The rise of sustainable investing

In 2016 the investment world – notably including the UK and the US under its new President – began to focus on infrastructure, driven by a return of faith in fiscal policy and a demand for long-term income. The focus for 2017 could well be sustainable investing. Turn to page 4 for a masterful analysis of the issues surrounding sustainable investing, written by Quintin Rayer, Chartered FCSI, who brings his academic verve – he has a doctorate in physics from Oxford University – to bear on this complex but rewarding subject.

Sustainable investing has come of age during the course of this decade. The ‘Finance for the Future’ Awards, presented in Merchant Taylor’s Hall in October, are now in their fifth year. They are meant as a “celebration of leadership and innovation that creates sustainable businesses and economies”. This is no mere do-gooding piffle. The judges for this year’s awards included the chief financial officers of mainstream profit-oriented (and shareholder-responsible) businesses such as Adidas, Tesco and Wates Group.

Communication lies at the heart of this new approach to business. Veronica Poole, global IFRS leader and UK head of accounting at Deloitte – one of the sponsors of the programme – says: “What really stood out amongst the winners was authenticity and the way their integrated thinking shone through. Communicating in a way that truly explains what makes companies tick and the values they live by is extremely important in creating trust in business.”

The outright winner was the Coca-Cola Hellenic Bottling Company. The judges said the team there had “brought to life the vital role that the finance team can play to embed sustainability into everyday decision-making. It was able to develop an approach that systematically integrated environmental and social factors into capital expenditure across the diverse geographies, changing decisions as a result”.

The winner of the award for ‘communicating integrated thinking’, Warrington-based United Utilities, was praised for “producing clear, concise, integrated communications [that] demonstrate how integrated thinking translates to shareholder value in financial terms”. That quality of communications, in an age when more clients are asking questions about the ethics and sustainability of their investments, needs work in the financial services industry – see Michael Williamson’s analysis of some of the issues, from Cass Business School, on page 3.

INVESTMENT VALUATIONS

The space value of money

A much-admired runner-up at the sustainability awards was Dr Armen Papazian. The Financial Times’ Lucy Kellaway, presenting the awards, spoke for much of the audience when she remarked that while Dr Papazian conveyed a fine sense of excitement about his theories, many in the audience, perhaps a little rusty in the mathematics department, would need to read his paper to gain the full benefit. We are delighted to give his paper its first public airing here in The Review. Dr Papazian’s model introduces a new principle of value, ‘Space Value of Money’, into our current risk-and time-based paradigm. He describes his model, equations and approach as ‘Space Time Finance’, and he is currently writing a book on the same, due to be published by Palgrave Macmillan in 2017. Dr Papazian, who has extensive financial industry experience, was previously a Fellow and Research Associate at the Judge Business School of Cambridge University, from which he holds a PhD in financial economics.

CERF – the Cambridge Endowment for Research in Finance – runs this annual City event for practitioners, designed to stimulate discussion and research ideas that have practical relevance to the industry and to showcase some of the best and brightest research in finance that is done in Cambridge.

CERF promotes research in Cambridge University into all aspects of finance, financial institutions, and financial markets, and their relationship with economic behaviour and performance.

Professor Bart Lambrecht, Professor of Finance, Cambridge Judge Business School and a regular speaker at CISI events, is Director of CERF and Research Fellow of the CEPR.

Three fascinating talks from the latest ‘CERF in the City’ are now available to members on CISI TV: Dr Bang Dang Nguyen on ‘The impact of the external networks of directors on firms,’ Dr Chryssi Giannitsarou on ‘Informative social interactions’ and Professor Raghu Rau on ‘Evangelical investors and evolution of local bias’.

DISRUPTION IN FINANCE

A needle in the #aystack

From bogleheads.org, to seekingalpha, to stocktwits, to the reddit investing forum, to quora, to twitter, it’s clear that a large proportion of today’s stock market traders are eager to share their stock picks online. The winning entry in a competition for masters students at the University of Edinburgh Business School, with which the CISI has a close working relationship, explores this exciting new field.

Social media information is a source of immense, if uncertain, value. Academic papers have proven that aggregate social media data can be used to predict the market. In the last five years, fintech initiatives and research firms have begun sifting through these volumes of big data to bring social media alerts to investors. Social media sentiment analysis is a bottom-up method to extract the feelings of investors about market securities from their online posts. It is now the bedrock of a rich environment of firms competing for the attention of funds and investors. This innovation has forced information services firms to innovate and react, and has contributed to the rise of alternative research providers. The technology is not without pitfalls, as it risks entrenching divisions between retail investors and nimble competitors, and magnifying deceptive practices.

A needle in the #aystack is a documentary made by Nic Carter, Aris Georgopoulos, Dennis Jacob, and Wenrong Lu. The team says: “Join us in an occasionally surrealistic journey into the world of social media trading insights.”
One of the two runners-up was a team of three students from Kazakhstan – Sagindyk Abildinov, Aida Kalieva and Aray Nugumarova – who produced a fascinating survey of blockchain in finance. It cleverly analyses some of the key challenges in this field, such as bubble behaviour and price volatility, illegal activities, the potential rise of alternative crypto currencies, different categories of altcoins plus numerous legal issues. But it also covers the many opportunities that blockchain technologies create, including lower transaction fees, open and decentralised networks, peer-to-peer networks with user control, opportunities for the underbanked and blockchain's pivotal role as a platform for future innovation.

**Online trading**, the other runner-up, is a documentary film about how the internet has disrupted and continued to disrupt the way we conduct trading. The film defines what online trading actually means and mentions some of the concepts that are parts of online trading. It analyses the historical background to understand how trading used to work prior to the internet, as well as how the internet revolutionised the way that people trade, which changed the face of the international financial market for good. The film also describes in detail the positive benefits of online trading for individual investors, brokerage firms, and banks. In addition, it considers the downsides and the future of the industry. This 25-minute film was produced by Wenqian Shen, Rami Elsirgany, Alfonso Pliego, and Samir Sedaghat.

**Further Edinburgh research**

All of Edinburgh's MSc Banking & Risk students undertake an authoritative piece of work over the summer and many are keen to work with a company on a 'live' project that will add value to the business. The Business School invites firms who might be interested to submit a piece of research and analysis which will be matched to one of its top-performing students. The students will be supervised by a faculty member of the Credit Research Centre.

The Business School is especially interested this year in risk modelling and banking competition. The deadline for submitting proposals is January and the work is carried out late May – August.

Contact george.littlejohn@cisi.org for more information.

All these films are available to view now at cisi.org/disruption

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**ECONOMIC CRIME**

### Big data and the war on financial crime

Now in its 35th year, the 2017 Cambridge International Symposium on Economic Crime, the biggest such event in the world, with some 1,600 professionals and academics attending from every continent, will this September have a special focus on City affairs, notably on the impact of big data on the rise in economic crime, and in the fight against it.

