

Sustaining society with ecological capitalism

Shann Turnbull*

International Institute for Self-governance, Co-founding Member: Sustainable Money Working Group (UK), Woollahra, Sydney, Australia

Abstract. The research question is how to achieve a prosperous environmentally sustainable global society. The objective is incompatible with economic policies of full employment or of uninhibited use of non-renewable resources. Politically attractive incentives of smaller taxes are identified as a way of changing the way capitalistic economies operates by introducing ecological forms of owning and controlling realty, firms and money. Ecological capitalism facilitates increases in prosperity even with de-growth from a declining and aging population. Crucially, it introduces localisation in citizen ownership and control of the means of production and exchange to provide a basic minimum dividend income for all citizens. A basic income allows full employment policies to be replaced with policies of fulfillment in employment and/or leisure. The cost of welfare and the size of government reduced from the tax reductions creates the political incentive for change. Localisation also enriches democracy with the power for citizens to nurture their host environment. Increased life expectancy with depopulation is already occurring in over twenty countries and this is expected to spread globally in the current century. This phenomenon with current environmental degradation creates an imperative for introducing ecological capitalism as an answer to the research question sooner rather than later.

Keywords: Basic income, ecological capitalism, network-governance, stakeholder-society

1. Introduction

Humanity is facing unprecedented challenges and some scholars argue what we do in the next 10 years will decide how we will live for the next thousand years. A multitude of crises such as witnessed by the 2008 Global Financial Crisis are a prelude of what can happen in a predictable sequence of shocks to the current system that is unsustainable. In this paper, I wish to propose a radical alternative way to conceptualize business and the market economy. I will make the bold claim that we can achieve a universally prosperous and environmentally sustainable global society. I will also layout that we cannot achieve it with the current institutions and setups.

1.1. Why we need a new type of market economy

The contribution of this paper is to consider as a research question how we can achieve a better system

and a universally prosperous environmentally sustainable global society. This objective is incompatible with traditional economic policies dependent on full employment and uninhibited use of non-renewable resources. Politically attractive incentives of smaller taxes are identified as a way of changing the way capitalistic economies operates by introducing ecological forms of owning and controlling realty, firms and money. Ecological capitalism facilitate increases in prosperity even with de-growth from a declining and aging population. Perpetual, static and perpetual ownership rules are replaced with time limited, dynamic and inclusive rules. These rules that follow the principles found in nature, allow the ownership and control of the means of production and exchange to be both democratised and localised with citizens. Democratised ownership creates a universal minimum social dividend to replace the need for full employment, welfare, pensions, and big government [49]. Local democracy is enriched with the power to nurture their host environment. The introduction of ecological forms of cost carrying money tethered to a local service of nature allows market forces to encourage production techniques that reduce their environmental impact. Increased life expectancy with depopulation is already

*Corresponding author: Dr. Shann Turnbull, Principal: International Institute for Self-governance, Co-founding Member: Sustainable Money Working Group (UK), PO Box 266 Woollahra, Sydney 1350, Australia. Tel./Fax: +61 2 8065 5905; Cell: +61 418 222 378; E-mail: sturnbull@mba1963.hbs.edu.

Table 1
History and vision of transforming society

Features	Past society	Present society	Future society	
1	People treated as	Property	Resource	Potential
2	Role of women	Breeding	Cheap labour	Full partners
3	Purpose of work	Sustenance	Income distribution	Fulfillment
4	Sources of income	Work	Work or welfare	Work and/or dividends
5	Environment	Subservient to	Dominant over	Stewardship
6	Natural resources	Use	Exploit	Sustain
7	Source of land acquisition	Conquest or inheritance	Purchase or inheritance	Use
8	Land ownership	Through occupancy	Perpetual	Time of use & so limited
9	Firm ownership	Start up or inheritance	Purchase/start up & inheritance	Start up, investment and stakeholders
10	Business owners	Proprietors	Shareholders	Stakeholders
11	Ownership period	Life of owner	Perpetual	Limited
12	Property rights	Discretion of Sovereign	Static, monopoly and perpetual	Dynamic co-ownership and time limited
13	Structure of business	Paternal and centralised	Hierarchic and centralised	Nested networks of component holons
14	Monopolies	Granted to private interests by rulers	Banned or government control	Removed by time limited dynamic ownership rights
15	Institutions	Perpetual	Static	Dynamic time limited
16	Value of money	Commodities	Artificial	Sustainable natural service
17	Creation of money	Mostly top down	All top down	Decentralised bottom up
18	Cost of money	Storage & testing	Interest	Cost of risk insurance
19	Allocation of resources	Command & control	Markets	Family, benevolence, semiotics & markets
20	Value system	Absolute	Materialistic	Humanistic
21	Wealth distribution	Autarchic	Market forces	As to contribution & need
22	Accumulation of economic value	Limited by political power	Unlimited	Limited by dynamic ownership and time
23	Source of power	Inherited, physical	Democracy	Holonic with demarchy [3]
24	Political power	Centralised in ruler	Gov. & big business	Spread to communities

occurring in twenty countries and this is expected to spread globally in the current century according to the United Nations [57:3]. This phenomenon with current environmental degradation create an imperative for adopting the findings of the research question sooner rather than later.

As outlined in Table 1, the changes proposed for achieving sustainable prosperity are arguably not as great as the societal changes that have occurred over the last millennium.

The imperative for designing an economic system to achieve “prosperity without growth” [18] sooner than later arises from:

1. The need to protect and nurture the environment to sustain humanity on the planet and for,

2. Coping for the first time with declining populations in advanced economies [37].

Rosenberg [37] reports that 20 countries now have negative or zero population growth before immigration with only Austria achieving net positive growth through migration. The Ukraine expects to suffer a 28 per cent decrease in its population from 2006 to 2050 with a 22 per cent decrease in Russia and Belarus and a 21 per cent decrease in Japan. Even strong economic countries like Germany are suffering a declining population. There are now 70 countries with their fertility rate at or below the replacement rate. *The Economist* went on to report: “The move to replacement-level fertility is one of the most dramatic social changes in history” [43]. While this is easing the environmental

impact of humanity it also introduces economic and social problems.

With such large reduction in populations there could soon arise problems in having excess infrastructure and facilities like water catchments, sewerage facilities, power generators, hospitals, schools, shops, sports grounds, entertainment centres, churches and so on. De-populations in some urban centres could result in many facilities not paying their way with the need for de-commissioning. Ghost suburbs could develop with substantial falls in real-estate values. De-population could also lead to many privatised public facilities becoming uneconomic and/or redundant leading them into bankruptcy.

As noted by Reddaway [35] a declining population reduces demand for goods and services as well as for new and replacement investment. For these reasons, unemployment can be expected to increase just because the population declines. This situation currently exists in Europe and Japan. Reddaway proposed that the State becomes responsible for providing unemployment income. However since his book was written over 75 years ago, the problem of citizens living longer well past their retirement age is now making impact. An increasing proportion of the population is requiring income support. This in turn jeopardises the living standards for those employed from the need to increase their tax burden to support growing unemployment, those too old to work and their growing medical costs. To mitigate the problem some countries are increasing the retirement age.

Increases in life expectancy have been on a straight line for the last 160 years according to Wiener [58]. In being interviewed on his book, Weiner [59] stated “you get an increase in life expectancy around the world in every country that has the benefit of modern medicine”. The increase has been so predictable to date that “It looks as if every day we live, we’re granted another five hours, somewhere down the road.” Life expectancy is being increased by science and medicine so “we’re constantly gaining time even as we use it up, consume it by living”.

