Corporate Governance in a Crypto-World

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Abstract

This paper explores the nature of governance both within and by blockchains and the economies they support. There is a widespread assumption that the proper governance model for these economies is political, i.e., democratic voting. In this paper we make an alternative claim, namely that a more accurate model for blockchain governance is as a species of corporate governance. Political and corporate governance are similar, but they solve different problems with different incentives. Political governance, at its base, seeks to create legitimacy for coercive acts. Corporate governance is about solving agency problems with voluntary agreement. We explain why corporate governance is more like the latter, and in so doing draw out some of the lessons of the theory of modern corporate governance that might then usefully apply to the design of blockchain governance mechanisms.

Keywords: blockchain, corporate governance, political governance

1. Introduction

In this paper we examine one of two stylised facts within the blockchain eco-system. The first stylised fact – that we do not explore in detail – is that discretion can be largely replaced by *ex-ante* rules. There is a large literature in monetary economics, associated with Milton Friedman, which suggests that rules rather than discretion should employed in pursuing monetary policy. In the blockchain eco-system rules are determined by the deployment of smart contracts. Berg, Davidson and Potts (2019a,b) and Davidson, De Filippi and Potts (2018) argue that blockchain technology and smart contracts suppress opportunism (see Williamson 1985) and so dramatically expand the scope of economic activity.

The second stylised fact – that we do discuss in detail – is the assumption that when discretion is required (i.e., some form of human decision making or intervention) political governance mechanisms are the appropriate mechanism. We are less than convinced that *political* governance mechanisms are appropriate for the blockchain. Rather, we argue that *corporate* governance mechanisms are more appropriate mechanisms to deploy. At face value they are similar – they both have voting mechanisms at their core – but as we will argue they solve different problems at different levels of abstraction.

This paper is agnostic to specific forms of blockchain technology. It wishes to make a generalised argument that applies to all forms of decentralised ledger technology. For our purposes we are interested in those technologies that industrialise trust (Berg, Davidson and Potts 2019a, 2019b) i.e., public blockchains. Like Berg, Davidson and Potts (forthcoming) we adopt a precise *economic* definition of trust; many extant definitions are vague. For example, Hurwitz (2013: 1584) defines trust as being 'reliance without recourse', while Werbach (2018: 25) defines trust as being 'confident vulnerability'. Under those definitions, however, *the need for trust is a risk factor* in any transaction. Blockchain has been described as being a 'trustless' technology – the need for trust is reduced.[i] Of course, that is not at all how people normally think of trust – they think of trust as being the mitigation of risk. As Hurwitz (2013: 1584-5) argues the existence of trust is 'an intangible and important coordinating principle that [facilitates] interactions …'. By contrast, the need for trust may impede cooperation. Building on Lord Keynes' (1937) definition of risk, Berg, Davidson and Potts (forthcoming) argue that the existence trust alleviates or ameliorates the doubts that a transaction will be executed as negotiated.

This definition, however, raises the question – what are the factors that lead to higher levels of trust? In the context of fund managers, Gennaioli et al. (2015: 92) describe the sources of trust:

> Critically, we do not think of trust as deriving from past performance. Rather, trust describes confidence in the manager that is based on personal relationships, familiarity, persuasive advertising, connections to friends and colleagues, communication, and schmoozing.

In this paper, we discuss the notion of governance, and in particular corporate governance, as being a source of trust. Here, trust is not defined as a risk factor, but rather as a mechanism to reduce and ameliorate the risks of transactions not executing as expected. When contracts do not execute as negotiated the question arises what to do about that situation. This is the role for governance.

Governance problems arise when contracts do not execute as intended. Zingales (1998), for example, defines a governance system as 'the complex set of constraints that shape the ex-post bargaining over the quasi-rents generated in the course of a relationship'. Contracts may not execute as intended due to opportunism (Williamson 1985) or maladaptation (Aoki 1983, Williamson 1985). Of course, opportunism following maladaptation may also occur (Hart 2016). Williamson (1985) has defined opportunism as being 'self-interest seeking with guile'. This occurs when individuals engage in dishonest behaviour with respect to their trading partners. Aoki (1983) describes maladaptation as resulting from a 'shifting contract curve', i.e., the 'optimal' contract deviates from the agreed contract as real-world circumstances change. Over time the contract that individuals would have entered into changes from the one that they did actually negotiate. This deviation between the negotiated contract and the otherwise ideal contract imposes costs on, at least, one of the parties to the contract. That party may be likely to be subject to hold-up from their trading partner (Hart 2016) either as a result of opportunism or due to a genuine divergence of economic interest. In each instance, however, ownership or common governance is a solution to the problem at hand.

