

9 How do we judge the responsibility (or otherwise) of research and innovation?

Capital, Aristotle, and the neglected factor: freedom

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9.1 Introduction

Responsibility implies a choice, and therefore freedom. There can be no responsibility if there is no possibility of irresponsibility. Indeed, without the possibility of conflict between the two, the qualification of instances of research or innovation as ‘responsible’ appears to be empty.

However, unless a choice that is deemed responsible is funded, it cannot materialise. Freedom to choose in research and innovation requires money or capital to enable those who have chosen – according to their judgement regarding the responsibility of alternative solutions – to carry out their plans. As we argue in this chapter, the current (utilitarian) foundations of conventional economics and the normative prescriptions derived from them do not allow for such freedom because they force a choice upon us, namely to utilise capital in ways that maximise profits or shareholder value.

Indeed, the debate on ‘responsible research and innovation’ can be interpreted, we propose, as requesting a reconsideration of the motivational foundation of conventional economics and in particular capital allocation. If this is the (implicit rather than explicit) idea behind the growing awareness of the need for ‘responsibility’, both in research (science) and innovation (RRI) and in business (‘Corporate Social Responsibility’, CSR), the question arises whether the current debate on ‘responsibility’ is a match for the powers that organise science, innovation and business today.

A rising share of research and innovation takes place either in privatised contexts driven by financial interests, or in state-controlled environments driven by political priorities (Block and Keller, 2011) that, in turn, often cater to private interests (Mazzucato, 2013; Berman, 2012). One may well wish to research and innovate responsibly, but much of the responsibility literature underestimates how greatly innovation and research, and indeed the responsibility concept itself, are subject to the precepts of finance. Increasingly, no invention or innovation will see the light of day unless it proves to be ‘finance-friendly’ (Houghton Budd, 2014). When we demand responsibility in research

and technology, therefore, one cannot escape addressing the question: how does responsibility relate to finance?

For lack of a clear understanding of the notion of responsibility, the default position is to fall back on utilitarian choice theory as the conventional micro-economic foundation for choice, and to treat research and innovation as instruments of maximising profits or shareholder value. Freedom to choose in a responsible way will remain elusive unless we widen our understanding of money and capital in a way that will permit both to flow toward research and innovations that are considered responsible. The aim of this paper is to contribute to finding a theoretical basis for such freedom.

In Section 9.2 we sketch economy-wide consequences of an empty responsibility concept (a responsibility concept that does not allow for choice). Without a sound theoretical foundation for ‘responsibility’, many uses of capital that are considered responsible are left to charity that tries to remedy, but effectively reinforces, problems created by the current narrow view on choice and capital.

In Section 9.3 we zoom in on three related societal phenomena (taking recent developments in health care as an example) that, as we will explain, are the result of an empty responsibility concept: technological unemployment, a potential reduction in the powers of the human mind and restriction of choice. The three phenomena are a consequence of decisions in the cultural sphere that are dominated by demands coming from capital that is guided by utilitarian microeconomic choice theory, rather than by conscious judgement regarding the responsibility of alternative uses of capital.

In Section 9.4 we suggest that a theoretical basis for a responsibility concept that recognises the essence of responsibility – choice – is necessarily threefold: philosophically, a conception of the end¹ of human life; economically, an understanding of capital as an enabler of this end; politically and legally, laws, rights and regulation that enable capital to fulfil this role. A theoretical basis for all three can be found, we propose, in a broadly Aristotelian view of the economy as providing the material conditions that enable the human being to realise one’s *telos*.

As an aid in the process of judging whether a proposed solution contributes to this end, the individual will need guidelines for making judgements. In Section 9.5, therefore, we give a first sketch of an approach for judging the responsibility of research and innovation grounded in Aristotle’s notion of the ‘golden mean’. Section 9.6 concludes.

9.2 Responsibility by default: utilitarian microeconomic choice theory

In the absence of a clear understanding of the notion of responsibility, ‘responsible research and innovation’ is often defined with reference to the problems research and innovation may solve. Thus, research or innovation is said to be responsible if it contributes to solutions to what leaders in the public debate define as the ‘grand challenges’ of contemporary society, such as ‘smart,

sustainable and inclusive growth’, ‘an inclusive economic and social model’, and ‘improvements in health and the quality of life’.² In short: the goal justifies the means. But this is ‘kicking the can down the street’, because it does not make clear on what (theoretical or empirical) grounds these goals, and the means to attain them, are deemed responsible. Lack of such clarity regarding ends as well as the relationship between means and ends may lead to unexpected results.

For example, in a recent paper, philosopher Mathew Snow (2015) discusses a growing social movement named ‘Effective Altruism’ that aims at reducing the suffering of others, surely a goal many would consider responsible: ‘Effective Altruists calculate where expendable income is best spent and encourage the relatively affluent to channel their capital accordingly’. Among their ‘most highly favoured causes’ are medical aid and direct cash transfers to people in poverty; many have pledged to give a certain percentage of their income annually to such endorsed causes.