According to the United Nations [57:1] “Life expectancy is projected to increase steadily in all countries after 2050. No limit is set on the increase of life expectancy.” The UN report went on to state that “the world’s dependency ratio rises from 0.7 in 2000 to 1.1 in 2300, implying that by that time there will be more than one “dependent” per person of working age”; the working age being defined as being between 15 and 60.

However, increase in life expectancy is not changing the rate we age, even with the benefit of current science and medicine. So the quality of life continues to decrease with age as reported by Milne. Milne [28] found that there was no change in the rate of aging in a Swedish study that went back to 1751. This means that as populations increase their life expectancy, the need for income support for medical care will escalate.

The tax burden on those employed will spread globally as more nations increase their living standards to provide life extending health care and improved education. Improved education of women allows them to control their fertility. The incentive for less children increases when families have access to income support when the parents become too old to work [43]. In this way increased living standards provide both the incentive and means to reduce the birth rate to accelerate global de-population.

A squeeze will be created on government budgets as more and more medical care and income support is required to support more and more citizens incapable of earning an income. Many existing pension plans are insufficiently funded to provide for their beneficiaries as they live longer.

The United Nations [56] identified a short-solution for these problems for some nations through migration. But as a declining birth rate spreads to more nations this option may soon diminish. The culture of the countries that are expected to maintain population growth from the year 2000 to 2100 might give rise to inhibitions in seeking immigrants from them. “. . . just three — Niger, Uganda and Yemen—are expected to account for over half of the positive contribution to population growth at that time.” [57:3].

The United Nations report [57] identified three possible scenarios of global populations over the next two hundred years. According to the medium scenario, world population rises from 6.1 billion persons in 2000 to a maximum of 9.2 billion persons in 2075 and declines thereafter to reach 8.3 billion in 2175. By 2050, India is expected to have surpassed China in population size and will remain as the most populous country in the world thereafter. However, between 2000 and 2100, the three most populous countries are expected to account for a declining share of the world population, passing from 43 per cent in 2000 to 34 percent in 2100. China and India alone are projected to account for nearly 48 per cent of the population losses projected to occur in 2100.

Some commentators consider that the root cause of many concerns over the sustainability of human

society arise because there is “plague of people on the planet¹”. The need to “Abandon affluence and growth” has been proposed for over thirty years by Trainer [45]. Trainer [46] advocates “de-growth” with a simpler lifestyle to reduce the pressures creating climate change, extinctions of fauna and flora, pollution and loss of non-renewable resources.

“The new economy” proposed by Trainer [47] has many features in common with the “Future society” outlined in that last column of Table 1. “Ted” Trainer and I share concerns over the inefficiencies, and injustices inherent in capitalism detailed in Section 2 and the problems that arise from over reliance on market mechanisms. Also shared is the objective of a society composed of locally controlled largely self-sufficient, self-reliant and self-financing democratically governed communities that can minimise the need for markets by relying more on other co-ordinating mechanism such as families, associations and networks. It is a vision that goes beyond the concerns of many environmental writers such as Berger [2], Gummer and Goldsmith [11], Jackson [18] and economists such as Daly [5, 6].

Trainer [47] assumes that to initiate change there is a need for an “enormous” change in the values held by people. This paper takes a different view as set out in my 1975 book that states: “The greatest benefits that may arise from the new rules for owning property may be the modifications they may initiate in man’s values and behaviour patters” [49:4]. This aspect is discussed in Section 3.2 with the proposals for changing the economy through self-interest and market forces.

The next section identifies the need to reform capitalism to make it more efficient for achieving an environmentally sustainable society. Reformed capitalism also distributes prosperity more equitably to promote a sustainable society [55]. Section three describes political attractive techniques for introducing ecological capitalism. Section four explains how tax incentives can be used to introduce ecological forms of ownership to allow communities to become self-financing and so more self-reliant. Section five describes the vision of locally owned and controlled sustainable global communities outlined in the last row of Table 1. Concluding remarks follow.

2. Why do we need a new type of capitalism?

This Section identifies how the existing static, exclusive and perpetual rules for owning and controlling money, corporations and realty are inefficient and inequitable. To ameliorate these shortcomings, different rules are proposed. These are described as “ecological” because they mimic the character of living things by being dynamic, inclusive and time limited.

Ancient ways for owning money described below need to be re-instated because modern money can misallocate resources. It has also become a major driver in generating wealth inequality and the over expansion of the financial sector described by Palley as “financialization” [31]. Likewise, the property rights of corporations allows investors to be overpaid with “surplus profits” [52] in a way that is not reported by accountants and so not recognised by economists to generate further inequality and the misallocation of resources. Accounting doctrines exacerbate misallocation of resources and inequities by treating a proportion of investment returns as a cost to reduce reported profits by an imaginary expenditure described as “depreciation”. These practices contribute to the seven deadly sins of corporate capitalism discussed below.

Inequality is also generated from the private ownership of urban land that can capture windfall gains generated from the investment of others in providing site services, facilities and amenities. Each of the above mentions concerns are discussed in the following subsections.

2.1. *The problems of modern money and credit*

Markets allocate resources through prices and prices are defined in terms of money. However, money is no longer defined in terms of any one or more real goods and/or services. As a result the price signals created by official currencies that are national monopolies, can distort the allocation of resources to a greater degree than taxes and tariffs from “faulty feedback” signals described by Jacobs [19].

A mind experiment can illustrate this point using two assumptions: (a) Demand for foreign exchange in any one region is proportional to the population and (b) Western Australia that earns 60 per cent of the foreign exchange of Australia can issue its own currency for its population that only represents 10 per cent of the Australian total. This means that Western Australians are earning five times the foreign exchange they consume while the Eastern States with 90 per cent of the

¹<http://www.spiked-online.com/index.php?site/article/3337/>

population only obtain 36 per cent ($0.9 \times (1.0-0.6)$) of the foreign exchange they require. Separately currencies would make Western Australia money worth much more than the money in the Eastern States. Manufacturing, tourism and the export of education services would boom in the Eastern States with folk in the Eastern States migrating to the West to obtain a higher standard of living. This mind experiment illustrates a fundamental problem of the Euro and the concerns of Friedman and Schwartz [9].

More importantly it illustrates how exclusive/monopoly money can seriously distort resource allocation to support the case presented by Hayek [12, 13] of de-nationalising money to have competing currencies. The price distortions and resulting inefficiency of modern money are exacerbated by it being allowed to earn interest that also introduces inequities.

Proudhon [34] pointed out that all real assets depreciated and/or carried a storage cost except paper money. To provide a level playing to create what Suhr [41] described as “neutral money”, Gesell [10] proposed that paper money should only be issued if it depreciated like real goods or required a storage/holding fee. The private issue of cost carrying money was initiated in Germany in the 1920’s and was so successful in stimulating depressed communities during the Great Depression that it soon spread in Europe and on to the US as reported by Fisher [8]. Keynes [22] supported cost carrying money that was described as “Stamp Scrip”. Keynes described Gesell as “unduly neglected prophet”.

So successful was the use of stamp scrip in Germany and Austria that it threatened the monopoly of official money and so was banned. The carrying cost was created by the need to periodically affix a stamp on the back of the script. Revenues from the sale of stamps paid for the redemption of the money. It allowed communities to stimulate their economies with a self-financing self-liquidating locally issued currency.

The Economist [42] suggested that “depreciating currencies” be re-introduced to stimulate economies after the Global Financial Crisis (GFC). Today, cell phones again makes it practical to introduce depreciating money that pays the issuer a regular usage fee or carrying cost. This makes money self-cancelling to force money to be spent rather than saved. As noted by *The Economist* [44] developing nations are leading the way in using cell phones for financial transactions. There are now more mobile phones in the world

than people² to introduce this form of ecological currency.