There are a number of high-profile examples where contracts have not executed as intended (or, at least, as anticipated). The Bitcoin Block Size debate, for example, was a somewhat heated debate over whether the block sizes on the original Bitcoin Blockchain should be varied in order to better achieve the objectives of the Blockchain (see Bier 2021). Or consider the original The DAO. After a hack had occurred on the Ethereum blockchain was effectively 'rolled back' to prior to the hack having occurred and funds restored to their original owners. More recently a software bug prevented the governance mechanisms within the Yam Finance protocol from operating at all. No doubt there are many, many other examples too. The point being that governance still has a large role in ensuring that contracts – even smart contracts – execute as expected.

The paper is structured as follows. Section 2 outlines the notion of political governance in the blockchain eco-system. Section 3 provides a broad overview of corporate governance, while section 4 applies those insights to the governance of blockchains. Section 5 combines insights from sections 2 and 4 into a discussion of 'legitimacy' in governance and section 6 concludes.

2. Political Governance in the Blockchain Eco-System

Vitalik Buterin (2021a,b,c) recently published three essays where he discusses issues of political governance in the blockchain ecosystem. In Buterin (2021c) he sets out the governance problem in the blockchain eco-system as being a conundrum:

> … the cypherpunk spirit is fundamentally about making maximally immutable systems that work with as little information as possible about who is participating ("on the internet, nobody knows you're a dog"), but making new forms of governance requires the system to have richer information about its participants and ability to dynamically respond to attacks in order to remain stable in the face of actors with unforeseen incentives.

Indeed, this is a challenge. Yet, notice that Buterin (here) implies that there is a need for governance to respond to attacks and deal with perverse incentives.[ii] In his other writings he imagines a broader scope

for governance. It is clear, however, that Buterin prefers political governance mechanisms over corporate governance mechanisms largely due to 'a result of my own failure after years of attempts to find a financialized governance mechanism that is economically stable' (2021c).

In his first essay, Buterin (2021a) laments that some blockchain treasuries have vast amounts of capital and pay vast sums for security, but do not seem capable of providing 'public goods'. In non-digital economies it is the role of government to provide so-called public goods. Economists define public goods as those goods and services that are simultaneously non-rival and non-excludable. One individual's consumption of the good or service does not prevent another individual from using that good or service *and* it is not possible to exclude anyone from consuming that good or service. Uncontroversial examples include national security and law and order. Traditionally economists have argued that a private market would under-supply such goods and services. Hence the argument that government provide those goods and services. Public goods are those goods and services that are provided by the political process and not the market process (Buchanan 1968: 162). Some economists have argued that governments tend to provide more goods and services than what can be justified by arguments relating to market failure (Hayek 1960, Mises 1949, Seldon 1998). We note these debates, but they are not of immediate importance to the argument we pursue here. What is interesting for our purposes is that Buterin has in mind a political governance mechanism – he talks of the need for 'legitimacy' and specifically links it to notions of 'process' and 'participation'.

Buterin (2021a) defines 'legitimacy' as follows:

> Legitimacy is a pattern of higher-order acceptance. An outcome in some social context is legitimate if the people in that social context broadly accept and play their part in enacting that outcome, and each individual person does so because they expect everyone else to do the same.

Economists should be familiar with that definition – albeit in a slightly different context – it is very similar to how Alchian (1965) and Demsetz (1967) define the notion of property rights. As Alchian (1965: 817) indicates:

> The rights of individuals to the use of resources (i.e., property rights) in any society are to be construed as supported by the force of etiquette, social custom, ostracism, and formal legally enacted laws supported by the states' power of violence or punishment. Many of the constraints on the use of what we call private property involves the force of etiquette and social ostracism.

While Demsetz (1967: 347) argues:

> Property rights are an instrument of society and derive their significance from the fact that they help a man form those expectations which he can reasonably hold in his dealings with others. These expectations find expression in the laws, customs, and mores of a society. An owner of property rights possesses the consent of fellowmen to allow him to act in particular ways. An owner expects the community to prevent others from interfering with his actions, provided that these actions are not prohibited in the specifications of his rights.