Many of the issues here revolve around the pervasiveness of the internet in all our daily lives. Sir Alan Yarrow, Chartered FCSI(Hon), opened his speech at the 2016 Symposium with a reference to the work of the Global Commission on Internet Governance, which had just reported.

Half of the world’s population now uses the internet to connect, communicate and interact. But as the Commission points out, basic access to the internet is under threat, the technology that underpins it is increasingly unstable, and a growing number of people don’t trust it to be secure. In its final report, the Commission put forward three possible scenarios for the future, and proposed key steps that everyone needs to take to achieve an open, secure, trustworthy, and inclusive internet.

The internet as we know it today will not be the internet of the future. Our actions now will determine how it evolves, for better, or for worse. The Commission’s three scenarios explore these possibilities. No matter how less than ideal, or troubling, they may be, the highly experienced professionals from around the globe who make up this elite group have put them forward as the theoretical result of everyone’s choices and actions.

The Commission’s first scenario, said Sir Alan, is a dark one: a dangerous and broken cyber space. The internet breaks due to malicious activity, and overreaching government regulation. Basic human rights are violated, online privacy is non-existent and government surveillance follows. Criminal data breaches are the norm and cyber attacks become more frequent. The public loses its trust in the internet and people simply stop using the network. Its potential is truly lost.

The second prospect is better – but not much: uneven and unequal gains, and stunted growth. In this second scenario, the Commission paints a picture of a future where some users are able to enjoy some of the many benefits offered by being connected, while others are permanently locked out. Freedom of expression suffers, as does access to knowledge, because governments don’t preserve the internet’s openness. As a result, more than three billion people are left offline. Inequality and unrest spread, with minimal co-operation by governments across borders. Sharing and innovation are limited and stifled. Many are left behind.

But then, a brighter future suggests itself in the third and final scenario, with “broad, unprecedented progress” in the Commission’s words. That means an open internet that enables unprecedented progress and opportunities for individual freedom, knowledge and innovation. Billions of new users going online, narrowing digital, social, and economic divides. GDP growth reaches upwards of $11tn by 2025. Government and industry collaborate across borders to manage the risks of online activity. This future, said Sir Alan, requires concrete actions to ensure that the internet becomes open, secure, trustworthy and inclusive for all.

### The human role in cyber crime

Human error by way of a relaxed online attitude is a significant factor driving the global cyber crime threat and needs to be addressed urgently alongside technology failings. According to statistics from The Risk Management Group, 160 million phishing emails were sent daily in 2015 – 10% of these (or 16 million) penetrated conventional spam filters. However, of these 16 million, half (eight million) were read and a surprising 10% of people who read the emails (800,000 people) then clicked on links, so potentially allowing malware and virus into their computer network. A frightening 10% of people (80,000) then provided personal data.

Andrew Gracie, Executive Director at the Bank of England, recently hammered home the point that “cyber is not just about technology. More often than not attackers may seek to exploit potential weakness in personnel, to establish a bridgehead for attacks. It is therefore essential that firms have the right arrangements in place so that all staff understand cyber risk and their responsibilities for information assurance”.

It is research in these areas that will be a particular focus in our next issue of Review of Financial Markets (RoFM), which will feature a curtain-lifter on some current research in the fields of ‘traditional’ and cyber crime. If you have views on this, or anything else in this RoFM – or on what we should be including – then please do write to me.

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THE RISE OF GENERATIONS X AND Y

Digital investment advice will have the greatest impact on the next generation. So-called ‘generations X and Y’ will have the most buying power in the majority of European markets by the year 2025. It is very important for investment managers not only to recognise this, but also to get as much relevant investor educational information out there as possible, including on social media, in order to attract them. A 2013 survey of 4,000 affluent investors by Cogent Research of Cambridge, Massachusetts, showed that 69% of them use social media to find out financial information. This is in large part down to the emergence of smart phones and the emergence of ‘mobile-native’ apps that make it easy to access information on the move.

A November 2015 survey by UK research firm ComPeer of 1,000 end-investors – half in Britain and the rest spread evenly across France, Germany, Singapore, Switzerland and the US – found that 59% of US investors access their investment portfolios via a mobile application, compared to only a fifth of the Brits surveyed. Just over a third of UK investors surveyed said mobile applications are available from their wealth managers, advisers or stockbrokers. Only 17% of the remaining two-thirds want their wealth manager to launch one. But the soon-to-be-mighty buying power of generations X and Y means the industry will need to change its approach.

Almost three-quarters of the financial advisors encompassed in this research do not meet with their clients’ children more than once per year, and only 20% of financial advisors pursue the younger family members of a client at all. The World Economic Forum reckons that over the next 40 years, $41tn of wealth will be transferred to the millennials from the baby boomers, and total assets under management (currently nearing $100tn) could be as large as $400tn, according to Andrew Haldane, Chief Economist of the Bank of England, over the same period. Accenture estimated last year that less than half of the heirs, and the assets under management, stay with a firm after inheritance.

Inheritance is wiped out by the receiving generation, with tax a major cause, climbing to 90% by the time the next generation takes the financial reins. These succeeding generations need a financial plan, preferably one that (legitimately) helps protect them from high taxes.

DIGITAL PLATFORMS AND REGULATION

Digital investment advice platforms will come to the fore to help solve many time-consuming issues, other than just trading for a client. The business risk of compliance will be mitigated by allowing ease of access to a client’s account by the firm’s compliance officer (and potentially by the regulator), which could help with the overall costs of compliance. The Financial Industry Regulatory Authority (FINRA) in the US has already taken the first steps towards mandating firms to allow access to brokers’ clients electronically. Digital may become a smoother and better way for regulators to conduct oversight, especially if there are blockchain ledgers as part of this process. This should help guard against some of the inappropriate behaviours – like over-weighted single investments and churning – that regulators such as the FCA are anxious to stamp out. Reporting in November 2016 at the end of the FCA’s year-long asset management market study, Chief Executive Andrew Bailey said: “We want to see greater transparency so that investors can be clear about what they are paying and the impact charges have on their returns. We want asset managers to ensure investors receive value for money through pursuing energetically their duty to act in their customers’ best interests.”

‘Robo-advice’ has received much publicity. But in the November 2016 global survey by ComPeer of 1,000 end-investors, only one in four were aware of what it actually is. Of those, though, two-thirds said they would “consider investing via a robo-adviser”. That group felt that a robotic financial entity is less susceptible to making biased decisions or giving advice that is derived from traditional emotions or based on gut feeling. It is more likely to give clear and concise advice which often results in an informative decision. Others felt it added a new investment advisory service that complements their current wealth managers.

Those against the use of robo advisers commented: “[I] do not trust computers as they only work on history”; “[I] prefer an adviser who knows me and my needs”; and “[I] want to be able to discuss ideas and wishes with a real person so that I can ask them why they are making a recommendation.”