Cell phones have become electronic storehouses for money. In ancient Egypt, grain was used as money and deposited in storehouses. Deposit notes were issued in form of scratches on shards of pottery. Rather than earn interest, deposits incurred a storage fee and some times also a tax [40]. Cost carrying money has been the rule throughout history until the duplicity of fractional banking was introduced.

With fractional banking, banks created more notes to deliver grain, gold, silver, etc, than it owned. As the bank only held a fraction of the “hard” commodity backing the currency, this fraud meant that not all notes could be redeemed at once. Like a Ponzi scheme, only the first person to redeem their notes would be able to obtain hard currency unless other investors deposited new hard currency.

The ability of private banks to create credit out of nothing by issuing note to deliver commodities they did not own and then charge an interest rate or storage fee for a commodity they did not hold, exacerbates “financialization”, wealth concentration, inefficiencies and instability in the financial system. Huber and Robertson [17] estimated that if the government instead of banks carried out the creation of deposit money then UK tax collections in 1999 could have been reduced by 15 per cent. The former Governor of the Bank of England, Mervyn King, suggested that the practice of “fractional banking” be eliminated [23].

King [23] went on to state: “of all the many ways of organising banking, the worst is the one we have today”. A number of the indefensible practices of the existing financial system are set out in my paper on “How would the invisible hand handle electronic money?” [53].

2.2. *The problems of perpetual property rights*

Perpetual property rights allow investors to get overpaid. All intellectual property rights are time limited. Time limited investments are the norm as productive assets wear out or deplete. Perpetual property rights have only been created for owning land and corporations. To create a level investment playing field time limits need to be applied to all investments. This can also ameliorate the overpayment of investors and the associated concentration of wealth. Overpayment of investors is also inconsistent with the objective and

²<http://www.digitaltrends.com/mobile/mobile-phone-world-population-2014/>

reason for having a market economy to efficiently allocate resources.

In making a decision to invest, a commercial investor will not rely on the unforeseeable future to recover their investment and obtain a competitive return. The foreseeable future is described as the investor's "time horizon" [52]. Any cash received after the time horizon is not required to provide the incentive for the investment to be made. It represents a surplus incentive that I describe as a "surplus profit" [50]. Unlike profits, or any excessive profits that are reported by accountants, surplus profits are not identified or reported because accountants do not identify investment time horizons. This makes surplus profits different from other types of economic rent that are reported by accountants.

Because surplus profits are not reported, economic analysts are denied understanding how wealth in the form of asset ownership becomes highly concentrated. Surplus profits can be very substantial to become many times greater than the original investment as I discovered when working as a financial analyst for one of the largest firms in the world between my two years at Harvard Business School. More critically, economic analysts do not have a basis for understanding the full cost to communities that host alien investment. As a result foreign investment is widely promoted even though it may introduce excessive cost over benefits from its obtaining "unlimited, unknown and uncontrollable foreign liabilities" as noted by Penrose [32].

Another problem with the profits reported by accountants is that they under-report economic returns. This is created by accounting doctrines requiring accountants to describe part of the cash obtained from an investment as a return *of* the investment as a cost with only the remaining cash being described as a profit *on* the investment.

The cash described as a return *of* the investment is called "depreciation". This so called cost obscures the fact that investors are recovering the cost of their investment. Governments typically allow this artificial cost as a tax deduction. The tax deduction provided to investors to recover the cost of their investment has to be made up by other taxpayers.

Consider an investment being depreciated over ten years producing a net cash return of 20 percent per year. By introducing an artificial cost of 10 percent per year for ten years the reported before tax profit also becomes 10 percent per year. With a 30 percent tax rate the reported return becomes a marginal 7 percent. However, the after tax cash return to the investor becomes

17 percent that provides an acceptable 11 percent after taking into account the time value of money.

The policy lesson for governments from this insight is that ownership of any investment should be written off at the same rate that it is written off for tax purposes. This would not change the reported profits as the cost is already taken into account by the artificial cost of depreciation. For the various reasons set out in my other writings [50, 52] it makes good sense for the ownership of the assets being written off to be vested in the individuals who are essential for a firm to exist such as its suppliers, employers and customers. In this way surplus profits could become shared with stakeholders who participate in their creation. This provides one way to democratise the wealth of communities and so nations.

The above discussion explains some of the seven sins of corporate capitalism. Corporations can be:

1. Inefficient by not distributing to shareholders all their surpluses. This allows their managers rather than shareholders and so market forces allocate their investment funds. It also allows firms to grow too big to be allowed to fail;
2. Inequitable by over-paying investors with surplus profits not reported by accountants and not noticed or understood by economists;
3. Exploitive by not sharing surplus profits with their stakeholders on whose contribution they depend for their existence such as employees, suppliers, distributors, customers and other members of their host community;
4. Alienating by not sharing power with employees and other stakeholders;
5. Not directly accountable to all the stakeholders on which the firm depends upon for its existence and whose lives are affected by its operations;
6. Non-transparent, hiding the identity of their ultimate ownership and control with owners voting on a plutocratic basis that provides the wealthy with the most votes;
7. Degrading for democracy by using corporate resources to influence politicians and thereby concentrating economic, political and social power.

2.3. *The problems of private windfall gains from public investment*

Another way in which the current rules of ownership create inefficiencies and inequities is from windfall gains obtained from the private ownership of urban

land. The uplift in land values can occur from the site being approved for greater development and/or from surrounding improvements made in servicing the site with utilities, facilities and amenities by various levels of government and/or by private investors.

It is both inefficient and inequitable for government expenditure spent on utilities, roads, transport, schools, hospitals and other amenities to provide private profit to nearby landowners. The degree to which public investment creates private profit is not commonly revealed because economists or anybody else do not typically prepare balance sheets for communities. What is not measured is not managed. Windfall gains, like surplus profits are not generally reported and so not recognised by economists, policy makers and governments.

An illustration of the extent of how government investment can generate private profits is provided by the construction in 1999 of the Jubilee underground tube line in London. The cost of the project was 3.5 billion pounds. The uplift in land values within 1,000 yards of each of its eleven stations totalled 13 billion pounds [36].

Public expenditure could have been avoided and greater equity and efficiency achieved by the landowners financing the construction from the uplift in values they obtained. Even if the landowners borrowed all the construction costs they would still have received a net benefit of 9.5 billion pounds. However, this would still be inequitable as it is not the owners who create the uplift in values but the users of the sites and facilities. Sites and services without users have may be worth little.

As uplift in land/site values are created by the community, an equitable system of ownership would allow the community to share in the values so created. If all the land, but *not* the buildings, within 1,000 yards of each of the 11 Jubilee station had been collectively owned by a cooperative of all residents then each resident would receive a windfall gain of around 75,000 pounds using the data and assumptions presented in my paper on Urban Self-financing [54]. Each cooperative would have a net worth of $9.5/11 = 864$ million pounds after paying for the project with each resident owning cooperative shares worth around 74,000 pounds.

While a Cooperative or Community Land Bank (CLB) would create mutual ownership of land, the buildings would still be privately held by investors and/or residents. This is how the Garden City of Letchworth, 60 miles north of London, was financed at the beginning of the last century [16]. These examples demonstrate how urban development can be made

self-financing by capturing the values created by the community and being owned and controlled by local residents.