When Buterin speaks of 'legitimacy' he means that individuals have a (property) right to act in a particular way.

In his second essay, Buterin (2021b) discusses voting. For our purposes, he makes this claim:

> The voting process has four important security requirements that must be met for a vote to be secure: correctness, censorship resistance, privacy and coercion resistance.

But we are told:

> Blockchains are good at the first two. They are bad at the last two.

To be sure, those four criteria are very important in political governance. But less so in corporate governance. Buterin has in mind notions of political governance and political voting when formulating his arguments.

The idea that Buterin is thinking about political governance is further bolstered when he sets up a trilemma to illustrate his argument. He juxtaposes Democracy, Efficiency, and Security (see figure 1 below).

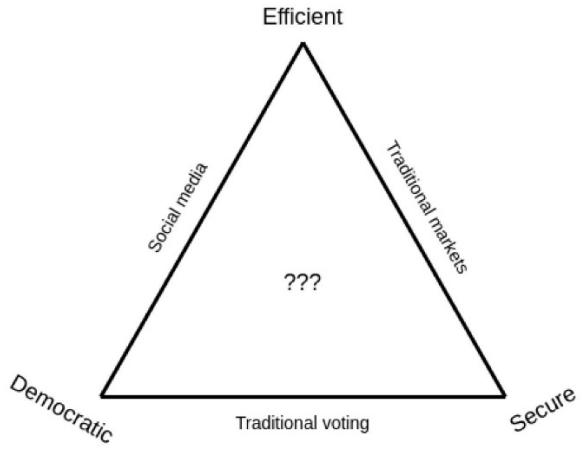

Figure 1: Buterin Trilemma. Source Buterin 2021b

He locates 'Traditional voting' between Democracy and Security with the trade-off being Efficiency. The notion that democratic voting leads to inefficiency is well established in the public choice literature (see Caplan 2007 for recent and compelling literature on this point). He also juxtaposes Democracy with 'traditional markets.' To be fair this is consistent with a lot of economic analysis. Yet he is completely ignoring a tradition in economics that was initiated by Ronald Coase (1937).

While neoclassical economics describes a situation where large numbers of buyers and sellers interact in markets and respond to price signals and the like, Ronald Coase explained that this vision of market economies – that highly decentralised vision – was inconsistent with the existence of firms. Firms – 'islands of conscious power' – allocate resources within themselves without reference to market prices. For our purposes theorists like Oliver Williamson (1985) have indicated that firms are themselves a form, and source, of governance. Contrary to Buterin's vision the trade-off between democracy (political governance) and the economy (what he calls 'traditional markets') is far more subtle. To be fair, theorists such as Hayek and Mises articulated their arguments (at a macroeconomic level) in these terms. But other theorists (Coase and Williamson for example) recognise that states and decentralised markets exist on a continuum governing human cooperation under the division of labour.

Political governance and corporate governance (discussed below) solve very different problems of human cooperation. Many observers might argue that political governance and corporate governance are mechanisms that facilitate collective decision making – albeit at different levels of aggregation. That notion, we suggest, is not quite correct.

Democracy as a form of political governance has been historically rare but has become increasingly common over the past 30 years. Most nation-states have at least the appearance of regular elections

where citizens cast votes for a legislature and/or an executive. As Buterin (2021b) correctly indicates this process is not widely perceived to be 'efficient', but as Winston Churchill is reported to have said, 'democracy is the worst form of government except for all others'. Caplan (2007: 3) is damning with his faint praise, 'At least democracies do not murder millions of their own citizens'. Similarly, Amartya Sen has argued that famines do not occur in functioning democracies (Sen 1999).

In this view democracy is a constraint on autocracy. Democracy acts a constraint on centralised power. In the theory set out by Djankov et.al (2003) and expounded by Allen, Berg and Lane in this special issue, democracy exists to mitigate dictatorship costs – the costs that centralised state power imposes on citizens. By contrast, in that framework, corporate governance does act as a constraint on disorder costs.

In any event, political governance and corporate governance perform very different functions within an economy and nation-state. Hayek (1960: 172–174) sets out three advantages of democracy – it facilitates peaceful transitions of power, it safeguards individual liberty, and educates the public in matters of public interest. As Caplan and Sen indicate these advantages are not trivial. Yet it is not clear that keeping the peace is a challenge for the blockchain eco-system. Political governance operates to legitimise and normalise coercion (see Mises 1927 [2005], 1944 [2007], 1956 [2006] for extensive discussion on this point). Corporate governance exists to prevent insiders from exploiting outsiders.