Snow points to a contradiction between the individualised ‘culture of giving’ advocated by philanthropists such as philosopher Peter Singer, and the Effective Altruists’ ‘political quietism’ and ‘bourgeois moral philosophy’ that remains silent on the dynamics that cause the very problems to which they claim to offer a solution. Passing over a ‘moral and structural analysis’ of ‘the social dynamics constitutive of capitalism’, Effective Altruism ‘aspires to fix the world’s most pressing problems on capital’s terms’:

The irony of Effective Altruism is that it implores individuals to use their money to procure necessities for those who desperately need them, but says nothing about the system that determines how those necessities are produced and distributed in the first place.

(Snow, 2015)

By accepting rather than ‘challenging the rule of capital’, the philanthropic movement leads to some surprising results:

As charities and Effective Altruists publicise how badly the global poor need food, for example, capital acquires and controls their fertile land ... extracts around \$2 trillion annually from ‘developing countries’ through things like illicit financial flows, tax evasion, debt service, and trade policies ... [while] governments’ lost revenues are then used to justify cuts to essential services, predictably resulting in tens of thousands of deaths.

(Snow, 2015)

In the absence of awareness of the systemic causes that ‘generate a need for ever-multiplying charitable organisations in the first place’, the ‘only readily available option is donating to charity’ (Snow, 2015). However, ironically, by providing poor individuals with the income they need to buy the goods produced by the capitalist system, donations effectively subsidise the system that marginalises people. The philanthropic movement also leads to other perverse

results, such as that it brings forth ‘well-intentioned, bright young adults’ who see no option for improving the world but to ‘pursue a lucrative career with the intention of “earning to give”’, or ‘Join Wall Street [to] Save the World’, thereby confirming and regenerating the existing system.

Other, comparable movements exist. For example, the fast growing ‘Basic Income movement’ may appear more progressive or radical than a philanthropic movement such as Effective Altruism. However, when based on an ‘after the fact’ redistribution of income (Cole, 2008) – a redistribution of income after the (neoclassical) free market has done its work – basic income, too, effectively subsidises the ‘free market’ while alleviating its worst effects.

Similarly, when the European Commission expects solutions to ‘the pressing societal challenges of the 21st century’³ to be attained via higher competitiveness⁴ and efficient financial markets,⁵ it is on utilitarian microeconomic choice theory that it relies. However, as we will explain in the next section, such policies suffer from internal contradictions that may stand in the way of the desired outcomes.

Remarkably, both those relying on utilitarian microeconomic foundations for capital allocation decisions *and* their critics, opposite as they may seem, appear to accept the same view of capital as necessarily driven by self-interest.⁶ Yet, the concept of ‘Responsible Research and Innovation’ suggests an alternative to utilitarian choice: the possibility that owners or managers of capital are able, autonomously, to engender socially responsible conduct.

Snow (2015) concludes that philanthropic systems leave ‘no choice at all’. Choice, we suggest, becomes a possibility only when today’s mainstream microeconomic foundations are widened to include responsibility. Until this happens, utilitarian choice will continue to create many of the problems that RRI seeks to remedy.

9.3 Consequences of an empty responsibility concept: society-wide contradictions

Under the influence of an economic theory that is based on a belief in competitive struggle as the source of progress, solutions to the ‘grand challenges of the 21st century’ – including cultural and social questions such as health, the quality of life, and ‘inclusive society’ – are typically sought via competition and technology. The image is that if we simply profit-maximise, with technology as our handmaiden, everything else will fall into place as if ‘led by an invisible hand’ (Smith, 1776). However, in today’s economic and institutional context, such a strategy is likely to run into internal contradictions that threaten to frustrate the desired outcomes.

For example, according to conventional wisdom (expressed in policy documents), improvements in health and the quality of life can be reached through innovations in medical technology and ICT that will increase the ‘efficiency of the health care system’ by ‘controlling costs and reducing labour demands’. In a joint effort to reduce the rising costs of health care, governments, insurance companies and business seek to increase productivity in health care through innovations directed at reducing one of its main ‘cost components’: the hours of

work of doctors, therapists, nurses etc. Productivity growth in health care is modelled on centuries of innovation in agriculture and industry which increased labour productivity and reduced costs; but is this an adequate analogy? What is the societal significance or benefit of productivity growth in agriculture and industry? And does this also hold in health care?

Productivity growth frees not only labour but also the money that was used to remunerate this labour from its current use in production (Wilken, 1982). Historically, as productivity growth progressively obviated labour in agriculture, the labour and money that were no longer needed in agriculture moved to industry. Productivity growth in agriculture permitted industry to expand. Similarly, as productivity in industry increased, many of those whose labour was no longer needed in production found new work outside the economy,⁷ especially in the cultural sphere, including education, science, and health care. Productivity growth in industry made possible an expansion of cultural activity (Naastepad and Mulder, 2018).