A condition precedent for any government to finance public works that generate windfall gains is that such gains be shared on a mutualised basis with only residents as described above. By eliminating alien and foreign ownership of land, this approach would reduce the leakage of values out of communities and their host nations. CLBs provide a way to make the financing of “transition towns” self-financing to spread their emergence to create a green economy as envisaged by Berger [2] and in this paper.

The cost of urban land typically represents around half the cost of a house in the US [7:3], UK and Australia [29:60]. The ability of CLBs to make land self-financing as indicated above allows the cost of land to be removed in new towns or inner city re-development projects. In this way CLBs can provide half cost housing and eliminate the cost of land for commercial investors in rental housing, retail outlets, office buildings, entertainment and sporting facilities. However, the condition for providing land without cost to commercial developers could be tied to a requirement that as they wrote off the cost of their building for tax purposes the ownership of building would be transferred to nominees of the CLB. In this way all tenants in rental housing would acquire ownership of their residence without cost and the CLB would become the owners of supermarkets, office buildings and factories. The rent/rates from the commercial sector could then cross subsidise low cost housing over generations. In the event de-population arises CLBs are well placed to restructure their community as they have integrated control over intergenerational facilities.

3. Making capitalism efficient, equitable and sustainable

This section outlines how the adoption of ecological property rights for owning and controlling money, firms and realty can make capitalism more efficient, equitable and sustainable.

But more importantly, ownership of income producing assets becomes universal for all citizens to provide a “third way” to distribute national income without employment or welfare. It is by this means that prosperity can be achieved without growth as sought by Jackson [18]. As the government is no longer required to raise taxes and distribute welfare, the size of government can

be reduced. This in turn increases prosperity as the dead weight transfer costs of government are also reduced.

Rules for owning money, firms and realty created by society can be changed by society. The incentives to change the most fundamental defining feature of capitalism arise because the new rules provide greater benefits for a greater number of people. Because of this there exists the opportunity of obtaining a political mandate to initiate the changes described. In this way the venal materialistic values of self-interest can assist change to overcome the concerns of Trainer [43]. The new institutions created would then provide incentives for citizens to change their behaviour from the collective interdependencies that would arise.

The introduction of ecological property rights would create three new types of market institutions: (a) cost carrying money; (b) Ownership Transfer corporations (OTCs) [49, 50] and (c) Community Land Banks (CLBs) [25, 49]. However, while changing the nature of property rights is a necessary condition for building a sustainable society it is not sufficient.

Also required is ecological control described as “network governance” that is ubiquitous in nature. Such is the efficacy of network governance that it spontaneously emerges when society become more complex and dynamic was reported by Jones et al. [20]. The reason for its success is because ‘Nothing can be made simpler without becoming more complex’ as noted by of the founding CEO of the Visa card organisation, Dee Hock [14]. In other words, as society gets more complex it requires a requisite variety of complexity in its communication and control circuits as identified by Ashby [1]. In this way tasks can be sufficiently simplified to match the limited ability of humans to multi-task and/or process data [51:245].

Both evolution and the analysis by Simon [39] provide evidence why the communication and control architecture of nature creates the most robust way to create or manage complexity. Innate physical structures of nature and biota always create or manage complexity by using simpler sub-components. The universe is made up of components that Hock describes as “Chaords” [14] because they represent both “chaos” and “order”. The academic literature reviewed by Mathews [27] describes these components as “holons” as the whole creates more than the constituent parts.

A hierarchy of holons is described as a “Holarchy” [24]. Holarchies have properties diametrically opposed to hierarchies. Hock [14] highlighted the difference by writing:

Industrial Age, hierarchical command and control pyramids of power, whether political, social, educational or commercial, were aberrations of the Industrial Age, antithetical to the human spirit, destructive of the biosphere and structurally contrary to the whole history and methods of physical and biological evolution. They were not only archaic and increasingly irrelevant, they were a public menace.

The ecological architecture developed by evolution provides a basis for designing the governance architecture of an advanced complex global society. A democratic society governed from the bottom up composed of self-financing locally owned and control self-governing communities that are mostly self-reliant.

To allow communities to be self-governing they must become self-financing to avoid economic and so political dependency. The same principle applies to all the higher levels in the political hierarchy presented in Table 2. To allow communities to become self-financing they need to stop value leaking out. Many families spend over a third of their income on rents or mortgage payments. To stop rents and interest leaking out it becomes essential for communities to establish their own local currency and minimise any external ownership of land, buildings and enterprises. As explained later, OTCs provide a way to minimise external ownership of firms and CLBs provide a way to minimise external ownership of realty.

The establishment of local ecological currencies with ecological rules for owning firms through OTCs and realty through CLBs provides ways to plug the drains that invisibly suck out economic value from communities.

3.1. *Ecological community currencies*

The reasons why the existing nature of money and the financial system should not be replicated have been indicated in the previous section. A community currency is not just required to plug economic leaks but to also establish a local unit of value that is defined by the natural endowment of the host bioregion. In this way the local environment can provide self-correcting price signals to maintain its sustainability that get lost with a national monopoly currency as discussed earlier and by Jacobs [19]. Money whose value is tethered to the retail value of electricity (Kwhrs) generated from benign renewable energy resources will be described as Sustainable Energy Dollars (SEDs) or \$Z.

Table 2
Global governance and political economy

Level	Principle roles ^(a)	Other roles ^(a)	Source of funding ^(b)
Family	Personal and social development	Community and cultural development	Work and/or dividends, rents, profits etc.
Enterprises	Wealth generation	Fulfilling work	Self-financing
Neighbourhoods	Social & cultural support	Substitution of paid services	Non-profit & voluntary contributions
Land banks (CLBs)	Income distribution between entities	Health, education, welfare, & other infrastructure services	Enterprise rents & gains from site trades
Cities	Provide infrastructure	Balance income between CLBs	Taxes from CLBs
Bioregions	Federating economic & political systems	Co-ordinating infrastructure services	Green taxes from degrading enterprises
Regional biospheres	Federating bioregions	Co-ordinating economic structures in regional biospheres	Green taxes from bioregions
Global	Governance of global commons	Co-ordinating political structures in regional biospheres	Green taxes from regional biospheres

^(a)Roles allocated on the basis that no level of government should carry out any function, which is better undertaken at a lower level as per the 'Principle of Subsidiary Function' [37]. ^(b)Sources of funding based on the medieval cascade system of taxation where each level of government taxes the next lower level, which it represents. No taxes on individuals or the profits of enterprises. Redistribution of income is achieved through the private sector from the democratic distribution of income producing assets and cross subsidisation through land bank rentals, property trades and provision of welfare services.

Table 3, Existing and Ecological Money outlines how \$Z contribute to building an ecological economy with quite different operating characteristics. Local Employment and Exchange Trading Systems (LETs) allows any person in a community to create and/or obtain credit. They illustrate how anyone can create credit. But governments and/or banks as shown in row 1 of Table 3 have typically created money.

Hand written IOUs were used as hand-to-hand money in Sydney Town early in the 19th century before there was a printing press or the discovery of precious metals in the Colony [4]. Parties accepting the notes as money, would counter sign the notes to pass the notes on as money. The additional signatures would reinforce the creditability and acceptance of the notes as money. Money was created from the bottom up by what was in fact a mutual credit system. Creditability to locally created notes can also be provided with third party guarantors. The guarantee fee would create a carrying cost as noted in Table 3, rows 2 and seven.