Robo-advice has its place, but human advisory strengths remain important: the ability to explain complex and confusing topics, to follow up and probe based on experience, to synthesise custom client solutions, to steer clients through a difficult market and to persuade to action and provide validation. Communication with clients remains a major issue.

The ComPeer survey identified a requirement for “much improvement” in communications, with international investors proving to be more demanding in comparison to those in the UK. So we mere mortals are still in demand.

MICHAEL WILLIAMSON

With 17 years’ experience in financial services in his native US, and in Australia, under his belt, Michael Williamson arrived at Cass Business School in London in 2015 to enter the MBA programme, which he completed in 2016. During this time, Michael was president of the Cass Banking and Wealth Management Society, which has more than 1,000 members, and regularly hosted events for the CISI and for Cass students, including our series of ‘Great British Breakoff’ debates held across the country ahead of the EU referendum. He was sponsored by a major US bank to produce his MBA dissertation on ‘The future of the investment management marketplace in UK and Europe.’ This paper is an updated excerpt from that dissertation, on the digital battlefront.
EXPLORING ETHICAL AND SUSTAINABLE INVESTING
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ABSTRACT
Ethical investment can be seen as falling into the ‘nice-to-have’ but not essential category. This paper seeks to raise awareness of the fundamental importance of ethical investing and to increase familiarity with the concept of ‘sustainable’ investment. It includes a brief history of the topic and outlines a number of approaches that can be used to help counter assumptions that it simply involves excluding ‘sin stocks’. In practical terms, ethical investors may benefit from an awareness of resources available as well as some suggestions to help differentiate committed ethical investment fund managers from those seeking a marketing advantage from a green makeover. Finally, the logic behind assumptions that ethical investments must underperform due to ‘the price of conscience’ is challenged, with emphasis on the interplay between ethical investing, risk and competitive advantage.

INTRODUCTION
Although ethical investment can be seen as desirable but not essential, this paper outlines its fundamental importance and outlines ‘sustainable’ investing, a more recent development. Having established sustainable investing’s significance, implementation approaches are outlined, moving beyond common assumptions that it only involves avoiding investment in companies carrying out unacceptable activities (‘sin stocks’). In practice, ethical investors can benefit from awareness of resources available as well as approaches to help identify committed ethical investment fund managers from those seeking a marketing advantage from appearing ethical (‘greenwashing’). Finally, investors may believe that ethical restrictions placed on the investment opportunity set must result in inferior performance, the so-called ‘price of conscience’. This logic is challenged by exploring the interplay between ethical investing, risk and competitive advantage.

ETHICAL INVESTING MATTERS
The relationship between sustainability and finance usefully sets the background to ethical investing.

Unsustainable human activities have generated threats including climate change, resulting in damage, loss of life, and disruption to food and fresh water supplies. The human life-span is increasing, so demographics will impact healthcare and pension costs. An expanding proportion of a growing world population will demand improved living standards as less developed countries modernise. Proponents of responsible investment argue that behaving in an unsustainable manner will cease to be an option.

Corporations are ubiquitous and powerful, spanning the globe. Humanity needs them to end unsustainable behaviours and tackle future challenges, which may include environmental challenges, climate change and social issues. Regrettably, part of industry’s dynamism has been (and still can be) the externalisation of costs on to the environment, communities, employees or future generations [1]. Financial markets help support and control corporate behaviour; markets reward ingenuity, efficiency, talent and productivity through the ability to raise funds and by share pricing (thereby valuing companies). Companies making far-sighted investments tackling these problems will benefit in either the short or longer-term, making them valuable investments.

Since corporate activity is an essential part of human activity and development, sustainable investment also requires that companies generate economically sustainable long and short-term returns. This counters short-termism, where immediate profits are made at the expense of damaging profitability at a later date.

In today’s environmentally and socially aware business environment, there is appreciation that:

- Companies taking environmental risks have caused disasters (eg, oil spills, deforestation, mining pollution).
- Social costs of business practices can no longer be ignored, as in previous eras. Public tolerance of unacceptable worker conditions has diminished (eg, labour conditions in mines and child labour).
- Companies require effective governance to confidently develop, meet legal and ethical requirements, and be accountable to stakeholders, including owners and shareholders. Corruption facilitates losses and sub-optimal decision-making. Poor oversight encourages high-risk behaviours and damaging scandals, potentially undermining reputations of entire industry sectors.

In the modern technologically-enabled world, environmental, social and governance failures are readily exposed by media and achieve global coverage rapidly. Such failures can easily result in financial losses, adverse litigation, reputational damage and clients taking business elsewhere. This has the potential to cause enormous damage to a company’s value, share price and even its long-term survival.

Thus ethically and sustainably orientated companies have the opportunity to target higher long-term profits by addressing necessary challenges while avoiding failures. At the same time they should accumulate marketing advantages and loyal customers as a result of their ethical behaviour.

SUSTAINABLE INVESTING
For current purposes, little distinction is made between ethical investment, socially responsible investing or sustainable investing. Companies are encouraged to promote practices including environmental stewardship; consumer protection; human rights and support the social good [2], [3]. One focus is on environmental, social justice and corporate governance issues (ESG). In sustainable investing, funds are directed into companies with business practices capable of being continued indefinitely without causing harm to current or future generations, or exhausting natural resources (ie, not ‘unsustainable’). Sustainability is often defined as ensuring development meets the needs of the present without compromising the ability of future generations to meet their own needs [4].

ESG identifies three key dimensions of sustainable investing (see Figure 1).

1. Environmental, including CO2 emissions, or carbon-intensity; forest and woodland degradation (important for absorption of atmospheric CO2); airborne, water-borne or land-based pollution; usage of scarce resources, including water and living creatures as well as minerals, oil and natural gas; mining activities which generate toxic byproducts; over-fishing, intensive agricultural methods and so on.
2. Social, including corporate social responsibility (CSR); child labour; modern-day slavery; payment of non-living wages; hazardous, exploitative and/or coercive working conditions;6 structures that reduce corporate taxation bills to levels incommensurate with the profits and activities taking place in those countries; anti-social working hours or conditions; displacement of indigenous peoples.

3. Governance; companies with weak internal controls may have management not following company policies, increasing risks of irresponsible behaviours, corruption and bribery. At board level, weak governance may mean that non-executive directors (NEDs) are unable to hold powerful executive directors in check, with possible damage to the company as well as the owners’ (shareholders’) interests, and increased risk of excessive executive remuneration.

Figure 1: The three pillars of sustainability

Companies may outsource production to countries or other companies operating without meaningful sustainability practices. A company might claim ethical operations, while not looking too deeply into its suppliers’ practices. Best practice requires companies to scrutinise their resource chains and monitor the entire production process, from origin through to ultimate disposal of products after use.