Today, however, the idea is that productivity should be increased also in the cultural sphere – the sphere where we develop our thinking (e.g. in research and education) and a *mens sana in corpore sano* (through health care and reflection) – as well as in the political-judicial sphere (law-giving and regulation). Lawyers, judges, doctors, psychologists, teachers and professors should be replaced as much as possible through computerisation and robotisation. But what is the purpose of the shedding of people from these spheres?

Until recently in history, productivity growth in the economy implied an expansion of the possibilities of people. The growth of the cultural sphere (of schools, universities and hospitals) has been made possible by a dynamic economy that was able to free people as well as money from production. Could this be the significance of productivity growth?

It will be impossible to answer this question unless we arrive at a standpoint from which we can determine an end for human life. Productivity growth, a consequence of the growth of human intelligence, knowledge and consciousness, liberates human beings from the necessity to work full-time for their livelihood, permitting them to pursue other aims in life. ‘Will this be a benefit?’, asked Keynes already in 1930. It is surely beneficial to mankind if there is ongoing development of culture – or, in terms of the modern literature,⁸ development of human capabilities (Sen, 2001; Nussbaum, 2011), capacities (Houghton Budd, 2011), intrinsic motivation (Grant, 2011; Sandel, 2012), ‘flourishing’ (Giovanola and Fermani, 2012; Sison, 2010; Page, 2010; Giovanola, 2009), self-knowledge (Rödl, 2007), ‘character’ (Cheffers and Pakaluk, 2007), virtue (Solomon, 1993, 2004), in short, development of the ‘real values of life’ (Keynes, 1930). Capital accumulation has enormously expanded material comfort⁹ but, as Keynes foresaw already in 1930, ‘it will be those peoples who can keep alive, and cultivate into a fuller perfection, the art of life itself and do not sell themselves for the means of life, who will be able to enjoy the abundance when it comes.’

Until this is understood and put into practice, rising productivity may give rise to a social paradox. Productivity growth liberates human beings from the

necessity to work for their material livelihood, giving humanity the possibility to enjoy, cultivate and expand the non-material aspects of life. Once the economic problem has been solved, said Keynes (1930), the accumulation of capital for further expansion of material welfare makes no sense. However, until today, this message appears to have been largely neglected. Faced with limited investment opportunities in a stagnating economy, managers of capital continue to seek new opportunities to generate returns on their capital by ‘opening up’ the cultural (and legal-political) sphere to the market (Naastepad and Mulder, 2018). Hospitals, therapies, research and education are transformed to reduce costs and increase returns on ‘investment capital’ (e.g. Bain & Company, 2012). Lobbying for change in laws and regulation is another vehicle through which the ‘strenuous, purposeful money-makers’ (Keynes, 1930) continue to accumulate capital. The pharmaceutical industry is a well-known example; the requested changes include rules and regulation that permit advertising directed at convincing rather than informing doctors and patients, and throw up barriers to or even outlaw medicine and therapies that do not correspond to dominant views on health and disease (Ackerknecht, 2016; Dinmohamed, 2016; Koshy, 2015; Mees, 1983).

Instead of using the capital that is liberated by productivity growth, a consequence of the growth of human talents, knowledge and intelligence, for the further development of human capacities, the cultural sphere is increasingly transformed into an object of investment. If capital continues to be accumulated for material gain, the ‘real values of life’ will escape the growing numbers of people who are left without work, or with only ‘dumb’ and ‘unworthy’ jobs (Trajtenberg, 2018) – and therefore without opportunity to develop and unfold their talents, skills and faculties – for lack of capital to fund them.

What, then, could be the deeper meaning of the destruction of work in the cultural sphere? Of course, the idea of opening up health care to the ‘discipline’ of ‘efficient markets’ is said to be to reduce the costs of health care and make it more affordable. However, such effects have not yet materialised. While hours worked by doctors, therapists and nurses are reduced – with the help of, for instance, computerised standards and protocols for diagnosis and treatment – spending on medicine, medical technology, ICT and management is rising. Rather than reducing costs overall, resources are redistributed away from the provision of health care by doctors, therapists and nurses towards the balance sheets of producers (of medicine, medical technology, software), insurance companies and health care managers (Koshy, 2015).

If cost reduction is not achieved, perhaps there is a gain in terms of quality? Apart from obvious gains in quality of, for example, medical technology, some studies warn, on the other hand, that an overdose of automation and robotisation in health care (and elsewhere) may contribute to a deskilling of people, including medical specialists (e.g. Hoff, 2011). If an impersonal approach implemented through standards and protocols comes to dominate work in the cultural sphere, this may, in the end, reduce the power of the human mind (Carr, 2014; Head, 2011, 2014; Spitzer, 2014; Graeber, 2013, 2015).