Over the millenniums money has always been a product of nature that incurred storage and/or insurance cost as proposed in the column of Table 3 rows 2 and 7. Cost

carrying money reduces the resources absorbed by the financial system because it removes the current incentive to invest in synthetic paper assets as shown in the middle column of Table 3, row 5 rather than in the real economy proposed in the last column of rows 9 and 11). In this way cost-carrying money paradoxically reduced the cost of the financial system whose purpose is to service the real economy.

Cost carrying money also improves equity as it removes the ability for money to make money from earning interest. Instead of capturing "unearned income" [11] an incentive is created to invest in what Moulton [28] describes as "... processes by which society expands its power to make nature yield its resource more abundantly". Moulton describes such processes as being "procreative". In this way productivity is increased to reverse inflation while limiting the ability of the finance sector to act like a leech on the real economy. The crucial importance of procreative assets is that they create the *only* way prosperity can be increased without humans working harder or longer.

Importantly, procreative assets by their nature must become self-financing as they increase productivity and

Table 3
Existing Official Money and Sustainable Value Money (\$Z)

	Difference between:	Existing official money	Sustainable Value money (\$Z)
1	Money created by:	Government & banks	Consumers, producers, traders and investors
2	Interest rates set by:	Central Bank	Cost of risk insurance ³
3	Expansion of money:	Government ratios/regulation	Value of market transactions
4	Value defined by:	Not defined	Benign renewable Kwhs (Z)
5	Unit of value	Government fiat	Benign renewable Kwhs (\$Z)
6	Store of value	Yes, subject to inflation	Not a store of value
7	Integrity of value	Indeterminate	Locally determined & tethered
8	Integrity of system	Exposed to contagion	Little exposed to contagion
9	Choice of currency	Government monopoly	Determined by currency region
10	Inflation control by:	'Blunt' policy instruments	Value of renewable Kwhrs
11	Structure of money:	Unlimited accrual of interest	Carrying cost limiting life
12	Economic flaw-1	Incentive to own money	Disincentive to hold money
13	Economic flaw-2	Allocates resources to finance	Real assets more attractive
14	Economic flaw-3	Distorts price relativities	Prices set by renewable Kwhrs
15	Financial system cost	Ever increasing	Minimized
16	Financial assets/real	Ratio increases	Incentive to minimize
17	Economic growth	Required to pay interest costs	Accommodates de-growth
18	Social flaw-1	Compounds unearned income	No unearned income
19	Social flaw -2	Concentrates influence	Localizes influence
20	Political flaw-1	Concentrates power	Enriches local democracy
21	Political flaw-2	Low accountability	Cooperative accountability
22	Environmental flaw 1	Incentive to burn carbon	Favors renewable energy
23	Environmental flaw 2	No feedback from nature	Nature controls price signals
24	Ecological feedback	None	Local renewable energy
25	Sustainability	Highly questionable	More likely

crucially they provide the ability for society to live more lightly on the planet, by making "nature yield its resources more abundantly" [29]. Investments in procreative assets provide the key to increasing prosperity without consuming more. Because procreative assets are by definition self-financing they can be owned any one or more individuals who can obtain credit during their payback period. The provision of credit insurance to cover their payback period provides a way to encourage the formation and wide distribution of the ownership of procreative assets to reduce inequalities and increase prosperity without growth. Various ways of providing selective credit insurance are described by Kelso & Hetter [21] and Turnbull [49:57].

No living thing can exist without processing energy, so electricity generated from renewable resources provides a universal inflation-resisting unit of value. The relative value of the Kilo Watt-Hours (KwHrs) generated in each community could vary according to its endowment of renewable resources. But some sort of

renewable energy is available throughout the world. As proposed in Table 3, row 6 the role of money would be simplified to only being a unit of account and medium of exchange and not also a store of value.

The value of \$Z can be determined by anyone who invests in solar cells, wind farms, hydrogen producing bacteria or other sources of benign renewable energy. Ideally, mutually owned and controlled renewable generators would create the reference unit of value for each community. The generators could be financed by consumers buying their electricity in advance by accepting IOUs issued by the mutual association, owned by the note holders, to deliver specified kWhrs at specified future times. The IOUs would be negotiable to become the reserve green currency of the community. Ideally also, the local government body or Coopera-

³As described at <http://www.nextbillion.net/remittances-mobile-globe-cash> and <http://www.wirelessfederation.com/news/13463-zain-bahrain-launches-zain-wallet-bahrain> viewed 22 March 2015.

tive Land Bank (CLB) would require its rates to be paid in green dollars issued to finance the conversion of renewable energy into electricity. The local government body could then redeem its notes to pay for its street lighting and other energy requirements.

However, it is vital to note that \$Z would not be redeemable into Kwhrs like Green Money that might be used to finance the electricity supplier. \$Zs are only tethered to the retail value of Kwhrs distributed in the currency area. This may include diverse types of renewable energy contributed by diverse suppliers who could also be consumer members of the mutually owned supplier. This insulates \$Z from being subject to short-term changes in consumption, supply or speculative derivative trading in energy futures that was the downfall of Enron. Tethering allows the value of supply to be averaged out for all types of renewable generators installed by different people at different times in the currency area.

The redemption of privately issued cost carrying money into various commodities was established in Germany in the 1920's. The idea was promoted by Silvio Gesell [11] so as to avoid the ability of money to make money and so the rich richer.

Privately issued cost carrying money described as 'stamped scrip' rapidly spread through Europe and to the US during the Great Depression because it was so successful in stimulating local communities as described by Fisher [10]. The scrip was issued mainly by individual businesses in Europe. In the US the scrip was issued by a local government authority or by organisations of merchants like a chamber of commerce. The merchants would agree to accept the scrip presented by their customers. Each Tuesday night the notes became worthless unless the holder placed a stamp on the back equal to 2 per cent of the notes nominated value. In this way the issuer sold stamps over a year valued at 52 by 2 per cent being 104 per cent to allow them to redeem the notes into official money and leave the issuer with a 4 per cent gross margin. While the merchants would need to pay 2 per cent of the value of the notes they held on Tuesday evening, this is but a fraction of the cost of paying over 2 per cent on every credit card transaction.

I discuss how many "invisible hands" would support the introduction of cost carrying money in another article [53]. Another GFC could initiate the spontaneous introduction of cost carrying money to complement, augment and/or replace legal tender as it did during the Great Depression [10].

Today, stamp scrip could be created in electronic form that could be stored on the Subscriber Ident-

tity Modules (SIM) of cell phones. Cell phones that can transmit money electronically and/or be swiped at checkout counters have already been introduced in some countries⁴. The introduction of cost carrying money, whether in official money or as \$Z would provide a way for communities to insulate themselves from another global financial crisis. Self-financing self-cancelling cost carrying money create the means to build economic lifeboats to float away from control and exploitation of big money central banks. To build the most efficient, equitable and effective lifeboats, communities need to also establish OTCs and CLBs as described below.

3.2. *Ecological corporations*

All the seven sins of corporations identified in Section 2.2 can be ameliorated and/or removed by providing a relatively modest tax incentive for investors to convert existing corporations to OTCs as explained in the Appendix of my book [49]. OTCs convert investor owned and controlled firms to stakeholder owned firms to provide a basis for introducing a comprehensive form of network governance [51:217].

The modest nature of the concession arises because investors discount twice money that they may obtain in the future. First they discount the value of future money because of the lost opportunity to earn interest and profits today. They then discount future values again to recognise the uncertainty of any values being recovered.