It will be apparent to the reader that we are clearly differentiating our notions of political governance and corporate governance from political theories of the corporation associated with theorists such as Ciepley (2013) and Singer (2018). It is true that both the liberal state and the corporation are forms of hierarchy in need of governance; yet it is not correct to argue that the objectives of the state and the corporation necessarily coincide, or that the precise governance mechanisms of each are interchangeable.

3. Corporate Governance

In this section we set out the notion of corporate governance in the context of the large publicly owned capitalist corporation.[iii] This institution is the dominant organisational form in most economies. There are other organisational forms that are of interest to organisational economists, such as cooperatives and workers owned firms, but here we wish to outline the general principles of corporate governance without being exhaustive.

Unfortunately, Shleifer and Vishny (1997: 737) do not have a compact definition of corporate governance:

> Corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment. How do the suppliers of finance get managers to return some of the profits to them? How do they make sure that managers do not steal the capital they supply or invest it in bad projects? How do suppliers of finance control managers?

While Shleifer and Vishny (1997) write about the suppliers of finance restraining managers, this problem remains true for other organisational forms – how, for example, do worker cooperatives restrain managers? The important point being this: corporate governance establishes expectations as to behaviour – it creates a form of trust.

Corporate governance deals with what economists label as being the 'agency problem' (Jensen and Meckling 1976). This is the notion that the managers of large firms often have high levels of decision-making rights within those firms, but few cashflow rights relative to their decision-making rights. This separation of ownership and control had been extensively discussed by Berle and Means (1932). The separation of ownership and control results in disputes between insiders (managers) and outsiders

(shareholders) over the allocation of free cash flow (Jensen 1986, 1989, Roe 1996). That dispute can manifest itself in many ways, for example it could be as simple as a dispute over effort. Insiders could shirk their responsibilities. Conversely, it could manifest as a dispute over risk profiles or time horizons. Insiders hold undiversified portfolios whereas as shareholders hold diversified portfolios and are likely to be less risk averse than managers. Insiders could consume (too many) perquisites on the job, or literally steal business opportunities from the business, or engage in insider trading. Conversely, Insiders could over-invest in loss-making business ventures. Of course, there are gains from trade in supressing these disputes, yet it isn't clear who benefits from those gains and how the gains would be shared, as such there is also a free-rider problem associated with the resolution of agency problems.

While the discussion is focussed on disputes between management and shareholders, these disputes do generalise to other stakeholders. For example, free cash flow disputes could occur between workers and management, risk profile disputes could occur between bond holders and management, and so on.

Agency problems could, in principle, be fatal to the prospects of any organisational form surviving. They represent a trust problem – insiders have access to privileged information and opportunities and could expropriate that information and those opportunities. Both market and non-market mechanisms exist to prevent or suppress behaviour that would otherwise inhibit profitable exchange and trade. Those mechanisms, however, are themselves costly and Jensen and Meckling (1976) have defined agency costs as being the sum of monitoring costs (outsiders monitor insiders to ensure their interests are being pursued), bonding costs (insiders signal to outsiders that they are trustworthy agents), and a residual loss (unresolved disputes that impose costs on the relationship despite both monitoring and bonding behaviour).

Jensen (1993) has argued that four control forces exist to align the interests of insiders (managers) and outsiders (capital providers). These include capital markets, legal, political, and regulatory systems, product and factor markets, and finally internal control systems.

In the very first instance, capital markets establish the cost of capital to firms, they also provide opportunities for mergers and acquisitions. Legal, political, and regulatory systems are important and have attracted a lot of interest over the years. Shleifer and Vishny (1997:750) argue, for example, that:

> [m]uch of the difference in corporate governance systems around the world stems from the differences in the nature of legal obligations that managers have to the financiers, as well as in the differences in how courts interpret and enforce these obligations.