In today's context, capital is increasingly used merely to preserve and multiply itself. However, when doctors, therapists, lawyers, judges and teachers are replaced through computerisation and robotisation, this may lead to technological unemployment (Frey and Osborne, 2013; Spence, 2014; Vogel, Kratena and Hranyai, 2015) and *underemployment*, and a reduction in human expertise and responsibility. For unless people find work that enables them to take care of their material needs *and* gives them an opportunity to develop and unfold their talents and abilities, how much room do they have for freely expressing their responsibility as human beings?

Is there a deeper meaning or significance to such developments? Is it, perhaps, to understand that this is not a crisis caused by capital, but primarily an epistemological (Houghton Budd, 2011) or paradigmatic crisis – a crisis we can solve only by rethinking the principle that currently guides capital, which in turn requires a rethinking of the way we acquire knowledge, especially regarding the nature and purpose of capital and the human being?

9.4 Free to choose? Towards a wider understanding of capital

'Economic imperialism' (Fine, 2002; Lazear, 2000; Frey, 1993; Landes, 1961) or the 'export' of neoclassical-utilitarian efficiency concepts to the cultural and political-judicial spheres (as discussed above) is ultimately caused not by capital, nor by an economic order of which capital is a core constituting element, but by an incomplete understanding of both.

In 1941, Keynes warned that 'Loose funds may sweep the world, disorganising all steady business' (Keynes, 1978). However, it seems not to have occurred to him to connect 'loose funds' with the 'real values of life'. In conventional economic theory, value is found only in consumption, and capital has been linked to this value. If humanity finds its destiny in the free development of its capacities, and their development is the very point of human existence, it makes sense to relate capital also to the latter (Naastepad and Houghton Budd, 2015, 2019).

Maximisation of consumption was elected as the economic goal around two-and-a-half centuries ago in a context – Britain during and after the Industrial Revolution – that differs significantly, economically and financially, from today's economy. Living standards were much lower at the time than today, and an expansion of the opportunities of people required, first of all, an increase in the number of goods available to them. This, in turn, required an expansion of *physical* capital – 'capital goods' such as machines, factory buildings, tools – financed by an expansion of financial capital. The idea proposed by neoclassical thinkers was that the quickest way to accumulate capital would be through (1) private property and (2) the pursuit of self-interest. If self-interested persons own capital, they will strive to multiply it. Since financial markets were not as ubiquitous then as they are today, the way to accumulate capital was to start a factory and produce goods. This is Adam Smith's 'invisible hand': when an entrepreneur directs his capital in such a way that it contributes to the expansion of the number or quality of goods which people have at their disposal, he serves society as much as he serves himself, even

though the former was no part of his intention.¹⁰ The private benefit of owners of capital coincides with benefit for society.

Considering the poverty that continued to exist over the centuries despite fast economic growth, one might wonder whether the pursuit of private gain is the only or best possible means to raise living standards even in conditions of capital scarcity.¹¹ However, what end do profit maximisation and capital accumulation serve in today's economy characterised by 'excess liquidity' or 'capital super-abundance'? Obviously, even today, the material needs of many have not yet been met. But isn't this, too, a consequence of the one-sided focus on self-interest?

However, instead of discarding the 'love of money as a possession', which was originally promoted to stimulate the growth of production, as a 'somewhat disgusting morbidity, one of those semi-criminal, semi-pathological propensities which one hands over with a shudder to the specialists in mental disease' (Keynes, 1930), it is increasingly applied also in other realms of life, including science, education and health care. The imperative of accumulation increasingly draws non-material, non-economic dimensions of life – which were acknowledged for instance by sociologists such as Max Weber and Jürgen Habermas (1981) to belong to the cultural sphere – into the economic realm. When research, education and innovation are treated as 'services' to be sold in 'markets' and made to comply with the demands of profit-maximising capital, scientists, doctors and teachers will be funded for research, health care and education that leads to profitable innovations, but not for investigating whether a particular innovation is the best solution for the problem for which it is developed. This becomes very visible, for example, in commercialised medical research, where the imperative to maximise profit drives medical researchers in universities as well as industry to search for solutions that maintain or increase the profitability of medical industries (Gotzsche, 2013; Goldacre, 2012; Berman, 2012; Suarez-Villa, 2012) and precludes the funding of alternative solutions that may be less profitable financially but profitable from the point of view of health (Ackerknecht, 2016; Dinmohamed, 2016; Mees, 1983).

At stake is freedom of thought, a value belonging to the cultural sphere. An obvious question, then, would be how the freedom of utilitarian economics – the theoretical basis of microeconomic choice theory and the 'free market' – relates to freedom of thought. The transformations that are taking place today in the cultural sphere (health care, science, education) show that when utilitarian freedom – or, in a term used by Berlin (1958), 'negative freedom' ('the absence of obstacles to the fulfilment of a man's desires', Berlin, 1969, p. xxxviii) – rules over capital, the result is restriction of cultural freedom. However, at risk is not just academic freedom, or Alfred Weber's 'freischwebende Intelligenz' (Mannheim, 1929), but human development in general.