Equity investors are much more concerned about not losing the money they put at risk than the prospects of obtaining a return on their money invested. No matter what accountants may report, equity investors cannot make a profit until they have recovered all their investment placed at risk. The time required to recover their funds is described as the payback period. As the payback period gets longer the risk of loss gets bigger. The incentive for investors to vote at a shareholders meeting to convert existing corporations to OTCs in return for a tax concession is that they would obtain bigger, quicker profits with less risk. An analysis of the trade off between perpetual ownership and a tax incentive at various rates is provided in the Appendix of my book [49]

⁴When \$Z are created by a third party insuring private contracts to allow them to be used as money with part of the insurance cost attached to the contract/currency to create a negative interest rate. Cost attached to the currency could also include a contribution to a redemption fund and/or a verification fee on a decentralized system as referred to in the text.

and updated in my article on Stakeholder Governance [50].

No changes in the law need be required to create OTCs governed by their stakeholders. OTCs create investment shares that last for 20 years. This creates a more level investment playing field between investors in corporations and in patents that may last for twenty years. OTCs also create stakeholder shares that over the 20 years to acquire all the property and voting rights of the investment shares. Stakeholder shares would be issued without cost to residential individuals of the host community. In this way all OTCs would become locally owned and controlled to eliminate the draining out of the community profits that Penrose [31] described as “unlimited, unknown and uncontrollable”. It makes operational sense to include those individuals who can make a direct contribution to the success of the firm such suppliers, employees or customers or individuals employed by suppliers and customers. The identity of each individuals and the market value of the contribution of each are recorded in the books of the OTC and/or firms in which it does business. This provides one basis for distributing stakeholder shares. Other ways of distributing stakeholder shares could also be introduced to reduce inequality in society.

Besides being more economically efficient by limiting the export of surplus profits OTCs distribute wealth according to the contributions of its stakeholders. Stakeholder shares would obtain votes on a democratic basis of one vote per person rather than the plutocratic one vote per share obtained by investors. Each class of stakeholder would elect a separate stakeholder council to further and protect their interests and that of the firm as described by Pirson and Turnbull [32]. Firms would then become more accountable to their host community. Firms would not become too big to fail because investors would require all profits to be distributed each year instead of any being re-invested as retained profits become increasingly owned by stakeholders.

Firms would grow by establishing offspring corporations taking over part of the assets of the progenitor business. The offspring firms would be funded with dividends from their progenitor corporation and/or from other sources. This would also improve the efficiency of the capital markets, as shareholders, not managers would undertake re-investment decisions. Shareholders are not conflicted by being involved in the use of the funds to expand their power and influence by otherwise poorly justified growth. Shareholders, that now includes managers, and have many more investment options than firms and

their managers. The result would be the creation of many smaller firms to improve competition, social and political accountability with the features indicated in Table 4.

4. Self-financing urban communities

This section describes how communities can efficiently restrict the leakage of value from their community to alien parties through rents, interest, profits and/or capital gains. To achieve these objectives the title deed to land needs to be separated from the title deed to structures over the land [49:65] to create a CLB.

Combing the ownership values created in land with the ownership values of buildings creates both inefficiency and inequities because parties providing essential services enhance the value of the land/sites they service but do not share in the uplift in values they create. As a result, landowners capture unearned windfall gains generated by the investment by others. For example: governments who finance the roads, water, sewerage, schools and hospitals and the private sector providing shopping facilities, places or work, amusement and recreation.

Efficiency and equity can be achieved by all buildings being privately owned with all sites on which they are built being owned mutually by all citizens residing in the community. The community precinct would need a sufficiently large population to support a number of secondary schools and places of significant employment. In this way sufficient windfall gains created by urban development can be captured by the mutually owned CLB with sufficient rental income for it to become self-financing. As the cost of land is typically halve the cost of a dwelling, this arrangement eliminates the cost of land for pioneer homeowners to half the cost of acquiring a house. It also makes more attractive commercial investment in rental housing, office buildings and shopping facilities as the land cost is also eliminated for them.

All individual homeowners and individual residential tenants obtain one share in the CLB for each square meter of the site they occupy. As only residents can own voting shares, no non-residents or commercial investors can capture any uplift in land values created by the community to extract value from the community. As residents typically only occupy around 20 per cent of the land area in an urban precinct, the area of land in which residents obtain an ownership interest through the CLB becomes five-times

Table 4
Existing and ecological corporations

	Feature	Existing corporations	Ecological corporations
1	Rights to life:	Perpetual	Limited to 20 years like patents
2	Ownership rights	Static and monopoly	Dynamic and co-ownership
3	Owners	Located anywhere	Mainly local
4	Creation of corporations	Entrepreneurs & investors	Entrepreneurs, investors and mature fecund corporations
5	Size of corporations	No inherent limit	Limited by investor's short-term return <i>of and on</i> investment.
6	Number of firms	As at present	Many more smaller corporations
7	Power architecture	Top down	Top down & bottom up
8	Power distribution	Centralised	Decentralised
9	Control	Inside out	Inside out and outside in
10	Competition for control from	External equity markets and/or regulators	Internal agents from network governance
11	Social feedback	Media & managers	All affected stakeholders
12	Environmental feedback	Some from operational activities	Any concerned stakeholders as well as operational activities
13	Operational intelligence	Mainly known knowns and some known unknowns	Mainly external that can include unknown unknowns
14	Motivations	Profits of Mgs and investors	Sustainability of operations
15	Governance by:	Shareholders in theory but in practice by directors	Competitively and dynamically determined by stakeholders
16	Regulation by:	By government	By stakeholders and so by local requirements

greater than a homeowner with a conventional unitary title.

Homeowners can finance and sell their dwellings in the usual way. However, for the buyer to obtain title to the dwelling she/he must buy at market value the CLB shares held by the vendors that are redeemed by the CLB and resold to the buyer. The CLB share redemption price discount reduces from 100 per cent to zero over the time required to write-off the dwelling for accounting purposes. The profit obtained by the CLB in redeeming its shares and reselling them provides another source of income to allow the CLB to become self-financing.

Because the CLB becomes self-financing, its shares can be gifted to pioneer homebuyers. As investors cannot acquire CLB shares, tenants in rental properties can likewise be gifted shares over the period the rental properties are written off by their owners

for accounting purposes. Tenants acquire co-ownership rights to rental properties without cost at the same rate that the property is written off. This does not reduce the reported rate of return for investors. As co-owners tenants have an incentive to undertake repair and maintenance to increase the return of investors who already obtain higher returns by not needing to buy land.

CLBs capture the surplus profits by becoming owners of all commercial developments except rental housing. CLBs provide a way to provide a minimum social dividend to all residents, as every resident must become a shareholder. Residents involved as stakeholders from being suppliers, workers and/or consumers of local enterprises would also obtain additional income from acquiring without cost stakeholder shares as described in Section 3.2. It is by this means that national income

can be equitably distributed to all citizens without work or welfare.

The provision of a minimum income to all residents of all generations resident in a CLB means that provision for pensions are no longer required. This would improve the level of prosperity without growth, as individuals would no longer need to forgo consumption to finance a private pension or contribute to a public pension and medical insurance. As CLBs have a comprehensive integrated involvement in all aspect of community life at the neighbourhood level, they are well place to initiate preventive medical care and mobilise the unemployed in self-help and community care activities – refer to row four in Table 1.

The type of society that could result from introducing ecology ownership and control of money, firms and realty are considered in the next concluding Section.

5. Building sustainable communities

The type of society that would emerge by introducing ecological property rights to money, firms and realty is outlined in Table 1. The changes required to create a stable state more efficient and equitable resilient society with built-in feedback messages from its host environment are less than the changes achieved from the past. However, the time for achieving the changes needs to be very much shorter.