Companies may externalise costs of production [1]. Companies consume resources and create waste products. Ideally all costs associated with resources consumed and waste product disposal during manufacture would be included in the price of goods created; including disposal after use.

A company with energy-intensive production, burning fossil fuel, may release significant quantities of atmospheric CO2. The build-up of atmospheric CO2 is leading to global warming and climate change. This is unsustainable, yet it is generally unlikely that the company releasing CO2 will be paying significantly towards atmospheric CO2 reduction, or pricing the cost of CO2 removal into the finished product. The costs of climate change adaption will fall to society as a whole, often with poorer countries suffering greater damage (and costs) than richer, industrialised countries.7 This typifies externalised costs: the company that emitted the CO2 has not paid for its consequences. Generally consumers buying that company’s goods may not pay a price reflecting the true cost of dealing with the CO2 involved in production.

Externalising production costs applies not only to pollution; similar arguments relate to forcing labour to subsidise activities, and saving money with potentially health-damaging practices or inadequate wages. Failure to invest in appropriate governance and management structures can result in company staff undertaking activities boosting earnings, but with the tab ultimately being picked up by society or taxpayers. The company saves money on management and governance, while the taxpayer pays the cost of dealing with problems that may arise as a result. The company externalises these costs to the taxpayer when it should pay them itself.

Having identified some concerns motivating ethical investing, investors want, broadly speaking, to see capital put to an ethically good use. Not merely maximising investment return, but also causing benefit (or at least doing no harm) while generating a decent return, ‘doing well while doing good’.

Ethical investors wish to allocate resources to areas they feel deserve investment and to avoid businesses that (directly or indirectly) do not. Typically avoiding the so-called ‘sextet of sin’, which generally refers to alcohol, tobacco, gambling, pornography, armaments and nuclear power [3]. Different investors may wish to avoid different or more sectors than these.

Exclusions, or ‘screening’ is only one strategy of several. Consider:

- Do investors wish to avoid unethical companies, but accept ethically-neutral companies doing neither good nor harm? (Negative screening.)
- Do investors wish to invest only in ethical companies, avoiding both unethical and ethically-neutral companies? (Positive screening.)
- Do they wish to actively seek to influence corporate behaviours for the better? (Positive engagement, or shareholder activism.)

These questions and their implementation lead to a nuanced range of investment approaches.

HISTORY OF ETHICAL INVESTING

Malthus’s 1798 ‘Essay on the principles of population’ warned of population growth outpacing the planet’s ability to support human needs [5]. Including social aspects to business activity dates from the 1700s, with mutual societies and Quaker philanthropists such as Cadbury’s. In the 1800s the Quakers prohibited members from participating in the slave trade. Ethical investing also traces thinking from Methodism. Its religious roots meant investors were asked to avoid companies encouraging ‘sin’. Association with guns, liquor and tobacco were to be avoided.

Over time, the list of excluded business widened to include social and environmental problems [6]. The 1972 Stockholm Conference on the Human Environment named the environmental assessment component of its action plan ‘Earthwatch’, recommending environmental assessment as an operational area of the UN Environment Programme (UNEP). Business pioneers such as The Body Shop (1976) and Ben & Jerry’s ice cream (1978) placed ethical and social considerations deep within their offering [7]. The Stockholm recommendations were elaborated in the 1980 World Conservation Strategy – a collaboration between the International Union for the Conservation of Nature, the World Wildlife Fund and UNEP. In 1983, growing realisation in national governments and...
multilateral institutions of linkage between economic development and environmental issues lead to establishment of the World Commission on Environment and Development by the UN General Assembly. Depletion of the atmospheric ozone layer by chlorofluorocarbons lead to the 1989 Montreal Protocol ban. In 1992, leaders set out sustainable development principles at the UN Conference on Environment and Development in Rio de Janeiro, Brazil. Later in 1992, the UN General Assembly officially created the Commission on Sustainable Development. The 2006 Stern report [8] concluded that the benefits of decisive early action on climate change outweighed the costs. In 2007, the International Panel on Climate Change declared “it is no longer a question of whether climate change policy should be understood in the context of sustainable development goals; it is a question of how”.

Ethical investing’s history means several excluded sectors derive from religious roots, while civil nuclear power’s association with atomic weapon development may taint that sector, despite its ability to reduce CO2 emissions. Sustainable (ESG) investment may be a useful development: by emphasising the need for sustainability, ethical investment can be placed on a more scientific basis, without the need to lean upon its religious roots. The identification of ESG factors gives clarity of focus, provides structure, and potentially the addition of further factors if desirable.

INVESTMENT APPROACHES

Investments tend to focus on activities that are seen as generating desirable or undesirable outcomes. Sustainability is helpful when it comes to determining where an activity should be seen as having a positive or negative impact, based on ESG factors.

Ethical investing means different things to different people and institutional investors may answer to stakeholders that differ amongst themselves. Despite the range of approaches available, some investors may feel that none of the main methods fit their requirements. Approaches commonly use screening, but can also use ‘best-in-class’, tilting, or influence and engagement.

Screening

Screening appears to be the commonest approach. Investments are tested against several requirements aligned with positive and negative impacts, or other criteria. Companies’ impacts are identified as positive, negative, or ‘ethically-neutral’ (broadly doing neither good nor harm).

Following screening, an investor must decide whether to avoid ethically-neutral companies (see Figure 2).

- Negative screening avoids unethical companies, but invests in ethically-neutral companies.
- Positive screening only invests in ethically beneficial companies, avoiding ethically-neutral and unethical companies.

A concern with screening is that it can generate portfolio biases towards company size and sectors, limiting portfolio diversification.

Best-in-class

This approach includes companies and industries that are the best operators within the class considered, including the best companies within a sector. This can mean selecting the ‘least bad’ companies in that sector.

It can motivate companies in ethically-challenging sectors to improve. Consider the position of a fictitious mining company against some different ethical investing strategies. Suppose our mining company has a weak record with regard to environmental damage during extraction, pollution from refinery waste products, treatment of labour and of indigenous peoples displaced or harmed by its activities. If financial investors wishing to be somewhat ‘green’ but fearing that ethical investing might undermine performance, this offers a ‘light green’ approach. The company could also be influenced by ethical investment styles such as ‘tilting’, if they can reduce their carbon intensity, influence and engagement or shareholder activism.

For investors seeking to actively engage, best-in-class can provide benefits to those most affected by negative company practices.

Portfolio tilting

Data providers can supply information on ESG scores or the carbon-intensity of portfolio holdings. Determining whether, for example, a portfolio is over or under-weight its benchmark in terms of carbon intensity.