In his essay *Two Concepts of Liberty*, Berlin (1958) relates freedom to 'the essence of human nature':

We must preserve a minimum area of personal freedom if we are not to 'degrade or deny our nature'.¹² What then must the minimum be? That

which a man cannot give up without offending against the essence of his human nature.

(Berlin, 2008, p. 173)

‘What is this essence?’ is the obvious next question. One year after *Two Concepts of Liberty* Berlin (1959) wrote another paper, *John Stuart Mill and the Ends of Life*, in which he powerfully defended the ‘ends of life’ according to John Stuart Mill against the Benthamite-utilitarian perspective on the human being. However incomplete or uncompleted Mill’s view on the nature of the human being and the end of human life may be, for Mill,

man differs from animals primarily neither as the possessor of reason, nor as an inventor of tools and methods, but as a being capable of choice, one who is most himself in choosing and not being chosen for; the rider and not the horse; the seeker of ends, and not merely of means; ends that he pursues, each in his own fashion; with the corollary that the more various these fashions, the richer the lives of men become; the larger the field of interplay between individuals, the greater the opportunities of the new and the unexpected; the more numerous the possibilities for altering his own character in some fresh or unexplored direction, the more paths will open before each individual, and the wider will be his freedom of action and thought.

(Berlin, 2008, p. 222–3)

Mill ‘often seems to advocate freedom on the ground that without it the truth cannot be discovered’ (Berlin, 2008, p. 225). Freedom is a value belonging to the cultural sphere and it is valuable not as an end, but as a means towards ‘ends which men pursue for their own sake, and which Bentham had either ignored or falsely classified under the head of pleasure’ (Berlin, 2008, p. 226).

Mill introduces a standard other than pleasure itself (Downie, 1966), appealing to man as ‘a being capable of pursuing spiritual perfection as an end; of desiring, for its own sake, the conformity of his own character to his standard of excellence, without hope of good or fear of evil from other source than his own inward consciousness’ (Mill 1838 [2003], p. 68). Indeed, Mill praised the Greek ideal of self-development (Copleston, 2003), and it is in this sense that he defended liberty: ‘The only freedom which deserves the name, is that of pursuing our own good in our own way’ (Mill, quoted in Berlin, 2008, p. 174).

What made the protection of individual liberty so sacred to Mill, writes Berlin, is that

... unless the individual is left to live as he wishes in ‘the part [of his conduct] which merely concerns himself’, civilisation cannot advance; the truth will not, for lack of a free market in ideas, come to light; there will be no scope for spontaneity, originality, genius, for mental energy, for moral courage. Society will be crushed by the weight of ‘collective mediocrity’.

(Berlin, 2008, p. 174)

Freedom as a value finds its home not in the economic sphere (where neo-classical theory has given it a very limited meaning) but in the cultural sphere – the sphere where we think in order to be better prepared to make choices in life, even if we make choices that prove to be wrong:

To threaten man with persecution unless he submits to a life in which he exercises no choices of his goals; to block before him every door but one, no matter how noble the prospect upon which it opens, or how benevolent the motives of those who arrange this, is to sin against the truth that he is a man, a being with a life of his own to live. This is liberty as it has been conceived by liberals in the modern world from the days of Erasmus (some would say of Occam) to our own.

(Berlin, 2008, p. 174–5)

When freedom is the leading value in the cultural sphere, including invention and innovation, it will expand the possibilities of humanity also in the political-legal and economic spheres. However, if freedom in the sense of the ‘free market’¹³ becomes leading in economic life, the result is not freedom but standardisation and the elimination of choice resulting, ultimately, in a narrowing down of human nature itself. As ‘human objectives [are] artificially made narrower and smaller and the majority of men [are] being concerted ... into mere “industrious sheep”’ (Berlin, 2008, p. 228), an artificial rationality comes to prevail that has no eye for how the economy holds society together, and no imaginative grasp of how, in the economy, every individual in fact works for everyone else in two ways: by providing the goods that people need, and by generating the capital that in turn supports the further growth of ideas and competences.

Such views come close to Aristotle who, as explained by Skidelsky (2009) and Skidelsky and Skidelsky (2012), is also the root of Keynes’s defence of the ‘real values of life’. The Aristotelian concepts of *telos* and character involve freedom in cultural life and commitment (instead of satisfaction of insatiable desires; Pack, 1985, 2008) in economic life. For Aristotle (in perhaps the first written statement of the essence of economics in his *Politics*), the νόμος (*nomos*, law or principle) of the management of the οἶκος (*oikos*, household) is responsibility or commitment, not freedom; it is the responsibility of the manager of the household to ensure a sufficient material basis for all members of the household that will enable them to carry out their tasks in life. The traditional German and Dutch words for economics, ‘Wirtschaft’ and ‘(staat)huishoudkunde’ respectively, as also the English word ‘husbandry’, remind of this responsibility or commitment that is essential to Aristotle’s economics.