One of the results of introducing network governance within and between organisations is the decomposition of decision making labour to allow people with little specialised knowledge or experience to make decisions. Life and death decisions in a number of societies have been made by randomly selected people to form a jury to sit in judgement of people charged with murder. Random selection of qualified decision makers was an important element of Athenian democracy and in the governance of medieval cities of Italy [3]. Electing decision makers raises the problem of rich vested interests using their resources to support and/or buy votes of candidates who undertake to make decisions to further the enrichment of those already rich. Political democracies that elect representatives create an inbuilt bias for the rich to get richer.

Network governance makes is practical to introduce an alternative to electoral politics as described by Martin [28]. The selection of decision makers by lot instead of votes is described as “demarchy” [3] – refer to the second last row in Table 1. Some elements of demarchy are practiced in a number of employee

owned enterprises such as the MCC. The key to the constructive implementation of “demarchy” is for only appropriately qualified individuals to be available for selection. The process of filtering individuals according to their abilities is, in any event, typical of many pre-selection process in democracies based on political parties.

Another way of distributing political power, influence and wealth is through the rotation of office bearers. The city leader of ancient Athens was rotated each month with a representative from the various suburbs. This practice has been adopted by the European Union who rotate the Presidency every six months with leaders from their member states. To provide continuity each Presidency is shared among three member states over one and half years.

In considering how to design the governance architecture of society, scholars have identified six co-ordinating mechanisms. Economists focus on markets and private hierarchies. Social relationships are also governed by: families, networks, associations and government as identified by Hollingworth [17]. Each of these six co-ordinating mechanisms has strengths and weaknesses but each can be used in various combinations as found in various societies over history as indicated in Turnbull [51:276–7].

In addition, governance architects need to consider the criteria and design concepts embedded in nature. How and why the architecture of nature provides a compelling model for designing an equitable, efficient and sustainable society is illustrated in my PhD dissertation [51:130]. A contribution of this paper is to identify how this can be achieved by introducing ecological property rights and ecological governance.

The consumption of non-renewable resources is likely to seriously exacerbate the problems of achieving sustainable society. Reduced consumption may well be forced upon society. Trainer [41–44] anticipates this possibility with his compelling arguments for adopting a much more frugal lifestyle. But ecological capitalism facilitates increasing leisure and the quality of life and so prosperity even with de-growth in consumption per person with a declining population.

6. Conclusion

The Trainer analysis leads to the conclusion that a sustainable society that protects and nurtures the environment for future generations may only become

possible with a much smaller global population. The contribution of this paper is that it has identified a new type of capitalism that can promote a sustainable society on a politically attractive basis. Importantly this response to the research question makes it politically and economically attractive to encourage both de-population and de-growth to create a virtuous reinforcing process transform and sustain society for future generations in perpetuity.

References

- [1] W.R. Ashby, *An Introduction to Cybernetics*, p. 243, Chapman & Hall, London 1956, available at <http://pespmc1.vub.ac.be/ASHBOOK.html>, (accessed 2 February 2015).
- [2] C. Berger, *Better than Growth: The new economics of genuine progress and quality of life, a primer for policy innovation*, Australian Conservation Foundation, Melbourne, 2010, available at http://www.acfonline.org.au/sites/default/files/resources/ACF_BetterThanGrowth.pdf, (accessed 2 February 2015).
- [3] J. Burnheim, *Is Democracy Possible? An alternative to electoral politics*, University of California Press 1985.
- [4] S.J. Butlin, *Foundations of the Australian Monetary System 1788-1851*, University Press, Sydney, 1953.
- [5] H.E. Daly, *Steady State Economics*, 2nd ed., Island Press, Washington D.C. 1991.
- [6] H.E. Daly, *Beyond Growth: Economics of sustainable development*, Beacon Press, Boston, 1996.
- [7] A.M. Davis and M.G. Palumbo, *The Price of Residential Land in Large US Cities*, p. 3, Finance and Economics Discussion Series Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington DC, 2006, available at: <http://www.federalreserve.gov/Pubs/feds/2006/200625/200625pap.pdf>, (accessed 2 February 2015).
- [8] I. Fisher, *Stamp Scrip*, Adelphi & Co., New York, 1933, available at <http://userpage.fu-berlin.de/roehrigw/fisher/>, (Accessed 2 February 2015).
- [9] M. Friedman and A.J. Schwartz, Has Government Any Role in Money? *Journal of Military Economics* **17** (1986), 37–60.
- [10] S. Gesell, *The Natural Economic Order*, 1919 translated by Philip Pye, 2002, available at <https://www.community-exchange.org/docs/Gesell/en/neo/>, (accessed 2 February 2015).
- [11] J. Gummer and Z. Goldsmith, *Blueprint for a green economy: The low carbon economy, security, stability and green growth*, Policy Green Paper No. 8, London, Conservative Party, 2007, available at <http://www.conservatives.com/~media/files/downloadable%20files/lce.aspx?dl=true> (accessed 2 February 2015).
- [12] F.A. Hayek, *Choice in Currency: A Way to Stop Inflation*, Occasional Paper 48, The Institute of Economic Affairs, London, 1976.
- [13] F.A. Hayek, *Denationalization of Money: An Analysis of the Theory and Practice of Concurrent Currencies*, Hobart Paper Special 70, The Institute of Economic Affairs, London, 1976.
- [14] D.W. Hock, The Chaordic Organization: Out of control and into order, *World Business Academy Perspectives* 9(1), (1995) available at <http://education.jhu.edu/PD/newhorizons/lifelonglearning/higher-education/order/index.html> (accessed 2 February 2015).
- [15] J.R. Hollingsworth, Some reflections on how institutions influence styles of innovation, paper presented to the Swedish Collegium for Advanced Study in the Social Sciences (SCASSS) 26 September, 2002, available at: http://history.wisc.edu/Hollingsworth/documents/Some_Reflections_on_How_Institutions_Influence_Styles_of_Innovation.htm, (accessed 2 February 2015).
- [16] E. Howard, *Garden Cities of To-morrow*, Faber and Faber, London, 1946.
- [17] J. Huber, and J. Robertson, *Creating New Money: A monetary reform for the information age*, London, New Economics Foundation, London, 2000, available at <http://www.neweconomics.org/publications/entry/creating-new-money>, (accessed 2 February 2015).
- [18] T. Jackson, *Prosperity without growth? – The transition to a sustainable economy*, London, Sustainable Development Commission, 2010, available at http://www.sd-commission.org.uk/publications/downloads/prosperity_without_growth_report.pdf, (accessed 2 February 2015).
- [19] J. Jacobs, *Cities and Wealth of Nations: Principles of Economic Life*, p. 156, Vintage Books, New York, 1985.
- [20] C. Jones, W.S. Hesterly and S.P. Borgatti, A General Theory of Network Governance: Exchange Conditions and Social Mechanisms, *The Academy of Management Review* **22**(4) (1997), 911–945.
- [21] L.O. Kelso and P. Hetter, *Two-Factor Theory: The economics of reality*, Vintage Press, New York 1967.
- [22] J.M. Keynes, *The General Theory of Employment, Interest, and Money*. New York, Harcourt Brace Jovanovich, Chapter 23, part VI, 1964, available at <http://www.marxists.org/reference/subject/economics/keynes/general-theory/index.htm>, (accessed 2 February 2015).
- [23] M. King, Banking: From Bagehot to Basel, and Back Again, The Second Bagehot Lecture, Buttonwood Gathering, New York City, October 25, (2010), available at <http://www.bis.org/review/r101028a.pdf> (accessed 2 February 2015).
- [24] C.O. Koestler, *The ghost in the machine*, London, Hutchinson, 1967.
- [25] M. Lewis and S. Turnbull, Cooperative Land Banks: A solution looking for a home, in *i4*, Canadian Centre for Community Renewal, Vancouver, November 30, 2011, available at <http://communityrenewal.ca/co-op-landbanks>, (accessed 2 February 2015).
- [26] J. Martin, Demarchy: A democratic to alternative to electoral politics, 2001, posted at <http://www.uow.edu.au/~bmartin/pubs/89demarchy.html>, (accessed 2 February 2015).
- [27] J. Mathews, Holonic organizational architecture, *Human Systems Management* **15** (1996), 27–54.
- [28] E.G. Milne, Dynamics of Human Mortality, *Experimental Gerontology* **45**(3) (2010), 180–187.
- [29] A.J. Moran, *The tragedy of planning: Loosing the great Australian Dream*, p. 60, Institute of Public Affairs, Melbourne, 2006, available at: <http://www.ipa.org.au/library/MORANPlanning2006.pdf>, (accessed 2 February 2015)