La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997, 1999a, 1999b) have provided empirical evidence that legal and regulatory environments have a large impact on corporate governance. As Fama and Jensen (1983b) explain, 'Absent fiat, the form of organization that survives in an activity is the one that delivers the product demanded by customers at the lowest price while covering costs'. This implies that firms, irrespective of their internal disputes over free cash flow, must still meet a market test. They must still be able to satisfy consumer expectations while covering costs. The managerial labour market is itself a factor market and prices (wages) paid within that market will also act as a constraint on agency problems (Fama 1980). The argument here being that those organisations that are bedevilled by high agency costs will be less profitable than others and will be outcompeted. Finally internal control systems exist within organisations to inhibit insider opportunism. These include boards of directors, remuneration policies, audit functions, and the like.

An important internal control mechanism is the division of specialisation that occurs in decision management and control (Fama and Jensen 1983b). Decision management consists of proposal initiation and implementation, while decision control consists of proposal approval and monitoring. In modern corporations the management perform decision management while boards of directors perform decision control.

In this theory organisations are viewed as being nexus of contracts. As Fama and Jensen (1983a) explain:

> An organization is the nexus of contracts, written and unwritten, among owners of factors of production and customers. These contracts or internal ‘’rules of the game” specify the rights of each agent in the organization, performance criteria on which agents are evaluated, and the payoff functions they face. … The central contracts in any organization specify (1) the nature of residual claims and (2) the allocation of the steps of the decision process among agents.

Different organisational types allocate residual claims and decision-making powers in different ways.[iv] The modern firm has its origin in the specialisation of labour and vast amounts of capital necessary to finance mass production. To mobilise these vast amounts of capital it was necessary to vest the rights to residual income (profits) to capital providers. These capital providers (shareholders) are said to be the ‘owners’ of the firm. It is these individuals, according to Alchian (1983) who demand monitoring powers over the firm. Alchian’s (1983) view is that firms are comprised of both general and specific assets. Once an investment has been made in a specific asset,[v] there is always the opportunity for *ex post* opportunism (also see Williamson 1985 and Hart 1995). In order to minimise that opportunism, the owners of the firm are those whose resources or investments are specific to the firm. Williamson (1988) makes a similar argument when applying his transaction cost analysis to the debt-equity decision in corporate finance. There he argues that debt should be used to finance assets that are non-specific and equity to finance specific assets. The logic here is that owners of specific assets have an incentive to ensure that their investment does not lose its value – therefore, they should engage in monitoring.

For our purposes, organisations are not just nexus of contracts, they are nexus of *incomplete* contracts. Governance is the mechanism that ultimately resolves conflicts of interest between various stakeholders. In this view, ownership matters. Most importantly, in Hart’s (1995) view it is ownership of specific assets that matter – it is ownership over these assets that ultimately resolve hold-up problems that can arise when contracts are incomplete.

4. Blockchain Governance

The principles of governance and ownership in the industrial economy (i.e., the non-blockchain economy) have been worked out over many decades, if not centuries. It is not immediately obvious that these principles might apply to organisational forms within the blockchain eco-system. For example, in a blockchain context it is more likely that the providers of human capital will be ‘owners’ – to the extent that the notion of ‘ownership’ is even sensible. It is far more sensible to think of different parties to a nexus of contacts as having different sets of rights and obligations (see Hansmann 1996). Additionally, it might be easy to argue that the problems of traditional corporate governance are simply due to centralisation. Zingales (1998) makes the argument that ‘governance’ is synonymous with the exercise of authority, direction, and control’. One of the key tenets of the blockchain-economy is decentralisation and the absence of insiders who can misappropriate outsiders’ property. As we set out below, that argument is incorrect.

While the electronic markets hypothesis (Berg, Davidson and Potts 2019) suggests that we should observe more economic activity within markets and less economic activity within hierarchy in a crypto-economy, the fact remains that organisational structures identifiable as being a nexus of contracts do exist within the blockchain eco-system. Obvious examples include decentralised autonomous organisations (DAOs) and automated market makers (AMMs). These organisational forms constitute a nexus of *smart* contracts.

Blockchain technology has the potential to suppress opportunism (Berg, Davidson and Potts (2019, 2020) but does not suppress maladaptation problems. Maladaption occurs when real-world circumstances change over time requiring the original contract to be re-negotiated. Furthermore, ex post

bargaining to repair maladaptation problems may be subject to hold-up problems (a different manifestation of opportunism). The need for governance remains in the blockchain economy; smart contracts may not execute as intended. This need for governance is apparent even before consideration of the nexus of contracts being a nexus of *incomplete* contracts is considered. Williamson (1985) indicates that it is the incomplete nature of contracts (due to bounded rationality) that is a source of the need for governance too.

