the truth.

Conclusions and Pathways for Future Research

The disruptive potential of cryptocurrencies, particularly given the ongoing crisis of the current debt-based fiat-money system, opens avenues for discussion and research on the *micro*, *meso*, and *macro* levels of business ethics (see Table 1). In contrast to the current monetary system run by governments, central banks and private banks, cryptocurrencies offer a trust-independent and technology-based means of currency generation and value exchange. Altcoins and the blockchain technology of digital ‘mining’

might have the potential to disrupt the existing monetary system, both for better and for worse, and thus contribute to a new monetary system overall.

However, given the myriad practical and technological issues associated with existing cryptocurrencies and the potential moral evils and wider moral ambiguities of the altcoin universe (transactions on the ‘dark web,’ tax evasion, money laundering, and the vulnerability to digital manipulation and theft), a morally acceptable alternative to the conventional monetary system has not yet arisen. Regulation on the national as well as the transnational level, as outlined above, could do a great deal to secure the potential benefits of cryptocurrencies such as assistance with poverty eradication. Cryptocurrencies are considered a remedy against poverty. They allow members of society, who could not open a regular bank account, because they might not have a proper home address, to participate in financial transactions via an internet-based altcoin account operable from any smartphone.

Moreover, by making use of the “instant real-time transparency” digital technology offers (Seele 2016), criminal behavior would be easier to monitor and thus more readily prevented. In short, through careful international regulation, the rewards of cryptocurrency use, such as the granting of financial sovereignty to civil society and the enhancement of global economic participation and value creation for the ‘base of the pyramid,’ could come to outweigh the ethical risks. This, however, does not eliminate the ethical challenges of illegal and immoral transactions in the dark net, of shadow banking, and money laundering. More transparency and complete protocols in line with national regulation could be a remedy here, although this would, of course, reduce the freedom and independence of altcoin use.

Since their inception in 2009, the perception of cryptocurrencies has changed markedly. This is particularly due to the recent crisis of Bitcoin (Popper 2016), which poses new questions to the future of cryptocurrencies in general and also indicates a path beyond Bitcoin (Extance 2015). In the light of the ethical considerations mentioned above we see need and potential for further research on cryptocurrencies in a business ethics perspective particularly along the following lines:

(1) *Ethical clarification of moral ambiguities* This article mapped the rather unknown territory of cryptocurrencies from a business ethics perspective. We identified the morally ‘ambiguous’ characteristics demand further consideration. Assessing these characteristics from the perspectives of deontological, teleological, utilitarian, contractarian theory, and/or from a care and virtue ethics angle may help to arrive at more balanced and nuanced ethical positioning of cryptocurrencies.

- (2) *Research on effects of inflation/deflation* The latest turbulences around Bitcoin and the discussions to make it more of a ‘traditional’ currency, where the number of units could be adjusted continuously (Popper 2016), opens questions regarding the inflationary versus deflationary effects of cryptocurrencies. Originally, the idea of a decentralized cryptocurrency did not contain the option to change the total number of units to be emitted, which is why initially cryptocurrencies were seen as a ‘new gold.’ Where, however, the amount of units of altcoins can be altered, this opens up questions regarding deliberate, instrumental inflation as well as deflation. Thus further research is called for on the economic and ethical effects of the design of altcoin liquidity levels.
- (3) *Changing role of the miner* Whereas in the original concept, cryptocurrencies were devised to be decentralized and unchangeable, the latest discussion on miners raising transaction costs and changing algorithms raises new questions. In particular, it puts into question the original belief that altcoins are a panacea against the arbitrary decision-making of private and central about liquidity levels and thus rather puts into questions the ethicality of the miners’ approach to generate and trade cryptocurrencies.
- (4) *Potential to promote good* By facilitating more affordable micropayments, altcoins could act as a major force for good throughout the entire social business sector. While the usefulness of social media for a wide variety of ethically motivated civil society initiatives has long since been at the focus of business ethics research, it is now time to investigate also the benefits, both existing and potential, of cryptocurrencies. Lately the call for “social bitcoins” (Kleineberg and Helbing 2016) also opened up the question how blockchain technology could be used to promote ethical goals in society, e.g., by hitching the ‘mining’ to the creation of social or ecological benefits.
- (5) *Business opportunities* Given the near-zero transaction costs of cryptocurrencies, existing business models for money transfer are now being challenged. New opportunities emerge as transaction costs and intermediary institutions disappear, particularly for microbusinesses at the base of the pyramid as well as for microtransactions in ‘crowd-and-cloud’ environments. Research should especially address hybrid business models whose feasibility relies on ‘liquid feedback’ and micropayments.
- (6) *Role of government* The potential backing of cryptocurrencies by civil society touches on one of the

core functions of government. If financial stability can no longer be guaranteed by government-owned central banks or other public players, currency wars between governments could also be started via cryptocurrencies. If cryptocurrencies remain decentralized, this would indeed also change the overall role of governments and their centralistic approach to monetarist policies. This is however not strict either-or, as also hybrid forms between governments or licensed by governments are conceivable. Hence research is needed which highlights both the risks and potential rewards of altcoins for government actors.

- (7) *Mapping regulatory trends* Closely linked to the changing role of government are global regulatory trends regarding cryptocurrencies, since the ethical implications of altcoins very much depend on regulatory frameworks with legislative reach across borders.
- (8) *Spread of use* More and more businesses are accepting cryptocurrencies as mediums of exchange. A rigorous mapping of this spread would enable business actors, among others, better to understand and offset looming volatility risks and generally to make sound policy decisions in this fast-changing field.
- (9) *Role of trust* Finally, we see the need for future research on the overall role of trust and money: With the advent of blockchain technology, radically new perspectives on the role of trust in monetary transactions are now emerging. Empirical research on trust in both *fiat*-money and cryptocurrency transactions can inform wider normative debates around the role of trust in business. Whereas public authorities legitimize central banks, the idea behind cryptocurrencies accepts no authority other than the one conveyed by the respective community of users through their acceptance of the algorithms governing the blockchain. Thus altcoins are a suitable *analogon* to substance monies such as gold, where likewise no political trust is needed.

In sum, in light of the tremendous challenges the economic system and the financial industry are facing at the moment, chances for prosocial alternatives must not be squandered, and hence these possible avenues for future business ethics research deserve further scholarly attention. The same applies, of course, for the many unsolved ethical challenges posed by the use of cryptocurrencies in the dark net, shadow banking, or money laundering.

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