- [30] H.G. Moulton, *The Formation of Capital*, The Institute of Economics, The Brookings Institution Publication No. 59, Washington, DC, pp. 11–13, (1935).
- [31] T.I. Palley, *Financialization: What It Is and Why It Matters*, Working Paper No 525, The Levy Economics Institute, New York, 2007, available at <http://ssrn.com/abstract=1077923>, (accessed 2 February 2015).
- [32] E.T. Penrose, Foreign investment and the growth of the firm, *The Economic Journal* **66**(262) (1956), 235.
- [33] M. Pirson and S. Turnbull, Corporate Governance, Risk Management, and the Financial Crisis - An Information Processing View, *Corporate Governance: An International Review* **19**(5) (2011), 459–470.
- [34] P.J. Proudhon, *What is Property? An Inquiry into the Principle of Right and of Government*, BiblioBazaar LLC, [1840] (2007), available at <http://theanarchistlibrary.org/library/pierre-joseph-proudhon-what-is-property-an-inquiry-into-the-principle-of-right-and-of-governmen>, (accessed 2 February 2015).
- [35] W.B. Reddaway, *The economics of a declining population*, Allen and Unwin, London, 1939.
- [36] D. Riley, *Taken for a Ride*, Centre for Land Policy Studies, London, 2002.
- [37] M. Rosenberg, Negative Population Growth: 20 countries have negative of zero natural increase, 17, November, 2010, posted at <http://geography.about.com/od/populationgeography/a/zero.htm>, (2 February 2015).
- [38] E.F. Schumacher, *Small is beautiful: A study of economics if people mattered*, p. 203, London, Abacus, 1975.
- [39] H.A. Simon, The architecture of complexity, *Proceeding of the American Philosophical Society*, 106, December, pp. 467–482, (1962).
- [40] D. Suhr, *The Capitalistic Cost-Benefit Structure of Money: an analysis of money's structural non-neutrality and its effects on the economy*, Berlin, Heidelberg, New York, Springer, 1989.
- [41] D. Suhr, *The Neutral Money Network: A Critical Analysis of Traditional Money and the Financial Innovation "Neutral Money"*, (NewMoNe), University of Augsburg, Paper presented on 30 April 1990, in Brussels.
- [42] *The Economist*, 'Depreciating Currencies', p. 74, January 24th–30th, 2009, available at http://www.economist.com/finance/displaystory.cfm?story_id=12998254, (accessed 2 February 2015).
- [43] *The Economist*, 'Fertility and Living Standards: Go forth and multiply a lot less', October 29th, 2009, available at <http://www.economist.com/node/14743589>, (Accessed, 2 February 2015).
- [44] *The Economist*, 'Mobile marvels': A special report on telecoms in emerging markets, September 26th–October 2nd, 2009.
- [45] F.E. Trainer, *Abandon Affluence and Growth*, Zed Books, London, 1985.
- [46] F.E. Trainer, De-growth is not enough, *The International Journal of inclusive democracy*, 6:4, (2010) available at http://www.inclusivedemocracy.org/journal/vol6/vol6_no4.trainer_degrowth_not_enough.htm, (accessed 2 February 2015).
- [47] F.E. Trainer, *The New Economy: For the simpler way*, 2010, posted at: <http://ssis.arts.unsw.edu.au/tsw/TheNewEc.html> (accessed 2 February 2015).
- [48] F.E. Trainer, *The Transition to a Sustainable and Just World*, Envirobook, Sydney, 2010.
- [49] S. Turnbull, *Democratising the Wealth of Nations*, The Company Directors' Association of Australia, p. 4, Sydney, 1975, available at: http://ssrn.com/abstract_id=1146062, (accessed 2 February 2015).
- [50] S. Turnbull, Stakeholder governance: A cybernetic and property rights analysis, in R.I. Tricker, ed., *Corporate Governance: The history of management thought*, pp. 401–413, London, Ashgate Publishing, 2000, available at: <http://ssrn.com/abstract=11355> (accessed 2 February 2015).
- [51] S. Turnbull, *The governance of firms controlled by more than one board: Theory development and examples*, p. 245, PhD Thesis, Sydney, Macquarie University, Sydney, 2000 available at <http://ssrn.com/abstract=858244>, (accessed 2 February 2015).
- [52] S. Turnbull, Grounding economics in commercial reality: A cash-flow paradigm, in P. Kreisler, M. Johnson, and J. Lodewijks, (Eds.), *Essays in Heterodox Economics: Proceedings, refereed papers, Fifth conference of Heterodox Economics*, pp. 438–461, University of New South Wales, Sydney, 2006, available at <http://ssrn.com/abstract=946033>, (accessed 2 February 2015).
- [53] S. Turnbull, How would the invisible hand handle electronic money? In: Lynne Chester, Michael Johnson and Peter Kriesler, eds, *Heterodox Economics' Visions*, Proceedings of refereed papers, Eighth Australian Society for Heterodox Economists conference, The University of New South Wales, Sydney, December 7-8, 2009, available at: <http://ssrn.com/abstract=1399224>, (accessed 2 February 2015).
- [54] S. Turnbull, Self-financing Urban Development, presented to 21st Annual Conference of the Chinese Economics Association (UK), July 5, 2010, Oxford, Oxford University Chinese Centre, available at <http://ssrn.com/abstract=1113603>, (accessed 2 February 2015).
- [55] S. Turnbull, Sustaining society with economic democracy, International Conference on Economics and Social Science (ICESS 2013), Holiday Inn, Melbourne, January 20, 2013, available at: <http://ssrn.com/abstract=2220072>, (accessed 2 February 2015).
- [56] United Nations, *Replacement Migration: Is it a solution to declining and aging populations?* Population Division, Department of Economic and Social Affairs, ST/ESA/SER.A/206, 2001, available at <http://www.un.org/esa/population/publications/ReplMigED/Cover.pdf> (accessed 2 February 2015).
- [57] United Nations, *World population in 2300*, Department of Economic and Social Affairs, December 9, 2003, ESA/P/WP.187 DRAFT, New York: United Nations. Available at http://www.un.org/esa/population/publications/longrange2/Long_range_report.pdf, (accessed 2 February 2015).
- [58] J. Weiner, *Long for this World - The strange science of immortality*, New York: HarperCollins, 2010.
- [59] J. Weiner, Discussion broadcast in *FutureTense* program on "Our ageing future", Radio National, Australian Broadcasting Commission, January 24th, 2011, Transcript available at <http://www.abc.net.au/rm/futuretense/stories/2011/3068037.htm#transcript>, (accessed 2 February 2015).