If commitment to the material needs of all members of the household (whether a family, a town or the world economy) were accepted as the leading value in economic life, and freedom as the central value in cultural life, capital could be consciously allocated to these two purposes rather than be left to the mechanical pursuit of desire. Such conscious choice would be supported by laws, rights and regulation that permit capital to flow towards ends that are

deemed responsible in the sense of being in agreement with the essence of human nature and the purpose of human life.

Obviously, individuals will not necessarily agree regarding which solutions and which ends are responsible. Therefore, as an aid in the process of judging whether a particular use of capital is, or is not, responsible, the individual will need guidelines for making judgements. In the next section, we give a first sketch of an approach for judging the responsibility of research and innovation grounded in Aristotle's notion of the 'golden mean'.

9.5 Towards a suitable theoretical foundation for responsibility

Let us start by a small detour of a seemingly abstract nature (it will turn out not to be abstract at all) before returning to the pressing question of how we could judge the (ir)responsibility of possible innovations. We ask, again, what choice is. Generally speaking, a choice is an answer to the question *What should I do?* It is a practical judgment to the effect that *A* (for example, choosing a doctor, selecting a school for one's children, studying a particular problem, making coffee, automating a task) is *to be done*. According to the egocentric utilitarian view underlying neoclassical economics, individual choice is guided by desire. Now, there is a peculiar paradox in this idea, which it is worth describing here.

The thought is that I should do whatever best satisfies my desires (or has the highest likelihood of doing so). A simple reflection on the nature of choice-guided action shows that this cannot be right: actions take more or less time (as our examples indicate), and desires are subject to change. So what is judged as to be done *now* may well be different from what is judged as to be done *later*: my desires may have changed in the meantime. Thus *no* judgment to the effect that *A* is to be done can be formed on the basis of *current* desire, if *A* extends over time (as all action does). For what my current desire happens to be implies nothing at all about what my desire will be on any of the future moments over which *A* is supposed to extend (see Rödl, 2007, Chapter 2, and Gersbach, 2016). Desire cannot be the principle of choice, because desires come and go.

Now, the utilitarian solution to this paradox implicit in current economic thinking is this: capital is *always* desirable, because it can *always* be employed in such a way as to deliver whatever we desire; therefore we should *always* desire that our capital be increased. Hence the principle that companies should always maximise shareholder value. Now, conventionally, the purpose of capital is to enable producers to meet the demand for goods. In contemporary society, however, as a result of various factors,¹⁴ capital is loosening itself from the economy (the production of goods). It starts leading a life of its own, and in doing so, it starts interfering with choice even on the utilitarian understanding of it. It does so by transforming anything that can be used for generating financial returns into a means of preserving and multiplying itself – including research and innovation. Consequently, choices such as those made in raising one's child, seeing a doctor, or appealing in court, are increasingly limited by conditions set by capital in search of returns.¹⁵

On the whole, then, the utilitarian desire-based understanding of choice is unstable. In the individual case, it is subject to changing desires, while at the macroeconomic level it becomes increasingly questionable whether desire (of consumers) can be met by desire (of owners of capital). It is high time to turn to a more satisfactory understanding of choice, difficult though that may be, given that we have grown accustomed to the utilitarian desire-based principle both in theory and in practice.

Aristotle's conception of choice is radically different on precisely the points that make the utilitarian understanding problematic: in particular, it is *not* desire-based, and it does *not* involve maximisation. Aristotle holds that the principle of choice is the end, the *telos*, of human life – that is, the principle of choice is *eudaimonia*, the 'good life'. Since this is a temporally general notion, it does not 'come and go', as desires do. That does not mean that it will always give the same answer to the practical question *what should I do?*, for the good life consists of a rich and varied array of more specific elements, such as health, justice, courage and generosity.¹⁶ Among these are the *virtues*: the points on which human beings strive for excellence. Now, as Aristotle famously showed, those virtues (and the elements of the good life generally) do not take the form of maximisations but rather of a 'golden mean' (cf. Aristotle, 2000, *Nicomachean Ethics* II.9): being courageous, for instance, is being able to strike the right balance between rashness and cowardice – which may be a different balance in different situations. Likewise, being just towards elderly people in a nursing home includes finding the right balance between, on the one hand, adopting innovations that replace human interaction, and, on the other hand, making sure that there is human interaction in every aspect of their lives. And, again, the right balance may be different depending on the specific circumstances, the specific people involved, etc.