The challenge in this space is that the central contract to a nexus of contracts must spell out residual control rights, residual cashflow rights, and the relationship between those two sets of rights. In the blockchain eco-system, however, decentralisation is a key feature (or, at least, ambition) making the notion of residual control rights fraught. Governance involves controlling insiders – yet, by definition, in the (idealised) blockchain eco-system there are no insiders. This itself could become a governance problem.

There are three possible reasons why a smart contract may not execute as intended. As per industrial economy governance opportunism (less likely) and maladaptation (just as likely) play a role. But an additional source of governance risk arises – software bugs or attacks. In the blockchain eco-system the issue of debugging and updating software is a governance challenge. Who gets to decide when these tasks are performed, who performs the tasks, who pays for these tasks, and who decides whether these tasks have been adequately performed? In short, who maintains and monitors the nexus of smart contracts?

Of Jensen's (1993) four control mechanisms, we can only rely on product and factor markets to act as a governance discipline. Consumer acceptance in the blockchain eco-system determines outcomes (this is an argument made by Buterin 2021a) – but as in the industrial economy, this may be a weak governance mechanism. At present finance for the crypto-economy is not sourced in capital markets per se, and the existing legal, political, and regulatory environment can be hostile to many elements within the crypto-economy. That leaves us with internal control mechanisms – our argument is that these mechanisms are better suited being modelled on corporate governance principles than political governance mechanisms.

In an attempt to explore these questions and tease out insights from traditional governance to crypto governance we make use of some ideas and definitions provided by Nadia Eghbal (2020). She identifies three categories of individuals who operate in the open-source economy, which we assume is synonymous with the crypto-economy regarding 'public' projects, or those with an opensource software code base. 'Maintainers' are individuals who have a 'responsibility' for creating, distributing, and maintaining software. 'Contributors' are those individuals who have made some contribution to the creation, distribution, and maintenance of software – but importantly for our purposes, they have no responsibility to do so. 'Users' are equivalent to being consumers. Eghbal also identifies three explicit costs of developing software, and a further implicit cost can be derived from her explanation. There are creation costs, distribution costs, and maintenance costs of producing software. There is also a cost in building a community around any particular software application or use. This we will label as 'Social Licence' costs.

As Eghbal (2020) recognises establishing residual cash flow rights in open-source software, and thus the crypto-economy, is difficult, but not impossible. In the governance space, this means that the central dispute over the payout of free cash flow is masked. Quasi-rents are being created and dissipated. The allocation of those quasi-rents may or may not follow value-creation activities.

It is possible to think more about decision rights. The table sets out Fama and Jensen's (1983b) decision management and decision control dichotomy with Ebhbal's (2020) costs. We then speculate who may have decision rights in each instance.

Software Costs	Initiation	Ratification	Implementation	Monitoring
Creation Costs	Maintainer	Maintainer	Maintainer	Maintainer
Distribution Costs	Maintainer	Maintainer	Maintainer	Maintainer
Maintenance Costs	Users	?	?	Users
Social Licencing Costs	Users	?	?	Users

Creation costs are entirely borne by maintainers. Ideally, the software being developed will pass some form of market test – which could involve earning money or creating a new community or whatever the maintainer's objective might be. Similarly, the distribution costs are borne by the maintainers. As regards these costs, maintainers are insiders in the same way they would be in traditional corporate governance. With the exception, however, that community expectations in the blockchain eco-system is that insiders very quickly exit from positions of influence. This creates a theoretical problem in itself – the Jensen and Meckling (1976) result is that agency problems rise as founders exit the firm.

Maintenance costs and Social Licencing costs, however, may be somewhat different. Users would demand on-going maintenance in the first instance and could monitor whether their demands have been met. It is not clear, however, who would ratify initiation decisions or implement them. Similarly, it is not clear who would ratify or implement decisions relating to Social Licencing costs.

There is a choice of effort and a free-rider problem in the crypto-economy. Maintainers who create the software and have responsibility may not earn the returns consistent with their value creation. Eghbal (2020), however, is not overly concerned about this point. Open-source software is created and is a growing segment of the market. Furthermore, the existence of Contributors suggests there may be less of a free-rider in the creation of open-source software. At present it appears that interest in doing work outweighs incentive effects. Whether or not that dynamic scales as the crypto-economy scales is an open question.