In this more nuanced approach, a portfolio is tilted away from carbon-intensive sectors or companies towards lower carbon areas. For investors wishing to be somewhat ‘green’ but fearing that ethical investing might undermine performance, this offers a ‘light green’ approach. Some exposure towards carbon-intensive areas is permitted, provided that elsewhere, sufficient weight is given to low-carbon industries, and overall the portfolio has a lower carbon intensity than its benchmark index. The manager can allocate across a wide range of companies or sectors to help with diversification and performance.
Influence and engagement

This approach involves influencing company directors, where appropriate, to make improvements in matters of ethical concern [3]. Directors are encouraged and supported to improve the balance between risk and return in the best interests of long-term owners.

The process may involve management meetings, questionnaires, and collaboration with other fund managers. The intention is to influence companies to consider their responsibilities to the environment, their stakeholders15 and society as a whole.

INFORMATION SOURCES

Apart from investment approach, an investor must select ethical companies and monitor their performance. Corporate carbon emissions, social responsibility and governance quality are not easy to measure objectively. Consequently, ethical investing is often outsourced to organisations with specialist skills, with many investors employing the skills of specialist fund managers.

Information sources tend to depend on whether investing via funds or directly constructing a portfolio that meets ethical criteria.

Ethical funds

Several fund management houses run ethical investing strategies. Some specialist houses only run ethical funds, while others include ethically-orientated funds as part of their wider offering.

A concern for investors is whether fund managers lack ethical investing experience, but want to ‘jump on the bandwagon’, launching a fund to appeal to the ethical market. Examination may reveal that although promoted as such, a fund’s ethical credentials are slender, potentially including holdings (or an approach) that clients would not regard as particularly ethical. A company lacking experience may launch a new ethical fund, but fail to reach required assets under management (AUM) targets to make it economically viable. This could result in a merger with a conventional fund, closure, or a shift away from ethical objectives. Inexperience with ethical investing could mean insufficient resources (such as databases on ethical activities and carbon intensity) have been allocated to develop the fund or insufficient investment in experienced staff with the necessary training and qualifications. This could result in inability to deliver the performance expected, resulting in gradual erosion of interest in the fund, with consequences such as closure, merger and change of objectives.

These concerns can be partially addressed by selecting funds from specialist ethical management houses. Their objectives and track record are likely to be more clear-cut. Good questions to ask when selecting an ethical fund might include:

- Does the fund house specialise in ethical investing, or does it manage other conventional funds?
- How deeply embedded is ethical investing culture in the organisation? What specific ethical initiatives does the fund management house undertake? How ethical are its own corporate values? Does it practice what it preaches?
- How long have they been running ethical funds for? What is their style and track record like?
- How long has the fund been running? What ethical investing style does it use?
- What resources do the managers have access to? What databases are used to investigate companies for investment? Are analysts proactive in contacting companies? Are shares’ voting rights used to influence companies invested in?
- What ethical investing experience and qualifications do staff have? Fund management houses may find clients like to hear them talk positively about ethical investing, and may do so for marketing benefits. Questions that explore the genuine level of staff experience may help detect those with only ‘skin deep’ commitment. Ethical investing qualifications appear in relatively short supply; only organisations and staff seriously committed are likely to have individuals with specific qualifications from recognised training institutions and accepted by industry bodies.16

A number of organisations and companies offer resources that can assist investors in determining the ethical credentials of specific funds and fund management houses (such as Morningstar and SRI Services).17

Individual companies, corporate standards and initiatives

A manager constructing a portfolio of ethical companies faces different challenges. Portfolio construction may use both ethical funds and individual stocks; requiring additional perspective on funds18 or companies.19

When considering a company for portfolio inclusion, apart from return, risk and diversification aspects, the manager must consider whether it meets ethical investment objectives. Although some criteria (like screening and carbon intensity) might be straightforward, other requirements could be sector specific.

Portfolio managers are assisted by corporate standards introduced in different countries over several years, including some ISO standards.21 Many are voluntary, but confirm that certain activities have been conducted meeting defined standards. While such standards are helpful, the sheer number can be difficult, and requirements vary. Often sustainably-orientated companies seek to meet requirements and be audited for several standards, even if related; thus adoption of multiple standards covering a company’s operations can provide some reassurance. However, the portfolio manager might be well advised to explore the differences between standards and how they are independently audited before reaching final conclusions. Other questions regarding standards are whether they provide symbolic or real value and whether they are strong but voluntary [5].

Independent organisations have launched initiatives encouraging companies and organisations to behave more responsibly, ranging from audit able quasi-official standards to reporting initiatives encouraging companies to publicly report emissions, achievements and progress to motivate them and others to improve.

One information source is company annual reports and accounts. These should reveal not only the company’s stated ethics,22 sustainability, CSR, environmental objectives and corporate standards, but also information about corporate governance23 [9], [10]. Several years’ reports and accounts should be examined, exploring such aspects as tenure and role of NEDs, board turnover, expertise, genuine level of independence, ability to challenge executive decision-making, and composition and independence of the remuneration committee. Resources covering environmental factors cover issues related to environmental concerns,24 including agriculture,25 emissions,26 energy,27 and water.28
For CSR, apart from resources covering labour and social issues, one test is to compare the salary of the highest paid staff member to the lowest paid as a measure of labour equality within an organisation [1].

Investors must dig beneath superficial statements regarding company achievements in these areas, since many companies desire a ‘green makeover’, while reluctant to absorb the costs and challenges required for genuine change [3]. The finance sector has come under scrutiny following scandals in recent years, and has a crucial role to play in encouraging sustainable investment, with organisations promoting such activities. It is also worth exploring the wider topic of sustainability for economies and businesses.

INVESTMENT PERFORMANCE

Investors seeking a performance yardstick for ethical funds or portfolios can use ethical indices, including those run by Dow Jones and FTSE indices. A major question is how ethical and conventional investments compare, with concerns about underperformance, further clouded by worries that ‘ethical’ or ‘green’ labels have been applied for marketing advantage. The problem is distinguishing between fund providers with only superficial commitment to ethical investing and those with genuine commitment and skills. Careful examination of fund and provider is required to help determine whether there has been a ‘green makeover’ for marketing purposes, or whether it can really deliver the ethical requirements desired.

Beyond ensuring selection of genuine ethical funds, there remain questions about whether such funds must underperform in the wider market. Investors often perceive ethical investing as positive or negative screening. Since this reduces the number of companies available for investment, the smaller ‘opportunity set’ reduces diversification possibilities, resulting in worse returns, higher risk, or weaker risk-adjusted portfolio performance. The following sections propose arguments challenging this perception, not by data analysis (it can be difficult to prove persistent performance tendencies from finite datasets), but by raising counter-arguments intended to widen debate. The counter-arguments relate to sustainable investing and risk, and whether sustainable investment can give competitive advantage [1], [11].