As these examples indicate, it is essential to choice that it aims at a situation-specific judgment. Thus choice, practical reasoning, moves from the general, all-encompassing notion of *eudaimonia* downwards to a particular action, through a series of specifications. Suppose I walk down the street through the rain. Why? Because I am returning this book to my colleague. Why? Because I promised him I would return it today. Keeping promises is a form of justice, and justice is an aspect of *eudaimonia*. Reading this description backwards reveals that my action is indeed a manifestation of *eudaimonia*: it specifies the relevant aspect (justice), and determines what the correct mean is in this situation. To illustrate: not returning the book because of the rain could have been a wrong estimation of the mean, as it would have resulted in my colleague's getting 'less than he deserves', while sacrificing my health for returning this book by exposing myself to hours of cold and rainy weather could have been a wrong estimation in the other direction, as it would have resulted in my colleague's getting 'more than he deserves'.¹⁷ Or, to return to our health care-related example, deciding to replace the largest part of human contact in health care for the elderly by 'social robots' may well amount to elderly individuals getting less human interaction than they deserve (even if they do not complain

about it), while, for example, refusing to allow for electronic wheelchairs, thus requiring nurses to push people about all the time while denying the latter autonomy in their movements, may be overdoing it in the other direction. (The virtue involved here is an aspect of justice: justice insofar as social relations and interactions are concerned. One could call this ‘sociality’.)

What transpires from the above is that, as Aristotle indeed observed, one needs to have *all* virtues in order to have *any* of them (Aristotle, 2000, *Nicomachean Ethics* VI.13) – or, to be more precise, one needs the *unity* of all virtues in order to have any of them. Staying home for the sake of health may be the right thing to do despite my promise, yet from the perspective of justice *in isolation* this conclusion is not reachable: justice appears to dictate returning the book *whatever the circumstances*. Likewise, replacing pushed wheelchairs by electric ones may be the right thing to do despite its leading to a reduction in human interaction, yet from the perspective of sociality *in isolation* this conclusion is not reachable. Hence justice, sociality, etc., are virtues only in their relations to all of the other virtues.¹⁸

Thus, choice cannot be mechanical for at least two reasons: determining which virtue to act upon *and* determining the right mean for that virtue in the case at hand are both non-mechanical (indeed, non-programmable) kinds of determination. Realising *eudaimonia* is, therefore, a very open-ended matter: the particular articulation of skills and practical and intellectual virtues that you or I are aiming for may differ greatly, depending on the various talents and capabilities each of us has, the circumstances we find ourselves in, and the choices we individually make and have made in the past.

Now, apart from this diversity that is inherent in the unity of the good life, one may be simply wrong about what *eudaimonia* includes. The elevation of the pursuit of self-interest to the status of guiding principle for economic activity, for example, can be considered an unduly restrictive case of the Aristotelian view. – In the worst case, misunderstanding *eudaimonia* may take the shape of ‘Evil, be thou my Good’: it takes what is in fact ‘evil’ (in the sense of not being in accord with *eudaimonia*) and elevates it to the status of *eudaimonia* itself. This shows that the ‘intellectual virtues’ are indeed crucial: without a proper development of one’s capacity for theoretical and practical thought it is impossible to achieve virtue. The good life is always *known* to be the good life, virtuous action is always *known* to be virtuous.

Having thus concluded our excursus into the nature of choice and its relationship to the end of human life, to *eudaimonia*, let us return to our pressing question. How does this help us with regard to decisions concerning the allocation of capital to research and innovation? Well, it is not difficult to see that the question about *responsible* innovation is one about a golden mean of sorts. For example, regarding capital and innovation, the challenge would be to find the right mean between using capital to expand the material basis of life (consumption) and using it to enable people (by funding them¹⁹) to co-shape non-material aspects of life in cultural, political-legal and economic realms, including innovation. Regarding the speed and direction of technological progress, responsible choice would involve finding

the golden mean between *technophobia*²⁰ and *technophilia*,²¹ between irrationally opposing and unreflectively embracing all technology-driven alterations of our human situation.²² What should guide us in estimating this mean is, as explained above, our conception of the good life, and in particular our understanding of what the intellectual virtues require. What are the circumstances under which human beings can flourish, under which the development of each individual realisation of the good life is furthered? And what does this imply for, for example, the education of our children and our youth, for the way working life takes shape in this or that area or profession? These are difficult questions, of course, and we cannot postpone our decisions about innovation until we have adequately answered every last one of them. That, however, is no excuse for letting the ‘correct’ mean between material and non-material dimensions of life, or between *technophobia* and *technophilia*, be determined by the imperative of shareholder value maximisation, as is now effectively done. Rather, we should again heed Aristotle’s advice: one acquires the virtue of courage by repeatedly taking courageous actions (however imperfect these may be at first); likewise, we may acquire a skill for responsible innovation by repeatedly innovating responsibly.