The free-rider problem may also manifest itself in cheap talk – can anyone in the ecosystem initiate a proposal? It is also not clear who pays to implement proposals that have been ratified (by whom?). Then who gets to monitor? Some users? All of them? These are questions that governance processes must resolve.

At present, and as indicated above, the blockchain eco-system makes extensive use of political democracy in decision making. Individuals who may be either Maintainers, Contributors, or Users get to vote. Very often, voting allocations are arbitrary. Consider, for example, that governance tokens have been distributed by an airdrop. There is no guarantee that those individuals who have acquired the token have the expertise or interest to participate in the governance of the blockchain. Furthermore, voting is costly in terms of both information and knowledge acquisition, and in transaction costs (so-called gas prices).

These governance problems are not fatal to the development of the blockchain eco-system. Several different governance models appear to be at work. For the sake of completeness, permissioned blockchains have precisely the problems of traditional corporate finance and can be thought of as being business tools within traditional business. Permissionless blockchains, however, have the interesting governance problems as outlined here.

The establishment of arms-length foundations is a common solution to governance within the crypto-economy. The exact powers and financing of these foundations is an on-going discovery process. Some blockchains appear to have insiders who can make decisions under extreme or unusual circumstances. Another governance model is to think of constitutional monarchies – the monarch has very few actual functions but can deploy moral suasion to convince the population and/or may have residual powers

under extreme circumstances. These latter models of governance are not consistent with the technology being decentralised and 'trustless'.

5. Legitimacy in political and corporate governance

Buterin (2021) discusses the sources of 'legitimacy' – again within a political context – as arising from brute force, continuity, fairness, process, performance, and participation. As a political construct, that list is entirely sensible. As an economic construct, however, that list is incomplete. As we argued earlier what Buterin (2021) describes as 'legitimacy', economists describe as property rights. Mises (1949: 257) describes markets as being 'individuals cooperating under the division of labor' – what Buterin calls a 'coordination game'. These are similar constructs being viewed through a different lens. To emphasise that what Buterin is describing is properly conceived as a market process, we quote Geoffrey Hodgson's (1988: 174) definition of markets:

> … the market [is] a set of social institutions in which a large number of commodity exchanges of a specific type regularly take place, and to some extent are facilitated and structured by those institutions. Exchange ... involves contractual agreement and the exchange of property rights, and the market consists in part of mechanisms to structure, organise, and legitimise these activities.

It can be argued that government also consists of 'mechanisms to structure, organise, and legitimise' various activities. These mechanisms include voting at elections, transparent budget processes, adherence to the rule of law, and the like. There are, however, profound differences between firms, markets, and governments. Alchian and Demsetz (1972: 777) explains: 'The firm does not own all its inputs. It has no power of fiat, no authority, no disciplinary action any different in the slightest degree from ordinary market contracting between any two people'. Now while it could be argued that Alchian and Demsetz are not entirely correct in their characterisation of firms having authority and power – that relationship is still contractual and voluntary – governments *do* have the power of fiat, *do* have authority, and *do* have disciplinary power over citizens that is not contractual or voluntary.

Economists argue that property rights emerge to capture economic value either through changed circumstance or changes in technology (Demsetz 1967). Property rights change in the face of changing economic opportunity and very often operate to internalise externalities. Here we see the emergence of various etiquettes, customs, and social norms. These etiquettes, customs, and social norms are often incorporated into law (see Libecap 1978). Of course, not all property rights emerge in this way. Sened (1997) has set out a legal-centric model that explains the emergence of property rights within a legal or political framework. Singer (2018b) makes much of the fact that the modern corporation emerged from a legal and political process and not from an economic (or market) process *per se*. To our mind, however, that does not imply that corporate governance be supplanted by political governance as he argues. In any event, as Sened argues, economic and legal interests are closely aligned when creating new property rights.

Sened (1997: 77–78) sets out four conditions necessary for the emergence of a new property right: The right must be valuable, right-holders must want the right, rule makers must want to enforce the right, and (some) duty-bearers must want to respect the right (see Brooks, Davidson and Faff (2003) for a discussion where rule makers do not want to enforce a right). In Sened's model the rule makers are the government (politicians and/or bureaucrats) – more generally the state. In the cryptoeconomy there is no 'state' or 'politicians' or 'bureaucrats' who are able to impose their will on others. To be sure there are individuals who are recognised as being highly influential, but there is nobody that can exercise anything like the power exercised by a government.