Sustainable investing and risk

It can be difficult to prove that one investment style or another is superior over an extended period. Proponents of sustainable investing argue that unethical corporate behaviour and unsustainable practices lead to increased risk [3], [11]. Harmful behaviour by companies eventually leads to negative consequences for them, generally having a detrimental effect on growth, profits and share price, leading to market underperformance, thereby running risks that are not well reflected in share price (not ‘priced in’ by the market). By excluding these companies, an investor is removing sources of unrewarded risk from their portfolio.

Such practices can increase the likelihood and consequence of litigation against the company, cause reputational damage to brand or products, or make customers decide they do not wish to be associated with the company and take business elsewhere. Other risks that can be very real in a competitive corporate environment may include:

- National or international environmental issues, such as climate change causing CO2 emissions restraints or carbon permit trading. Companies investing in appropriate technologies are better placed to adopt new standards and avoid heavy redesign costs, while those continuing harmful emission practices may require significant investment or higher ongoing business costs.
- Ethical behaviour gives a company a social ‘licence to operate’, being accepted as a valued community asset, avoiding opposition or resentment about activities. Community, government and NGO opposition can upset projects and damage company brands. Brand risk can be significant – oil-spills can cause reputational damage lasting decades.
- Poor sustainability records can increase insurance premiums, increase the cost of capital, or make it unavailable. Investor concerns about sustainability can increase the cost of debt and equity (lower share prices) [11].
- Unethical supply-chain partners can tarnish the reputation of a company’s brand [5].
- Energy usage reduction and waste minimisation helps optimise corporate processes, increasing efficiency and reducing costs.

Other business risks include [11]:

- Operating risks involving emissions and waste discharges, risks involved with product liability, permit costs and ‘eco-taxes’. Particularly affecting companies in the mining, oil, gas and forestry sectors.
- Balance sheet risks. Historical and contingent liabilities can negatively impact corporate market value. Decommissioning mines and cleaning up derelict industrial sites can be burdensome without suitable preparations. Litigation threats can damage stock price.
- Capital cost risk, involving pollution control expenditures, product redesign and other outlays following changing environmental standards, regulations and customer expectations.
- Business sustainability risk. Companies may face risks associated with the intrinsic lack of sustainability of their activities. Examples include coal mining, especially high-sulphur coal producers.

Competitive advantage

A businessman (or investor) may question whether ethical behaviour is profitable, or assume ethical behaviour has a cost. However, an ethical company should be able to build a good reputation, bringing financial rewards [13], [14]. Ethics encourages businesses to earn legitimate profits, contributing to society, avoiding coercive, exploitative or illegal practices (after all, a protection racket is a type of business). Internationally this relates to countries with lesser standards for human rights, labour, bribery and the environment [15].

An honest and trustworthy reputation attracts customers and potential business partners, creating economic opportunities [16]. Staying within the letter of the law is insufficient to protect reputation: not everything immoral is illegal. Laws can be slow to respond to new social concerns. An ethical climate within an organisation helps protect it from unethical or illegal staff conduct, since strong ethical principles help limit abuses by staff who may be tempted to circumvent regulation. Individuals in a modern international workforce have differing backgrounds, cultures and perceptions of what constitutes acceptable behaviours. They may be under pressure, while facing decisions that affect their own interests.

To trade and deal effectively, companies require trust, quality of goods and services, employees’ rewards, and a return on investors’ capital. Many financial products depend upon standardised contracts and deliverable
product, including terms associated with futures contracts, which are highly standardised. Additionally, companies with stronger ethical reputations should command higher PE ratios for their stock and borrow at lower rates in bond markets [17].

A 2010 study [18] concluded that positive CSR strategies were initially perceived as being value-destroying by analysts but have moved to being value-creating, with positive impacts on stock recommendations. Analysts are now more likely to recommend a stock ‘buy’ for strong CSR firms.

Other sources of competitive advantage for superior ethical performance, which can add value, ultimately being reflected in market pricing include [11]:

• Attracting, retaining and motivating top talent.
• Anticipating changes in the regulatory and business environments ahead of competitors.
• Generating revenue growth through new products, services and technologies.
• Increasing customer and investor loyalty.
• Improving relations with regulators, local suppliers, communities and key stakeholders.

• Securing, retaining and enhancing a ‘social licence to do business’, particularly in emerging market countries.
• Reducing operating expenses through improved energy efficiency and waste minimisation.
• Reducing the risk of legal liabilities and fines.
• Accessing and affording greater investment capital (through enhanced share prices and reduced cost of debt).
• Improving innovation and adaption within the corporate culture.

SUMMARY

To raise awareness and promote discussion around ethical investment, this paper outlines the fundamental importance of the topic before introducing sustainable investing and ESG factors. Following a brief history, it overviews approaches that can be used to help counter assumptions that it only involves excluding ‘sin stocks’. It also outlines resources available to ethical investors and suggestions to help identify committed ethical fund managers. Finally, the assumption that ethical investments must underperform due to ‘the price of conscience’ is challenged by considering ethical investing in terms of risk and competitive advantage.