All of this stands or falls, of course, with the availability of a choice in these matters in the first place. Do we allow ourselves the intellectual space to think through the mentioned questions? Is there room for actually choosing according to our best insight within the current societal and economic set-up? There is freedom, in the Aristotelian sense we advocate, only if these two questions receive an affirmative answer. Only then can there be any question of taking steps towards *responsible innovation*.

Freedom in choosing the direction of technological change may lead to a better understanding of where technology is appropriate and where it is not, and to a different degree and use of technology in different spheres, that is, to *sphere-appropriate technology*. An understanding of economic life that looks beyond the norms of one-dimensional utilitarianism, and manages to position the economic realm within a broader understanding of the good life, will have room for such considerations. Moreover, it will provide individuals with the intellectual power required to implement the conclusions arrived at in economic practice. That is to say, it will place individuals in a position to implement technological innovations to the extent that they are indeed in line with further cultural development, along with the possibility for all human beings involved to live well.

9.6 Conclusion

Responsibility in research and innovation presupposes the possibility of choice. Freedom to choose in research and innovation is an instance of freedom in cultural life, which we have associated with the essence of humankind, the source of all progress. However, the behavioural foundation of today’s mainstream economics does not permit choices in research and innovation other than those that maximise profits or shareholder value. Freedom to choose in cultural life becomes a possibility only if commitment to such freedom becomes the leading principle in

economic life, in particular in the allocation of capital. As an aid in the process of judging whether a particular use of capital is responsible, the individual will need guidelines for making judgements. We gave a first sketch of an approach for judging the responsibility of research and innovation based on Aristotelian freedom and grounded in Aristotle's notion of the 'golden mean'.

Notes

- 1 In the sense of purpose.
- 2 The European Union research programme Horizon 2020 identifies six Grand Challenges: (1) health, demographic change and wellbeing; (2) food security, sustainable agriculture, marine and maritime research and the bio-economy; (3) secure, clean and efficient energy; (4) smart, green and integrated transport; (5) climate action, resource efficiency and raw materials; and (6) inclusive, innovative and secure societies.
- 3 European Commission (2013).
- 4 Especially a 'larger and more powerful manufacturing engine' (European Commission, 2013).
- 5 E.g. through removal of 'financial market imperfections' (European Commission, 2014).
- 6 Interestingly, Effective Altruists' decision-making regarding which causes to fund (the calculations of where a dollar is best spent) are built on the same utilitarian calculus.
- 7 Understood as the production and delivery of goods.
- 8 A literature that links back to Aristotle and John Stuart Mill and resounds also in Alfred Marshall (1890) when he speaks of man's 'higher nature', 'high ideals' and 'noble emulation' in business.
- 9 On average, not for everyone; arguably, this is due to the same drive that propels the accumulation of capital.
- 10 According to the index to *An Inquiry into the Nature and Causes of the Wealth of Nations*, Smith refers to an 'invisible hand' in only one place, almost in passing, where he describes the decision to be made by the entrepreneur to allocate capital to domestic or foreign industry (in Volume One, Book IV, Chapter II).
- 11 Scarcity of capital is the assumption that justifies the priority given in neoclassical theory to capital accumulation.
- 12 Benjamin Constant, *Principes de politique*, chapter 1.
- 13 Freedom from constraints on the pursuit of self-interest.
- 14 Such as demand saturation, lack of purchasing power, and productivity growth, as explained above.
- 15 The profit maximisation motive can lead to a confinement of choice also in the economic sphere itself (for example, one may wonder whether phenomena such as fashion, advertising, 'planned obsolescence' or a 'lean and mean' type of efficiency serve the consumer or the profit-maximising owner of capital); but the matter becomes more serious when choice in the cultural and political-judicial sphere is restricted.
- 16 One can also include more specific, less 'profound' principles of action in this list. For instance, looking after your belongings, being well-informed – even Arthur Prior's 'a man has to relax sometimes' (Prior, 1968, p. 72): they all make sense only against the background of a full conception of 'the good life', of *eudaimonia*.
- 17 Talking in terms of 'more' and 'less' here is somewhat artificial. That is because, in the case of justice, things are more complex than our example suggests. We cannot, however, go into such details here.
- 18 As Anscombe (1993, p. 153) writes, 'helping your neighbours *is* doing well [i.e., *eudaimonia*], but killing someone for them is not helping them.' This illustrates the

- way in which the elements of the human *telos* are interdependent. See also Rödl (2007) and Wiggins (2009).
- 19 Without expecting (immediate) financial returns.
 - 20 E.g. Sale (1995), Kaczynski (2010).
 - 21 E.g. Kurzweil (2006, 2012).
 - 22 It is true that this improperly extends the examples given before. We are lumping together, to some extent, the individual's choice – the question of what is to be done – and the question of what our society should look like. Again, here we do not have the space to elaborate on this issue. Suffice it to say that these are, at least, obviously connected issues.

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