In the cryptoeconomy when various etiquettes, customs, and social norms emerge and are then codified into the blockchain those practices have emerged through a market process and not a political process. There can be no central authority in a decentralised network. That is not to deny that vigorous argument

and debate may have occurred but rather that there is no analogous 'rule maker'. Duty bearers who do not wish to observe a rule can always fork the chain and, in political terms, secede from any community. There is, of course, no guarantee that they would succeed in that endeavour. By contrast, secession in a political sense from a nation state is always difficult, expensive, and subject to resistance (if not actual civil war).

6. Conclusion

Political governance exists to normalise and legitimise coercion. Democracy exists to facilitate the peaceful transfer of power and minimise conflict in society. Corporate governance exists to facilitate cooperation under the division of labour. Superficially both forms of governance have similar processes – consensus of a sort and voting. Yet these forms of governance operate at different levels of abstraction. It is true that some goods and services are provided in political processes and not via market processes and that some institutions emerge via political processes and not market processes. Those observations, however, do not imply that political governance and corporate governance can or should substitute for each other.

Even in the trustless blockchain environment there remains a role for governance – when contracts do not execute as expected or as intended there is a role for human intervention. It is our argument that much can be learned by examining the principles of corporate governance over political governance. That the mechanisms that have evolved over time to control and manage voluntary cooperation are more likely to inform our understanding of blockchain governance than the mechanisms associated with involuntary cooperation that is the hallmark of the nation-state.

In this paper, we have outlined how the lessons from corporate governance carry over into the digital economy, and the blockchain economy in particular. Shleifer and Vishny (1997) have characterised the corporate governance problem of being how the suppliers of finance control managers. Similarly, Roe (1994) has characterised corporate governance as being a situation of strong managers and weak owners – this can be generalised to being a situation of a strong insider and weak outsiders. In the blockchain space, it is argued that decentralisation mitigates the existence of 'insiders' and that rules (encoded in smart contracts) can replace (governance) discretion. This view is over-stated. The need for governance remains.

Challenges remain. It is unlikely that corporate governance can provide all the answers to blockchain governance questions. For example, all forms of business organisation are ultimately hierarchical organisations. Blockchains operate more like markets than hierarchies. It is also the case that corporate governance has little to guide our understanding of how new proposals enter into a crypto system, as that creative and entrepreneurial role is played by a separate function (i.e., management). Corporate governance is really a form of check on that power rather than a source of new ideas. However, political systems very much have the sources of change endogenous to the process, with many levels from citizens through to legislators able to introduce new ideas into the system, and with political governance then providing a check on that power. So, in this way, corporate governance is indeed a more constrained system. Blockchain governance, with various improvement proposals able to be raised and put to a vote by any denizen with governance tokens, is perhaps best characterised as a hybrid system; it has broader mechanisms for introducing new ideas than corporate governance, but, being limited only to governance token holders, offers less franchise than political governance.

Governance of crypto systems is still new and experimental, and new governance problems will surely emerge and new solutions to those governance problems will need to be discovered. It is our argument that those discoveries will emerge more via adaptive market-type processes (and are therefore more similar to corporate governance, which are the organizational forms best adapted to market systems) and less via political processes, which are more adapted to coercive rather than incentive shaped systems.

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[i] See De Filippi, Mannan and Reijers (2020) for a discussion of, and the distinction between, confidence and trust.
[ii] Buterin (2021c) is responding to Schneider (this issue).
[iii] This section and the next (Section 4) draw on Davidson (2021).
[iv] It is here too that an important distinction between corporate governance and political governance manifests itself. While different individuals may have an entirely different bundle of residual claims and decision-making rights within a corporation, all individuals as citizens (with few exceptions e.g., children and convicted criminals) have precisely the same bundle of rights within political governance.

[v] A specific asset has high value only in a specific economic context, for example when combined with specific other assets, requiring the cooperation of those specific complementary assets to produce value. Or put differently, a specific asset has low value outside of that relationship. That cooperation can be secured through different mechanisms, including long-term contracting or joint ownership. But that relationship exposes the owner of the asset to risks of opportunism and hold-up. The opposite of a specific asset is one readily substitutable to other economic uses, therefore not vulnerable to this hazard, and so not requiring governance.