REFERENCES

ENDNOTES

1. Associated with rising sea levels, extreme weather and flooding for example.
2. For example the slave trade.
3. For example, the LIBOR scandal undermining the reputation of banking and finance [19].
4. For brevity, in this article the term ‘ethical’ investing will generally be used interchangeably with ‘socially responsible investing,’ ‘responsible investing’ and ‘sustainable investing’ except in cases where a useful distinction can be drawn. Definitions of these terms are offered in [2].
5. More recently in the developed world, this may also extend to the use of ‘zero-hours’ contracts, in which the employer is not obliged to provide any minimum working hours, while the worker is not obliged to accept any work offered. Unions have raised concerns about the possibility of exploitation since management could use these contracts to reward or punish employees for any reason, or for no reason, and whether workers would be able to adequately assert their rights.
6. And potentially other pollutants such as sulphur.
7. Which have historically benefited from the industry that generated much CO2 in the first place.
8. John Wesley’s sermon on the topic of the ‘Use of Money’, published in 1872, sets out the principles of social investing. He invited his fellow worshippers and investors to not harm their neighbour through their business practices and to avoid certain industries.
9. Three instruments of environmental governance were established: the UN framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD) and the non-legally binding Statement of Forest Principles.
10. A religious basis for ethical investing could create disagreements about what can be regarded as ethical. For example, Islamic finance may prohibit payment of interest, meaning that conventional interest-paying bonds would be unacceptable, although acceptable to some other religions.
11. The author notes that many current debt levels, both nationally and in companies may be regarded as unsustainable, potentially providing exclusions for sustainable investment purposes. This suggests the possibility of adding further factors beyond ESG to sustainable investing, perhaps relating to debt or corporate financing, although academics and practitioners would need to debate what level of debt should be regarded as ‘unsustainable’. In a similar vein, [3] suggests five factors.
12. Perhaps with a higher price-earnings (PE) ratio compared with their sector average, or access to cheaper debt financing for example.
13. Apart, presumably, from winding the company’s operations up.
14. The price of conscience.
15. Which may include, for example, staff, customers, shareholders and those living near their centres of operation.
16. Possible sources for qualifications include the Cambridge Institute for Sustainability Leadership and the Sustainable Investment Professional Certification (SIPC) program.
17. Examples include: Morningstar; Social Funds; SRI Services; Trustnet; Your Ethical Money.
18. Corporate Knights; Eco-Funds Rating Methodology, or EIRIS, an ESG research provider.
19. Corporate Knights: ‘The magazine for clean capitalism’. Articles have included the 2015 Best 50 corporate citizens in Canada, and an index of the global 100 most sustainable corporations, by year. Mercer offers carbon footprint analysis services through partnership with Trucost. Trucost provides data on natural capital used by companies; Sustainalytics provides research to integrate ESG factors into investment processes; Vigeo assesses companies and organisations with respect to ESG issues.
20. For example, for companies using significant amounts of timber, Forest Stewardship Council Certification and the Sustainable Forestry Initiative.
22. Good Corporation; Institute of Business Ethics; Ethisphere.
23. The Centre for International Governance Innovation; Financial Reporting Council, the UK Stewardship Code; Business Roundtable.
24. European Ecolabel; World Resources Institute.
25. World Coca Foundation; Principles for Great Plains Sustainability; Principles for Permaculture Design for Habitats; UK Food Industry Principles; Fair Trade Certified.
27. Leadership in Energy and Environmental Design; Sanborn principles for building design and construction; Guiding Principles for Biodiesel Sustainability; American Petroleum Institute Environmental Principles; Energy Star.
29. Fair Labor Association; Ethical Trading Initiative; Business Social Compliance Initiative; Fair Wear Foundation; Joint Initiative on Corporate Accountability & Workers’ Rights; and Social Accountability International.
30. Ethical Performance. A source for CSR industry news, with a global audience.
33. Dow Jones Sustainability Indices.
34. FTSE4Good Index Series.
35. The ‘price of conscience’.

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The Space Value of Money
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In September 2015, 193 world leaders agreed to 17 ‘Global Goals for sustainable development’. If these Goals are completed, it will mean an end to extreme poverty, inequality and climate change in less than a generation. To attain these goals by 2030 we must reel in the vast pool of capital currently deployed outside the guidelines of sustainable investing. To achieve this, we need to transform our mainstream risk and time-based financial models. Dr. Armen Papazian proposes a new principle of value, ‘Space Value of Money’, and new metrics of value that would seamlessly extend our existing equations, integrate impact and return, and provide us with a space value optimisation tool aligned with these Global Goals.

Space Value of Money

Space Value of Money establishes our spatial responsibility to ensure that a dollar invested in space has, at the very least, a dollar’s worth of positive impact on space.

Net Space Time Value (NSTV) = Net Present Value (NPV) + Net Space Value (NSV)

\[ NSTV = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} - \sum_{t=0}^{n} CE_t(1+s)^{n-t} \]

\[ NSTV = -2II + \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} + \sum_{t=0}^{n} CE_t(1+s)^{n-t} \]

\[ II = \sum CE_t = \text{Sum of Cash Expenditures} \]

\[ CF_t = \text{Future Expected Cash Flows} \]

\[ n = \text{Project Timeframe} \]

\[ s = \text{Space Growth Rate} \]

\[ r = \text{Discount Rate} \]

\[ t = \text{Moving time} \]

Introduction

The market share of sustainable investment strategies has been growing steadily over the last few years. Between 2012 and 2014, global sustainable investment assets grew by 61%, from $13.3tn to $21.4tn. In this same period, the proportion of total professionally managed assets that were deployed based on sustainable investment strategies increased from 21.5% to 30.2%. This means that in 2014, 69.8% of all professionally managed assets were not invested according to sustainable investment strategies. Meanwhile, by mid-2014, total global wealth was estimated at $262.6tn.

While we are making great progress, if we are going to attain our Global Goals by 2030, we must reel in this vast pool of capital into the fold. To achieve this, we must transcend our risk/time models, and build on and expand our current approaches to sustainable investing. This is due to the limitations of our risk/time paradigm, and the rise of algorithmic trading, which has made programmability a key to the success of any type of investment strategy (Charts 1 and 2). With the rise of fintech and blockchain, this trend is set to grow further, deeper and wider.

Charts 1 and 2: Algorithmic trading as percentage of market volume and market participants (US)

Building the 2030 world according to our Global Goals will require a number of important changes in the way we measure, design and value our investments. We will need to address impact and return together, and allow investors the opportunity and possibility of optimising their space impact in line with our Global Goals, across projects and different asset classes, using the latest technology.

1. GSIA, Global sustainable investment review, 2014.
2. James Davies, Rodrigo Lluberas, and Anthony Shorrocks, Credit Suisse global wealth databook 2015.
3. GSIA, Global sustainable investment review, 2012 and 2014, identify the following seven main approaches: 1) negative/exclusionary screening, 2) ESG integration, 3) corporate engagement and shareholder action, 4) norms-based screening, 5) positive/best-in-class screening, 6) sustainability themed investing, and 7) impact/community investing.
This paper proposes a new analytical tool for Space Value Optimisation that can help finance functions design and value investments in a way that optimises their space impact, and maximises the positive contribution to our Global Goals.

The Space Value Optimisation tool fills an important market gap, and supports the widespread implementation of ecologically and socially sound investment models and algorithms that are seamlessly integrated with our current models.

CURRENT VALUE FRAMEWORK

Our current financial value paradigm is built on two principles, Risk and Return and Time Value of Money, which describe a universe where time and risk parameters define the value of an investment opportunity or a series of expected future cash flows.

\[
NPV = -II + \sum_{t=1}^{n} \frac{CF_t}{(1 + r)^t}
\]

Using the Net Present Value equation as an example, we can see that the model discounts the future expected cash flows to the present with a discount rate \( r \), which is the opportunity cost in the form of the return on an alternative investment with the same level of risk.

The equation applies time and risk parameters to the expected cash flows in the future \( (t \) and \( r \)), and leaves the Initial Investment \( (II) \) as an abstract theoretical sum to be subtracted from the present value of the imaginary cash flows in the future.

The equation does not consider the impact of the II, which, when and if addressed, is addressed outside the key parameters of the model, as an externality.

Having the nature and space impact of the Initial Investment in its blind spot, this model is effectively incapable of distinguishing between a solar-powered asteroid mining company and a coal-powered cement factory.

THE MISSING PRINCIPLE: SPACE VALUE OF MONEY

Space Value of Money is built on the observed premise of reciprocity between our thoughts and actions, and what happens to and in space. Indeed, what goes around comes around, and as we think, design, choose and define our actions in space, we define our impact on space.

Space Value of Money establishes our spatial responsibility to ensure that a dollar invested in space has, at the very least, a dollar’s worth of positive impact on space.

Space Value of Money complements Time Value of Money and Risk and Return, and requires that while we are maximising our returns and minimizing our risks, we also optimise our space impact.

THE NEW METRICS OF SPACE VALUE

The Space Value metrics help us fulfil this responsibility by treating the impact of the II as an integral element of the value of the investment, and thus of the investment decision. Gross Space Value (GSV) provides an assessment of the aggregate space impact of an investment taking into account the New Assets (NA) and New Money (NM) that the investment will create, and its Carbon and Waste Footprint (CF and WF).

\[
\text{GSV} = \text{II} + \text{NM} + \text{NA} + \text{CF} + \text{WF}
\]

\[
\text{GSV} = \text{II} + \text{NM} + \text{NA} + \text{CF} + \text{WF}
\]

\[
n=\text{Project Timeframe}
\]

\[
\text{NM} = \text{New Money} = \text{II} * \text{DR} * \text{BLR} + (\text{II} + \text{X} - \text{M}) * \text{mm}
\]

\[
\text{mm} = \text{Money Multiplier}, \text{DR} = \text{Debt Ratio}, \text{BLR} = \text{Bank Loan Ratio}, \text{M} = \text{Imports}, \text{X} = \text{Exports}
\]

\[
\text{NA} = \text{New Assets} = a\text{INV} + b\text{RE} + c\text{T} + d\text{IP} + e\text{FIN} + ...
\]

\[
a, b, c, d, e = \text{Coefficients}
\]

\[
\text{INV} = \text{Inventories}, \text{RE} = \text{Real Estate}, \text{T} = \text{Technology}, \text{IP} = \text{Intellectual Property}, \text{FIN} = \text{Financial Assets}
\]

\[
\text{CF} = \text{Carbon Footprint} = \text{CO2 Equivalent Emissions in Tonnes of CO2} \times \text{Verified Carbon Unit Price}
\]

\[
\text{WF} = \text{Waste Footprint} = \text{Waste Output in Tonnes} \times \text{Cost of Treatment per Tonne}
\]

\[
\text{NSV} = \text{Gross Space Value (GSV)} - \text{Initial Investment (II)}
\]

Net Space Time Value (NSTV) brings into one equation the risk time metric Net Present Value and the space time metric Net Space Value, providing us with an aggregated measure of the space and time returns of the investment, while accounting for risk. It also introduces the Space Growth Rate, which reflects an investment’s present and/or planned impact in monetary terms, from II to GSV.

\[
\text{NSTV} = \text{NPV} + \text{NSV}
\]

\[
\text{NSTV} = \text{NPV} + \text{NSV}
\]

\[
\text{NSTV} = -2\text{II} + \sum_{t=1}^{n} \frac{CF_t}{(1 + r)^t} + \sum_{t=0}^{n} \text{CE}_t(1 + s)^{n-t}
\]

\[
\text{NSTV} = -2\text{II} + \sum_{t=1}^{n} \frac{CF_t}{(1 + r)^t} + \sum_{t=0}^{n} \text{CE}_t(1 + s)^{n-t}
\]

\[
\text{II} = \sum \text{CE}_t = \text{Sum of Cash Expenditures}
\]

\[
\text{CF}_t = \text{Future Expected Cash Flows}
\]

\[
n = \text{Project Timeframe}
\]

\[
s = \text{Space Growth Rate}
\]

\[
r = \text{Discount Rate}
\]

\[
t = \text{Moving Time}
\]

SPACE VALUES AND GLOBAL GOALS

Setting a required space growth rate for a project has practical implications for the investment, its management, and execution. By setting a positive space growth rate target, we are in effect requiring that the investment’s new money and new asset impact, as well as its ecological and waste footprint, are designed in line with our Global Goals.
Indeed, much like discount rates, a benchmark Space Growth Rate can be defined as a target rate across an economy. This provides governments the opportunity to prove their commitment to the environment and set high standards of Space Growth Rates for public investments, thus raising the bar for private investments.

**DIRECTLY IMPACTS**

The Space Value Optimisation toolkit allows the finance function to define its own unique equation for New Money and New Assets.

For example, one could decide to attach a monetary space value to employment/personnel, even though the latter is not categorised as an asset under our current accounting standards. This could be achieved by adding $gEMP$ to the New Asset equation, and assigning relevant coefficients that reflect our goals regarding factors such as gender balance, full time employment, fair wages, benefits and education.

The assets and their mode of creation and utilisation make the difference between a positive and a negative space growth rate. For example, when valuing a defence or oil company, we face an important question regarding the value of their inventory. The inventories of these firms, when used, have a proven track record of negative space impact, spreading pollution, destruction, and a host of other negative effects diametrically opposed to our Global Goals.

Indeed, what would the value of oil and defence companies be, if we were to integrate the impact of their inventory on the planet into our value models?

It could be argued that, in fact, if we are ever going to achieve our Global Goals, oil and defence companies should be assigned an inventory coefficient of at least -1, as the damage they cause could actually be far greater than the value of their inventory.

**OTHER APPLICATIONS**

In November 2015 the US Senate passed legislation H.R.2262, which states: “Any asteroid resources obtained in outer space are the property of the entity that obtained them, which shall be entitled to all property rights to them, consistent with applicable federal law and existing international obligations.”

The Space Value Optimisation tool supports the growing ambitions of humanity, and provides a framework that integrates our spatial responsibility and spatial expansion plans.

**CONCLUSION**

2015 was an inflection year. The UN Global Goals, the Paris Agreement, and the US Senate legislation H.R.2262 reveal an irreversible awareness of our space, our physical context. We have now officially recognised our role and responsibility in taking good care of it on Earth and beyond.

The Space Value Optimisation tool supports the finance function in fulfilling its responsibilities in the age of responsible growth.

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Armen Papazian is a financial economist with global experience in industry and academia. He is the founder and CEO of Finoptek, a fintech start-up developing a unique multi-tool, multi-instrument, cloud-based platform that introduces Space Time Valuation capabilities based on a proprietary model designed and created. His model introduces a new principle of value, Space Value of Money, into our current risk and time based paradigm. He describes his model, equations, and approach as Space Time Finance, and he is currently writing a book on the same, due to be published by Palgrave Macmillan in 2017.

He is a former managing director of Innovation and Development at Nasdaq Dubai (DIFX) where he led the launch of the Middle East’s first structured products platform with Morgan Stanley, Deutsche Bank, and Merrill Lynch, the creation of the region’s first tradable fixed income indices with HSBC, and the first fungible dual listing with a US exchange in the region.

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5. $gEMP = g * EMP$ where $g$ is a coefficient, like a,b,c,d, and e, in the NEW ASSETS equation, and EMP is employment expenditure.